A COMPARATIVE AND LONGITUDINAL ANALYSIS OF THE EVOLVING RELATIONSHIP BETWEEN THE ENVIRONMENT AND THE STRATEGY, STRUCTURE AND PERFORMANCE OF SELECTED ORGANISATIONS IN THE BRITISH CARPET INDUSTRY 1959-1986: A FIRMS IN SECTOR PERSPECTIVE OF ORGANISATIONAL ADAPTATION

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SUMMARY

Orthodox contingency theory links effective organisational performance to compatible relationships between the environment and organisation strategy and structure and assumes that organisations have the capacity to adapt as the environment changes. Recent contributions to the literature on organisation theory claim that the key to effective performance is effective adaptation which in turn requires the simultaneous reconciliation of efficiency and innovation which is afforded by an unique environment-organisation configuration.

The literature on organisation theory recognises the continuing confusion caused by the fragmented and often conflicting results from cross-sectional studies. Although the case is made for longitudinal studies which comprehensively describe the evolving relationship between the environment and the organisation there is little to suggest how such studies should be executed in practice. Typically the choice is between the approaches of the historicised case study and statistical analysis of large populations which examine the relationship between environment and organisation strategy and/or structure and ignore the product-process relationship.

This study combines the historicised case study and the multi-variable and ordinal scale approach of statistical analysis to construct an analytical framework which tracks and exposes the environment - organisation - performance relationship over time. The framework examines changes in the environment, strategy and structure and uniquely includes an assessment of the organisation's product - process relationship and its contribution to organisational efficiency and innovation.

The analytical framework is applied to examine the evolving environment - organisation relationship of two organisations in the same industry over the same twenty-five year period to provide a sector perspective of organisational adaptation. The findings demonstrate the significance of the environment - organisation configuration to the scope and frequency of adaptation and suggest that the level of sector homogeneity may be linked to the level of product-process standardisation.

ORGANISATIONAL ADAPTATION - A SECTOR PERSPECTIVE

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PART ONE: POINTS OF DEPARTURE

CHAPTER 1. INTRODUCTION

There is an extensive literature on the relationship between organisation strategy and structure and between structure and environment. Chandler[1] and Channon[2] have shown how a strategy of product-market diversification leads to a divisionalised organisation form: how increased heterogeneity in the market leads to decentralised decision-making and the development of more sophisticated control and co-ordinating systems. The links between structure and environment have been documented in the works by Burns & Stalker[3] and Lawrence & Lorsch[4] and others.

The perspective of synthesis in organisation theory (Miller & Mintzberg)[5] argues that many of the relationships between the various elements of organisation identified in the contingency perspective tend to cluster to produce relatively distinct overall configurations which are internally cohesive and appropriate to particular contexts.

Although both contingency and configuration studies seek to explain the relationship between the organisation and its environment, the former assumes the same relationships exist among variables in different types of organisation, whereas the configuration approach holds that relationships among variables differ among different types of configurations. A crucial theme of both approaches, however, is that organisational performance is greatly influenced by the match between environment, strategy and structure (Rumelt[6]; Miles & Snow[7]; Hambrick[8]; Miller & Friesen[9]).

Two recent contributions to the literature on organisation theory qualify the criteria for effective organisational performance and argue that such performance requires the organisation to achieve effective outcomes in both efficiency and innovation.

Thus Lawrence & Dyer[10] claim that only a Readaptive environment - organisation configuration is capable of sustaining both efficiency and innovation and, therefore, effective performance in the long term. Abernathy[11] demonstrates that efficiency and innovation are both outcomes of the organisation's product-process strategy which must ensure a balanced commitment to both efficiency and innovation to achieve effective performance in the long term.

Embedded in both contingency and configuration approaches is the expectation that as the environment changes the organisation adapts to accommodate the 'best fit' characteristics of the new environment - organisation relationship and, as Whipp & Clark[12] note, there is an underlying assumption that organisations have the capacity to encode incoming information, construct a design blueprint of the most appropriate form of organisation and shape the organisation accordingly. Miles & Snow's[13] typology of the adaptive process demonstrates adaptation in terms of the organisation's solutions to the three major problems informing the Adaptive Cycle through which the organisation seeks to maintain internal consistency even in the process of adjusting to maintain an effective alignment with the environment. Lawrence & Dyer[14] claim that the pattern of adaptation is linked to the environment - organisation relationship and that the effectiveness of the adaptation process is linked to certain structural characteristics and the presence of certain human resource practices. It is because the Readaptive configuration is shown to have a superior adaptive capability that Lawrence & Dyer claim[15] this configuration to be the only effective solution to effective performance in the long term.

The orthodox contingency and configuration approaches then link effective performance to compatible relationships beween the environment, strategy and structure. The revised model links effective performance to a Readaptive environment - organisation relationship which emphasises both efficiency and innovation and which, in turn, ensures effective adaptive behaviour. Clearly the revised model reintroduces a universalist approach to organisation design for effective performance but links this design to a particular strategy and to a particular environment.

In their review of the literature on the contingency and configuration approaches in organisation theory Miller & Friesen[16] conclude that much of the fault for the fragmented and often conflicting results lies in the central research approach which encourages minor modifications to atomistic hypotheses concerning simple relationships among small sets of variables and argue that organisations are too complex to be understood within so narrow a perspective.

Miller & Friesen[17] claim that it is only by examining state, process and situation simultaneously, and preferably as they evolve over time, that meaningful insights are gained into understanding environment - organisation relationships and organisational adaptation.

This holistic and longitudinal perspective is supported by other researchers including, for example, McKelvey[18] and Lawrence & Dyer[19]. Both Miller & Friesen[20] and Lawrence & Dyer[21] adopt a holistic and longitudinal perspective in generating a taxonomy of quantum organisation states and a typology of organisational adaptation respectively. Questions with regard to environment - organisation relationships and organisational adaptation, however, remain unanswered, notably with regard to the influence of technology, the configuration and adaptive behaviour of organisations in the same industry and the adaptive capability of mature organisations in mature industries. Thus Lawrence & Dyer[22] claim that because of the mediating influence of core technology organisations in the same industry are likely to be exposed to similar environments and similar organisational characteristics, whereas Miller & Friesen[23] ignore the influence of technology and argue that there are probably a number of different paths to success in the same environment, and following Child[24], thus much latitude for managers to choose their strategies and structures and even environments. Lawrence & Dyer[25] show that mature organisations in mature industries have difficulty in adapting to changes in their environments and call for further research to explain the phenomenon of the long-term survival of some such organisations and industries.

The confusion in the claims made arises in part from the wide sample of organisations and industries covered by researchers which, as McKelvey[26] notes, is presumably in the belief that the results will be generalisable to a broader and possibly more meaningful population, but in effect is akin to a biologist making a broad statement about heartbeat rates based on a sample of one elephant, one tiger, one rabbit and an alligator. Similarly Holdaway[27] referring to Pugh[28] criticises the width of a sample which includes a large tyre manufacturer and a public baths in Birmingham. McKelvey[29] thus argues for more narrowly defined, more adequately described, and more universally recognised organisational populations so as to improve the definitiveness of the findings and the applicability of the results to the populations.

Such a focused population approach is supported by the Work Organisation Research Centre at Aston University which seeks to address problems of industrial competitiveness by stimulating inquiry into the behaviour of firms within their sectors, namely the population of firms which provide similar goods and services. This firm in sector perspective is demonstrated by Child & Smith[30] and Whipp & Clark[31] in their case studies of organisational transformation at Cadburys and a major product-process innovation at Rover respectively.

Child & Smith[32] seek to examine the processes whereby a firm has passed through major changes, locating historically salient structural forms and transitions between these in relation to the sector as a relevant context. The study characterises the sector in terms of objective conditions, cognitive arenas and collaborative networks and provides a descriptive account of how these three elements at environment and enterprise level influenced the managerial processes informing Cadbury's transformation from the UK model of chocolate manufacture to the American 'Mars' model. The study concludes[33] that it is possible to distinguish objective sector phenomena which are relevant to understanding the behaviour of firms and more specifically the conditions under which they experience transformation, and that there was a co-existence of strategic models within the chocolate confectionery sector which persisted until new competitive conditions emerged to force Cadburys to shift towards the 'Mars' model.

The study does not locate the two strategic models within any particular environmental attributes in terms of the chosen characteristics and it is not demonstrated whether the two organisations were operating in the same environment and had adopted two different competitive responses to this environment and the Mars model emerged as the 'best fit' model which Cadburys was forced to adopt, or whether the two organisations were operating in different environments and that Cadburys poor performance in one environment stimulated the enactment of the same environment as Mars. In this way the competition for large retailer custom (the objective sector criteria identified) can be argued to be the result rather than the cause of the shift to the 'Mars' model. While the study identifies useful concepts for examining managerial processes informing strategy formation and implementation at the level of the firm, because no attempt is made to locate either the concepts or the exposed processes within the organisation - environment nexus it is not possible to explain Cadbury's competitive strategy and managerial processes in terms of the organisation's relationship with its environment. In terms of a firm in sector perspective, therefore, the study fails to expose the nature of the sector in terms of its environmental characteristics and fails to locate the focal organisation within its selected environment within this sector.

Whipp & Clark[34] also use a firm in sector perspective to examine the innovation-design capability at British Leyland's Rover subsidiary. Their analytical model uses some aspects of Abernathy's productive-unit concept to descriptively track the SD1 innovation from its conception to implementation and to expose the internal and external factors influencing the intended and actual outcomes of this innovation. Rover's innovation-design productive unit is located in both its historical and current contexts and comparisons are made with approaches to major product-process innovations in the European and American car industries. The study affords an instructive insight into the management of a major product-process innovation but no attempt is made to locate Rover's adaptive experience within any codification of product, process, environment or structure at either enterprise or sector level so that both the historical and comparative cases are only loosely connected to the SD1 experience. Abernathy himself notes[35] that the pattern of adaptation at each stage of a productive-unit's development is likely to be very different so that Whipp & Clark's failure to identify the stage of product-process development undermines the usefulness of the information generated in developing a processual model of adaptation at the level of the productive unit. Whipp & Clark nevertheless identify[36] the strengths of an historical and comparative dimension in organisation studies and their analytical framework provides a useful step forward in capturing the relationship between the environment - organisation relationship over time.

In terms of a firm in sector perspective, the Whipp & Clark model[37] provides a useful framework for tracking changes at the level of the focal and comparative productive units in the contexts of their respective organisations and sector. In application, however, the study fails to identify the level of product-process progression in the selected productive units within the context of their member oganisations' forms and strategies so that it is not possible to identify the exent to which the comparisons made are of similar or dis-similar states. The study also fails to identify the extent to which the selected organisations are operating in similar or dis-similar environments so that it is not possible to explain the identified competitive strategies and processes in the context of the organisation's relationship with its environment.

Thus while the holistic and longitudinal perspective in organisation studies is advocated the execution of this approach remains difficult to achieve in practice, particularly with regard to the choice of historicised case studies or statistical analysis of large populations as demonstrated in the approaches adopted by Lawrence & Dyer[38] and Miller & Friesen[39] respectively. One way forward is offered by combining the strengths of both historicised case study and statistical analysis methodologies to examine firms within the same sector.

This study then aims to refine certain features of the firm in sector perspective espoused by Whipp & Clark[40] and Child & Smith[41] by constructing an analytical framework which provides for an historical, comparative and longitudinal examination of the organisation - environment relationship. The study has three distinctive features. Firstly, the study combines the approach of the historicised case study with the multi-variable and ordinal scale approach of statistical analysis to construct a framework to examine organisation state, process and situation both longitudinally and comparatively. Secondly, the framework profiles the organisation's product - process strategy to identify the influence of core technology on organisational efficiency and innovation and thirdly, the framework is applied to examine two mature organisations in the same mature industry over the same twenty-five year period and constructs the structured business histories of these two organisations. The findings with regard to organisation configurations and the potential of these configurations for efficiency and innovation are then compared with the claims made by the theoretical models informing the study.

The next section examines the Lawrence & Dyer[42] and Abernathy[43] models in more detail before using the concepts in these two studies to construct the analytical framework which will be used to examine two organisations in the British carpet industry over the period 1959 -1986.

CHAPTER 2: THEORETICAL MODELS INFORMING THE STUDY

2.1. Lawrence & Dyer [1]

Summary of the Lawrence & Dyer study

Lawrence & Dyer aim to explain why so many American firms fail, in their maturity, to maintain competitive vitality. Their Analytic Framework of Adapation[2] is used to construct an historical overview of the way key American organisations and industries have, in fact, adapted to changing conditions. Their model demonstrates the interaction between environment and organisation in achieving effective organisational performance and concludes[3] that while certain environment-organisation configurations result in acceptable performance in terms of either efficiency or innovation, such configurations inhibit successful adaptation in the long term. Only an environment offering intermediate levels of uncertainty together with a Readaptive organisation form is capable of sustaining efficiency and innovation simultaneously thus providing the capability for ongoing adaptation or Readaptation.

Section (i) describes this study in more detail and section (ii) identifies some of the issues raised by this study and suggests ways of clarifying these issues

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2.1(i) The Analytical Framework of Adaptation

Lawrence & Dyer[4] attempt to synthesise two major interrelated controversies in the field of organisation theory - namely the question of whether organisations are driven by environmental forces or by managerial choice, and the question of whether organisation forms depend on resource availability or on information uncertainty. It is argued that adaptation is the concept which resolves these controversies and links the information uncertainty/resource availability approaches to organisation form.

Adaptation, or more correctly Mutual Adaptation[5], is a distinctive feature of the Lawrence & Dyer approach which, through their Analytical Framework of Adaptation, examines both external and internal conditions to show how they interact to effect mutual adaptation between the environment and the organisation.

The environment is described[6] in terms of two dimensions, Information Complexity (IC) and Resource Scarcity (RS), and these two dimensions are used to construct a nine-cell matrix of environmental areas. The organisation typologies of Mintzberg[7] and Miles & Snow[8] are then associated with these areas to demonstrate typical environment - organisation form relationships[9]. A new Readaptive organisation form is identified and is associated with Area 5 of the matrix[10].

Depending on the environmental area occupied, organisations are expected to emphasise adaptation in terms of efficiency or innovation. Such environment - organisation relationships, while adequate to ensure acceptable performance under existing environmental conditions, is expected to limit the organisation's ability to adapt to significant environmental changes thus impairing the organisation's survival in the longer term. It is claimed[11] that only the Readaptive organisation form/Area 5 configuration is capable of sustaining efficiency and innovation simultaneously. Readaptation[12] is a key concept of the Lawrence & Dyer model and is defined as organisational performance that is simultaneously highly efficient and highly innovative.

The environmental impact on readaptation is claimed[13] to be a function of two different kinds of environmental uncertainty - namely, uncertainty concerning resources and uncertainty concerning information. High levels of uncertainty in either or both of these domains makes organisation survival difficult, whereas certainty in either or both of the domains induces complacency in the organisation. It is argued that only the intermediate levels of environmental uncertainty in both domains afforded by Area 5 of the matrix provides an environment which stimulates the simultaneous potential for both efficiency and innovation.

It is claimed[14] that strategy is the process linking the organisation's internal arrangements to its treatment of the environment. Strategy is defined as the pattern of decisions in a company that determines and reveals its objectives, purposes, or goals; produces the principle policies and plans for achieving those goals, and defines the nature of the business the organisation is to pursue, the kind of economic and human organisation it is or intends to be and the nature of the economic and non-economic contributions it intends to make to its stakeholders. It is recognised[15] that a strategy embracing both efficiency and innovation is difficult to reconcile but that such a reconciliation is nevertheless critical to achieving a readaptive state. This tension between the simultaneous achievement of both efficiency and innovation is often manifested in a struggle between long and short term policies and, in terms of organisation design, between the looseness necessary for creativity and innovation, and the more rigid structures necessary for achieving efficiency.

Lawrence & Dyer argue[16] that if organisations are to be efficient production systems they must also be innovative learning systems. In the final analysis, however, it is the members of the organisation who need to learn for the organisation to be innovative and who need to strive for the organisation to be efficient. Thus, while perceptions of the environment may induce top managers to learn and strive, other members of the organisation remain unaffected unless internal organisation arrangements disseminate the influence of intermediate levels of IC/RS to all levels within the organisation[17]. The Readaptive process depends on all members of the organisation being made aware of the broad purpose, ethical standards and operating principles of the firm with emphasis given throughout to the value of both efficiency and innovation.

To achieve membership commitment, Lawrence & Dyer claim[18] that organisations must provide a balanced use of three kinds of human resource practices (market mechanisms, bureaucratic mechanisms and clan mechanisms) which help to integrate the individual with the organisation. In addition, if employees are to be involved in the process of readapation.

the organisation's power systems[19] must be relatively evenly balanced both vertically and horizontally.

Structure in the Lawrence & Dyer model follows the Lawrence & Lorsch[20] model in that the basic structure must reflect the levels of differentiation and integration necessary to complement environmental uncertainty. In this way, as IC increases, organisations must, within the limits of their resources, employ new kinds of specialists if they are to learn and innovate. This is the process of organisation differentiation[21]. As RS increases, organisations must increase the number of mechanisms available for coordinating their activities if they are to be efficient, up to the point when resource scarcity itself acts as a constraint on this activity. This is the process of integration[22]. Since the organisation fosters innovation through differentiation and efficiency through integration, Lawrence & Dyer claim[23] that within a given firm, readaptation will be most likely to be achieved when both differentiation and integration are at high levels.

In summary then, the Lawrence & Dyer model provides a two-dimensional framework for analysing the environment. The environment is presented as a matrix of nine areas and, drawing on previous studies, the model identifies organisation forms and strategies that are consistent with each of these areas. A new Readaptive organisation form is also identified and associated with Area 5 of the matrix and it is claimed that only this environment - organisation configuration is capable of sustaining efficiency and innovation simultaneously.

2.1(ii) Issues arising from the Lawrence & Dyer model

(a) Efficiency and innovation

Efficiency and innovation are key aspects of Lawrence & Dyer's model of adaptation and the potential for both these outcomes is related to levels of environmental uncertainty.

Lawrence & Dyer argue [24] that there can be either too much or too little IC to induce innovation and too much or too little RS to induce efficiency. When IC is very low, there is little external stimulus and variety to stir up the cognitive processes behind organisation learning and innovation. When IC is too high, information overload may inhibit innovation. Similarly, when RS is very low, organisations have little incentive to strive for efficiency while when RS is too high, resource starvation causes the neglect of even routine operations. Moreover, RS levels are expected to have an important secondary effect on the rate of innovation in that high RS is expected to depress the resources necessary for innovation. Both eficiency and innovation are claimed[25] to have an inverted 'U' relationship with RS and IC respectively and it is because these two outcomes are balanced at the intermediate levels of IC and RS that Area 5 is said to be particularly supportive of both these outcomes.

Lawrence & Dyer claim [26] that while other environmental areas support good results in just either efficiency or innovation, the special form of adaptation, readaptation, is most likely to occur in Area 5 and that this relationship between the organisation and the environment is the governing dynamic central to readaptation[27].

Lawrence & Dyer note [28] that notwithstanding their claim that readaptation is most likely in Area 5, some organisations in other areas do survive in the long term. Various explanations[29] are offered for this phenomenon, including, for example, that for some historical reasons some industrial sectors seem not to have yet evolved a single readaptive firm that puts severe competitive pressure on its rivals. However, none of these explanations suggest that efficiency and innovation can be reconciled in these other environmental areas.

The Lawrence and Dyer model of innovation [30] discusses innovation in terms of quantity and does not distinguish different patterns of innovation. If, however, as Abernathy [31] claims, different patterns of innovation are asociated with different levels of product-process certainty, then the potential for innovation may exist at all levels of IC.

Similarly, the Lawrence & Dyer model of efficiency [32] treats this outcome as a function of RS. If, as Abernathy claims[33], some patterns of innovation are associated with efficiency, then both efficiency and innovation would be functions of IC, and not RS and IC respectively. In this way the potential for reconciling efficiency and innovation would be supported by at least some of the other environmental areas and, if this is the case, may provide an explanation for the longterm survival of organisations in these other areas.

In the Lawrence & Dyer model the actual realisation of simultaneous efficiency and innovation is attributed [34] to the Readaptive organisation form which is characterised in terms of a strategy which emphasises efficiency and innovation, a highly differentiated and highly integrated structure and certain prescribed human resource practices.

While strategy clearly implies a consideration of the product-process characteristics, these characteristics are not explicated and the model thus fails to demonstrate the readaptive form in these terms. Similarly, product-process characterisation is omitted from the discussion of the other environment - organisation configurations.

This omission is significant in that following Abernathy [35] product-process considerations represent an important aspect of adaptive capability and is an area in which historical decisions may be expected to influence management's ability to respond to changing conditions in the short term.

The omission is also disappointing since Lawrence & Dyer use Miles & Snow's typology of strategic types [36] to demonstrate their own model and the Miles & Snow model [37] emphasises compatibility between all three elements of the adaptive cycle - namely, in the solutions to the entrepreneurial, administrative and engineering problems.

(b) The environment and related organisation forms

Lawrence & Dyer[38] describe the environment in terms of two dimensions - Information Complexity (IC) and Resource Scarcity (RS) - and use these two dimensions to construct a nine-cell matrix of environmental areas. The organisation typologies of Mintzberg[39] and Miles & Snow[40] are then related to eight of the nine environmental areas[41]. A new Readaptive organisation form is identified and is related to Area 5 of the matrix.

Lawrence & Dyer conclude[42] that firms in a given industry are expected to be clustered around the same IC level of the framework and it is noted that Miles & Snow's[43] study of organisations in four industries indicates that in some industries organisations may be widely dispersed across the framework. No explanation is given as to why this discrepancy exists and it is suggested that further longitudinal research is necessary to clarify the position.

In the Lawrence & Dyer model core technology is identified[44] as a major factor explaining the clustering of firms in the same industry around the same IC level. Lawrence & Dyer note[45] that it has proved difficult to find a typology of core technology that correlates strongly with organisation form and strategy. They demonstrate[46] how Thompson's[47] 3-fold system of technology can be linked to various levels of IC. Thus intensive or site-dispersed technologies are associated with high IC; long-linked or transforming technologies with the intermediate level of IC; and mediating or net-work technologies with low levels of IC. Woodward's[48] classification of batch, mass and process production systems is identified with long-linked or transforming techologies and is thus associated with the intermediate level of IC.

Lawrence & Dyer point out[49] that technological influences are not, however, to be treated as immutable forces but rather as predispositions that can be significantly modified by organisational choice of an appropriate strategy and form. An appropriate strategy and form is one that corresponds with its relevant environment and, depending on that environment, is expected[50] to emphasise either efficiency or innovation. Such environment - organisation relationships, while adequate to ensure acceptable performance under existing environmental conditions, is expected to limit the organisation's ability to respond to significant environmental changes[51]. It is claimed[52] that only the Readaptive/Area 5 configuration is capable of sustaining efficiency and innovation simultaneously, thus providing the capability for ongoing adaptation or readaptation.

Since Lawrence & Dyer clearly recognise that technological influences may be modified by organisation strategy and form and that strategy and form is related to the environment, it is reasonable to argue that different technological profiles may be observed in the different environment - organisation configurations. As previously noted, however, Lawrence & Dyer do not characterise this dimension of the organisation.

One way of resolving the discrepancy between the claims[53] made by Lawrence & Dyer and Miles & Snow regarding the environmental location of firms in the same industry is to study firms in the same industry. This study of two firms in the same industry using the same long-linked or transforming technology aims to profile the product-process system to show how core technology is modified by organisational strategy and structure.

In summary, this study uses the concepts informing Lawrence & Dyer's Analytical Framework of Adaptation to track the environment and the organisation form and strategy of the two focal organisations in the same industry over the same twenty-five year period. In addition, this study extends the Lawrence & Dyer model by including a profile of the product-process profiles of these two organisations and in this way the study records the changes in all three aspects of Miles & Snow's model of adaptation - that is the organisation's solutions to the entrepreneurial, engineering and administrative problems.

2.2. Abernathy [54]

Summary of the Abernathy Study

Abenathy's study, based on the Ford Motor Co.Ltd. in the USA, also examines the issues of efficiency and innovation and argues that these outcomes are related to the level of product-process standardisation.

Abernathy's distinctive unit of analysis, the productive unit[55], embraces both the product and its related processing system and demonstrates that the pattern and frequency of innovation and the emphasis given to efficiency changes as the product matures and as the processing system becomes more specifically identified with the product.

Abernathy argues[56] that the conditions supporting efficiency and innovation are very different and that both outcomes cannot be effectively pursued within a given productive unit.

Although a firm can, in theory, achieve both efficiency and innovation by managing a portfolio of productive units at different levels of development it is difficult, in practice, to manage several productive units that are in widely different stages of development. It is argued that organisations that are effective at managing productive units at one level of development are seldom effective at managing productive units at the extreme opposite level [57].

Abernathy challenges[58] the tradition that productivity is to be encouraged without restraint and his study shows that the complex mass production methods and sophisticated machinery in the US auto industry have resulted in high levels of product standardisation where, in the absence of differentiated products, price is the main competitive factor.

Abernathy argues[59] that some balance beween efficiency and innovation is necessary for effective performance in the long term and that great foresight is needed in directing technological investment if such a balance is to be achieved. In a competitive industry if competitive behaviour emphasises productivity gains and product - process standardisation is progressed to a level which inhibits flexibility, then competition is on the basis of price and the capacity to innovate is prejudiced.

Section (i) describes Abernathy's study in more detail and section (ii) identifies some of the issues raised by his study and suggests ways of clarifying these issues.

2.2(i) Productive Unit Characteristics and Behaviour

Abernathy[60] defines a productive unit as an integral production process that is located in one place under a common management to produce a particular product line and he points out that the important feature of this definition is that both product and process characteristics are considered jointly.

Abernathy shows[61] that in the early days of a product's development the pattern of innovation is radical and forms the basis of competition as manufacturers seek to establish market share. As the product matures and its characteristics become more standardised, the pattern of innovation becomes incremental and is often aimed at improving the efficiency of the product and/or its work processes.

Abernathy characterises a productive unit in terms of seven elements and demonstrates[62] how the dimensions of these elements change as the productive unit progresses from the early fluid state to a specific state as the product approaches standardisation. He notes[63] that although a certain degree of eveness among the major elements of the productive unit would be evident in the long run, the timing of progress is ragged and that until parallel advances in the elements are realised the full economic benefits of gains in efficiency cannot be realised. Until such parallel developments are achieved, however, the productive unit remains flexible in response to product innovation. What this means in effect is that until this stage is achieved product-line characteristics may move through a cycle of development and revert back to an earlier stage with comparative ease. Developments of equipment and changes in labour or management task characteristics, however, tend to be cumulative and persistent. Once these aspects are advanced reversals are less likely to occur and carry a correspondingly higher cost to achieve.

What Abernathy is arguing here[64] is that innovation of this latter type not only makes production processes more capital intensive and expensive but that they actually reduce barriers to entry into the industry since, by embodying management know-how, the critical knowledge for entry can be purchased as equipment.

Where innovations are broadly adopted in an industry they lead to the emergence of a dominant product design (ie a design meeting the needs of most market segments for that product) with the result that products are standardised and indistinguishable from competitor products and competition is then on the basis of price. A dominant design implies that not only are productive units at an equivalent stage of development even in competitor organisations, but that there is a technological mandate for product volume[65].

The important competitive implication here is that no firm sustains a competitive advantage through product innovation when all organisations have the same process capabilities and any firm can replicate the product innovations of a competitor. Under these conditions the incentive for significant product innovations is further weakened[66].

Abernathy's study then argues that there is a direct connection between the profile of the productive unit and patterns of innovation and efficiency. From a management point of view, the organisation is made up of a range of productive units which change over time. As more productive units become integrated into the overall manufacturing process, the cost of product change also increases. This means that the overall direction of innovation must be controlled to minimise the costs of change and to retain competitive advantages.

2.2(ii) Issues arising from Abernathy's study

(a) Organisation form

Abernathy's discussion of product and work process standardisation suggests that with the emergence of a dominant product there would be a high degree of consistency in the organisation form of the enterprises making up an industry. However, until a dominant product does emerge, organisations operating in the same industry may well display different organisation forms. Additionally, while the productive units themselves may be at similar stages of development throughout a given industry, the particular configuration or port folio of productive units making up the organisation would offer the potential for different organisaion forms emerging within the same industry [67].

Abernathy's study does not relate the product-process profile to organisation form - environment issues. It is reasonable to argue, following Miles & Snow[68] that there is likely to be such a relationship and clearly it would contribute to the clarification of the environment - organisation form - performance discussion if the product-process profile can be identified with particular organisation forms and environments.

(b) Eficiency and innovation

While Lawrence & Dyer argue that the potential for efficiency is linked to RS and the potential for innovation to IC, Abernathy's model[69] suggests that both these outcomes are a feature of the level of IC.

Abernathy distinguishes two patterns of innovation, radical and incremental[70]. Radical innovation is associated with high uncertainty and incremental innovation which is itself often associated with efficiency, with certainty. In Abernathy's model it is the degree of specificity in the product-process profile which determines the efficiency-innovation capability. This model of the efficiency-innovation relationship at least offers the potential for other forms of readaptation and may help to resolve the anomaly idenified by Lawrence & Dyer[71] as to why some mature organisations manage to survive long-term in non-Area 5 environments.

(c) Flexibility of labour and competitive behaviour

Abernathy's model notes[72] the higher ratio of labour in those production processes where flexibility is desirable in gaining competitive advantage. Besides describing task characteristics, however, the model offers little in the way of what labour practices support these task characteristics.

If, as Lawrence & Dyer claim[73] certain human resource practices are essential to effective competitive behaviour, then it is reasonable to argue that labour flexibility will be associated with the human resource practices identified by Lawrence & Dyer.

(d) Adaptation

Beyond noting[74] that the pattern and extent of change in a productive unit is likely to be different depending on the stage of productive unit development, Abernathy's model does not identify the environmental and organisational factors facilitating or inhibiting such change. If, as Lawrence & Dyer claim[75], the environment - organisation configuration determines the pattern of adaptation, then it is reasonable to argue that changes in the productive unit will also be influenced by these factors.

In summary, Abernathy's model provides a framework for tracking the changes in the product-process relationship over time. The degree of specificity in the product-process relationship is expected to influence the emphasis given to efficiency and innovation and the pattern of innovation. The emergence of a dominant product design is expected to be associated with high specificity in the product - process relationship when organisations in the same industry are expected to exhibit similar productive unit characteristics and compete on the basis of price.

2.3. Summary

This section has presented the main points of the Lawrence & Dyer and Abernathy models informing this study.

It was noted that the Lawrence & Dyer model of organisational adaptation demonstrates the relationship between the environment and organisational form and performance in terms of efficiency and innovation. It has been argued that the model demonstrates organisation form in terms of the organisation's solutions to the entrepreneurial and administrative problems but omits to identify the solution to the engineering problem and to note the effect of this solution on efficiency and innovation.

It was noted that Abernathy's model of a productive unit demonstrates that efficiency and innovation are functions of the level of product-process standardisation. It was argued that this model provides a framework for demonstrating the organisation's solution to the engineering problem and its contribution to organisational performance in terms of efficiency and innovation.

The next section identifies the concepts informing the Lawrence & Dyer and Abernathy models and constructs the analytical framework which will be used to identify the environment - strategy - structure relationship of two organisations in the same industry over the same twenty-five year period.

CHAPTER 3: A REVISED ANALYTICAL FRAMEWORK

A revised model combining and quantifying the descriptive Lawrence & Dyer[1] and Abernathy[2] models is constructed to provide a framework for analysing the environment and organisation and for tracking changes over time. This section identifies the main elements of the revised framework and discusses how these elements are expected to interact and influence environment - organisation relationships. Section 3.5 presents the instruments for operationalising the revised model.

The revised framework is derived from the basic Lawrence & Dyer model[3] which describes the environment and the expected organisation strategy and structure. The basic model is extended to include Abernathy's model[4] of a productive unit which describes the product-process relationship. The revised framework thus portrays the environment and, following Miles & Snow[5] the organisation's solution to the entrepreneurial, administrative, and engineering problems forming the Adaptive Cycle, and organisational performance in terms of efficiency and innovation.

Figure 1 presents a diagramatic interpretation of the revised analytical framework. The remainder of this section describes and discusses the elements of the framework and their expected behaviours.

Figure 1

REVISED ANALYTICAL FRAMEWORK OF ADAPTATION

ENVIRONMENT		ORGANISATION
1. Information Complexity	← →	1. Entrepreneurial Solution
2. Resource Scarcity		2. Administrative Solution
		3. Engineering Solution

E F F I C I E N C Y

I N N O V A T I O N

Source: Adapted from Lawrence & Dyer[6]

1

3.1. Environment

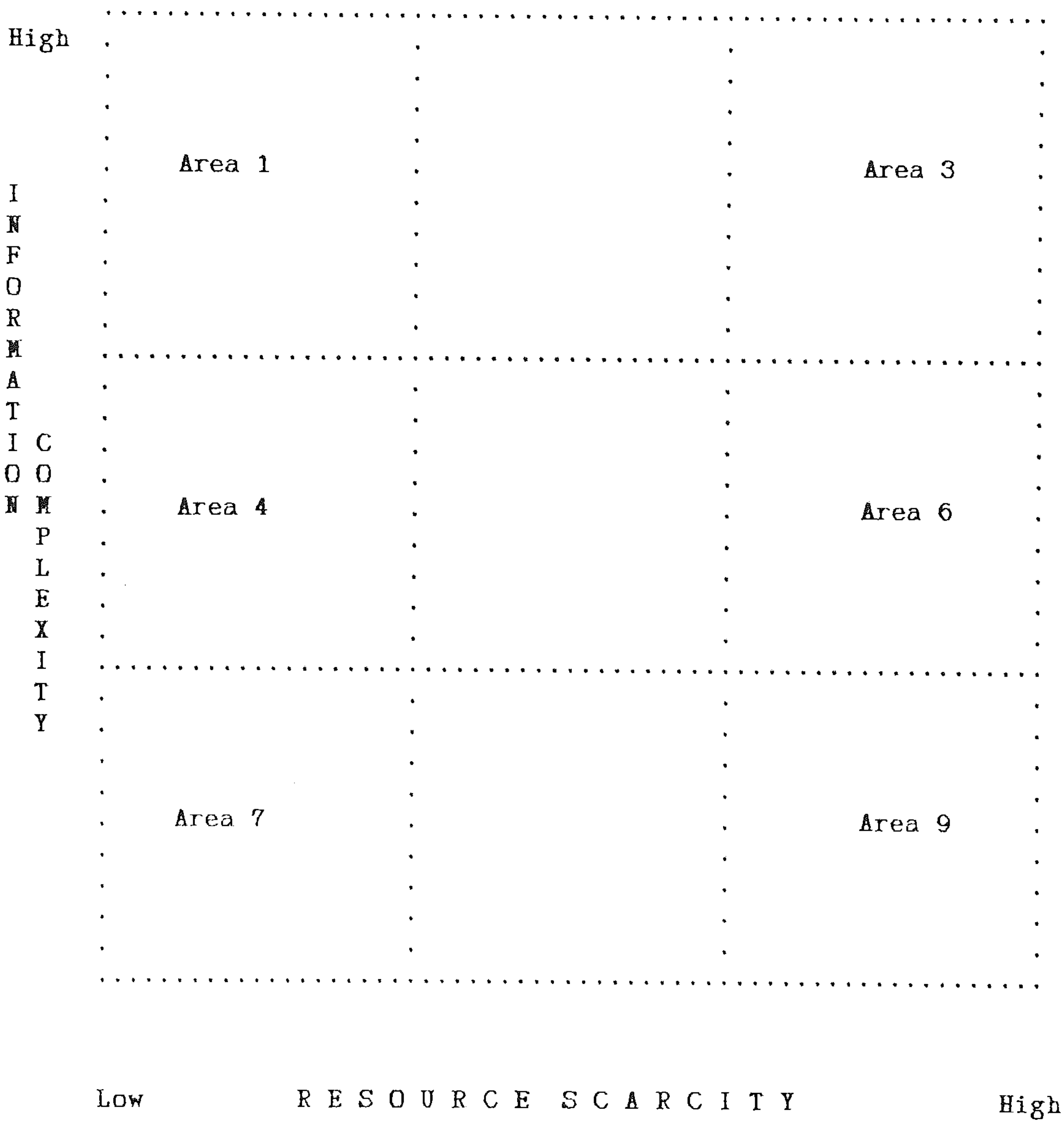
Following Lawrence & Dyer[7] the environment is defined as the industry in which the focal organisation operates and is seen[8] as setting the conditions that help to shape the organisation even as the organisation shapes and influences the environment.

Within this environment each organisation will have its own selected relevant environment. This relevant or enacted environment is determinded by the organisation's strategy and will, therefore, include only those aspects which are perceived to have high importance to the focal organisation[9]. This raises the ongoing and unresolved objective-subjective (or the actual-perceived) environment issue of how to treat the environment[10]. The accuracy of the enacted environment has obvious survival consequences for the organisation and yet there is litle in the literature that examines this issue empirically. There are significant methodological problems in addressing this issue but one way forward is offered here by adopting a comparative historical perspective which examines the evolving environment - organisation relationship in the context of the wider environment of the industry generally.

The environment will be described in terms of Lawrence & Dyer's Analytical Framework of Adaptation[11]. The framework consists of a nine-cell matrix (see Fig 2 below) which is derived from two characteristics of the environment - the Information Domain and the Resource Domain. In this way, Lawrence & Dyer argue[12], those parts of the environment on which the organisation relies for its material supplies and those on which it relies

Figure 2

ANALYTICAL FRAMEWORK OF ADAPTATION : ENVIRONMENTAL AREAS



Source: Lawrence & Dyer[11]

for its intellectual information are clearly differentiated and thus resolves the debate beween the longstanding information and resource perspectives[13]. Firms experience uncertainty in the resource domain as scarcity of essential material resources, while uncertainty in the information domain is experienced as complexity. While high uncertainty in both or either domain makes existence difficult for the organisation, certainty tends to assure organisation survival.

The sliding scale from low to high on the vertical axis of the information domain measures the complexity of its variable aspects ie variations in competitors, in technology, in customers, in products, in government regulations. As the degree of uncertainty in this domain increases, so does the amount of information an organisation needs to consider to make wise choices in regard to the goods and services it provides. The information domain thus represents the critical uncertainties that must be analysed by the organisation in making rational choices about its environmental transactions.

The primary influence of Information Complexity on the organisation is in terms of organisational differentiation, the central thesis being[14] that as environmenal complexity increases so too must the level of differentiation within the organisation.

Information Complexity (IC) is hypothesised[15] to have an inverted U-curve relationship with innovation. Lawrence & Dyer claim that there can be either too much or too little IC to induce innovation. Where IC is very low, there is little external stimulus and variety to stir the cognitive processes behind organisation learning and innovation. When too much IC surrounds strategic choices, information overload may inhibit learning and innovation.

Though not empirically tested, Lawrence & Dyer suggest[16] that the level of IC a firm will experience in its mature stage can be roughly predicted on the basis of its industry and the associated technology. Using Thompson's three-fold typology of technology Lawrence & Dyer argue[17] that core technology by impacting the size of firms is expected to influence the level of IC. Technological influences are not, however, deemed[18] to be immutable forces but constitute a predisposition that can be significantly modified by the organisational choice of an appropriate strategy and form. Thompson's long-linked or transforming technology is associated[19] with manufacturing firms and with the intermediate level of IC and it is at this level that Lawrence & Dyer expect to find the job shop, mass production and process technologies identified by Woodward[20].

The sliding scale from low to high on the horizontal axis forming the resource domain measures the degree of difficulty an organisation has in securing the resources it needs for its successful operation[21]. This domain is concerned with the scarcity of resources (RS) whether raw materials, capital or people. The level of RS for an organisation reflects changes in environmental factors such as customer demand for its goods and services, government actions, competition for limited resources, etc. Concomitantly, the organisation influences RS by means of the quality, cost and quantity of goods and services it makes available for exchanges.

The major influence of RS on the organisation is on the level and quality of organisation integration and the level of organisation efficiency. As RS increases organisations must increase the number of mechanisms available for coordinating their activities if they are to be efficient - up to the point, that is, that RS itself acts as a constraint[22].

Lawrence & Dyer hypothesise[23] that efficiency has an inverted U-curve relationship with RS. When RS is very low, organisations have little incentive to strive for efficiency. When RS is very high, resource starvation causes neglect and efficiency is lost. RS is also seen as having a secondary effect on the rate of innovation since high RS will act to depress innovation.

IC and RS then represent the vertical and horizontal axes of the environmental framework and are combined to produce a nine-cell matrix of environmental areas. Lawrence & Dyer associate[24] these areas with particular organisation forms and strategies and claim[25] that only Areas 5 offers an environment which favours both efficiency and innovation. By determining and organisation's position on these two intersecting axes it is possible to locate the organisation within the nine-cell matrix and to identify the expected organisation form and strategy.

3.2. Organisation Strategy and Structure

Lawrence & Dyer define[26] an organisation as a purposeful system of co-ordinated action embracing[27] learning, production and social systems. They characterise[28] a Readaptive Organisation in terms of a strategy which embraces both efficiency and innovation and stucture in terms of differentiation, integration, power distribution, human resource practices and member involvement.

Lawrence & Dyer use these characteristics to describe the organisation typologies of Mintzberg[29] and Miles & Snow[30] and they relate these typologies to the environmental areas. It is claimed[31] that only the Area 5 - Readaptive form and strategy configuration is capable of sustaining ongoing adaptation. Other configurations are expected to result in satisfactory performances in terms of either efficiency or innovation only if the environmental conditions remain unchanged.

Lawrence & Dyer's characterisation thus captures, following Miles & Snow[32] the organisation's entrepreneurial and administrative solutions but fails to characterise the production or engineering solution. In addition to the characteristics identified by Lawrence and Dyer, the revised framework therefore includes a profile of the product-process relationship. In this way the revised framework characterises all three elements of the Miles & Snow model of organisational adaptation - the entrepreneurial, engineering and administrative solutions to the problems raised by the environment[33].

The revised framework then characterises the organisation in terms of

(i) The entrepreneurial solution or strategy

(ii) The administrative solution or structure

(iii) The engineering solution

(iv) Efficiency and Innovation

3.2(i) The Entrepreneurial Solution

Following Miles & Snow[34] the entrepreneurial solution is concerned with the definition of the organisation's domain in terms of the goods and services it provides and the markets to be served.

Following Lawrence & Dyer[35] strategy links the organisation's internal arrangements to the environment and is defined as the pattern of decisions that determines and reveals the organisation's objectives, purposes or goals; produces the principal policies and plans for achieving those goals and defines the range of business the company is to pursue. In addition to the pattern of decisions identifying strategy the revised framework extends the Lawrence & Dyer model[36] to identify the strategy-making process in terms of Mintzberg's[37] typology of strategy-making modes.

3.2(ii) The Administrative Solution

Following Miles & Snow[38] the administrative solution is concerned with providing the structure and processes to service the entrepreneurial and engineering solutions.

Following Lawrence & Dyer[39] the characterisation of the administrative solution includes

(a) Differentiation and Integration

(b) Member Involvement and Human Resource Practices

(c) Power Distribution

(a) Differentiation and integration

Differentiation is defined[40] as the extent to which organisations employ specialised individuals and units to bring differentiated skills and orientations to problem-solving. The higher the level of environmental IC, the higher the degree of differentiation required. A sufficiently high degree of differentiation is essential if a firm is to sustain innovation.

Integration is defined[41] as the process through which organisations coordinate their activities if they are to be efficient. As RS increases, organisations are expecxted to increase the humber of integrative mechanisms. Similarly, the more differentiated the organisation, the higher the level of integration required to coordinate activities[42].

Lawrence & Dyer point out[43] that because there are resource and size constraints with high levels of RS and IC, organisations with a highly differentiated and integrated structure are most likely to appear in Area 5.

(b) Member Involvement and Human Resource Practices

Lawrence & Dyer[44] define member involvement as the complexity and richness of exchanges between individuals and the organisation which is expressed in the willingness of members to strive and learn. The potential for striving and learning is linked[45] with RS and IC and it is claimed[46] that the potential for member involvement is thus highest in Area 5. It is argued[47] that the realisation of member involvement requires the organisation to:

* Clearly and systematically communicate to the membership its goals and expectations. There must be as little ambiguity as possible regarding the principles underlying the organisation strategy, structure and practices.

* Provide a balanced use of three kinds of human resource practice to integrate employees with the firm.

The first of these three practices is market mechanisms which offer tangible financial rewards such as merit payments, bonus payments, profit sharing, etc, which supplement regular wages and salaries.

The second of these practices is bureaucratic mechanisms which act to foster stability in the organisation and through which the members can be involved in the decision-making process of the organisation.

The third kind of human resource practice is clan mechanisms which encourage a sense of membership and is aimed more at meeting an individual's membership needs through, for example, employment, security, work teams, job rotation, and other practices reflecting the organisation's concern for the general well-being of the employee and his/her family.

(c) Power Distribution

Lawrence & Dyer argue[48] that if members are to be effectively involved in achieving efficiency and innovation, there must be a relatively even distribution of power both vertically and horizontally. While the temporary assignment of power to a single department can sometimes be useful, a lasting and significant imbalance of power seriously impedes communication and complicates problem solving.

It is argued[49] that the lack of a reasonable horizontal power balance makes it more difficult for managers to integrate specialised sub-units in a constructive and creative way if in the end one party can be expected to make an arbitrary decision. The lack of vertical power is reflected in the perceived equity of the distribution of wealth generated by the organisation[50]. It is argued[51] that the continuing involvement of members of all types and at all levels depends upon their perceiving this distribution to be reasonably equitable. The inevitable conflict of interest in the distribution of rewards must be dealt with by some bargaining process, implicit or explicit.

3.2(iii) The Engineering Solution

Following Miles & Snow[52] the engineering solution is concerned with selecting the appropriate technology and systems for producing the products and services.

Following Abernathy[53] technology is characterised in terms of its close - loose relationship with the product characteristics and related work processes. Thus where the product is made to customer order the technology is defined as being general purpose and the production system is expected to reflect job-shop conditions. Where the product is highly standardised the related technology is defined as being specialised and the production system is expected to reflect technologically controlled and dedicated characteristics. The emergence of a dominant product design is thus expected to have significant implications for the technological profile and related production system of organisations within the same industry.

3.2(iv). Efficiency and Innovation

Following Lawrence & Dyer[54] efficiency is defined in terms of the effective use of resources, quality of output, cost of production and productivity. Efficiency is shown[55] to have an inverted U-curve relationship with RS. When RS is very low, there is little incentive to achieve efficiency, and when RS is very high, resource starvation may cause neglect of even routine efficiencies.

Following Abernathy[56] efficiency is expected to be related to a product-process profile which is highly specific. Conversely, efficiency is expected to be lower where the relationship between the product and its work process system is fluid.

Following Lawrence & Dyer[57] innovation is defined as the stream of ideas for relevant new goods and services and production techniques that are not only forthcoming but that are actually put to use in manufacture and distribution. Innovation is shown[58] to have an inverted U-curve relationship with IC. When IC is very low, there is little external stimulus to stir up the cognitive processes behind organisational learning and innovation. When too much IC surrounds strategic choices, information overload may inhibit innovation.

Following Abernathy[59] innovation is described as either radical or incremental. Radical innovation is defined[60] as an entrepreneurial act resulting in major changes involving the identification of an emerging need or a new way to meet an existing need. Typically, such innovation occurs when product characteristics are in a flux and production systems are flexible (ie fluid) and relatively inefficient.

Incremental innovation is defined[61] as changes which give impetus to and further shape the direction of existing design approaches, thus functioning as steps in an underlying longterm trend. Incremental innovation is important because it is cumulative and because it builds on existing approaches and may so improve a given underlying design approach to be preferred. Typically, such inmnovation occurs where the markets for goods are well defined, the product characteristics are specific and often standardised, and competition is mainly on the basis of price. The production technology is expected to be efficient, equipment-intensive and specialised to a particular product. In these circumstances, the major impact of the innovation is on cost reduction and productivity improvement.

Following Lawrence & Dyer[62] efficiency and innovation are balanced at the highest level in Area 5. Following Abernathy[63] efficiency is related to incremenal innovation and is associated with a product-process profile that is highly specific. Radical innovation is associated with a product-process profile that is fluid.

Following Lawrence & Dyer[64] these internal elements (excluding the engineering solution which has been added here by this study) characterise the organisation's adaptive form and the particular configuration of these elements is expected to reflect the environmental area in which the organisation operates. The next section identifies the expected relationships between environmental area and organisation form and strategy.

3.3 Expected environment and organisation relationships

Lawrence & Dyer[65] review the literature dealing with organisation form with a view to organising these previous contributions in terms of their own nine-cell framework. A brief summary of their discussion follows and is presented diagramatically in Fig 3 . Starting with Area 1 and proceeding clockwise to end in Area 5 the expected relationships are:

Area 1

Examples of firms in this area of high IC and low RS are the affluent universities studied by March & Olsen[66] who describe this organisation form as an 'organised anarchy' or 'loosely coupled' organisation. They point out that there is no straightforward way to develop an integrated and coherent strategy in these organisations as, when resources are abundant, the various departments and tenured faculty tend to act independently of the larger organisation. Mintzberg[67] has reviewed some of this literature and confers the name 'adhocracy' on the less extreme versions of this organisation form. Miles & Snow's[68] 'Prospector' organisation is expected to move from Area 4 into Area 1.

Area 2

Firms in young industries pass through this area as their markets begin to fill and mature. One type of firm that may reach an equilibrium in this area is the high-technology firm that contributes to or responds to one technical breakthrough after another. The most complete analysis of this

Figure: 3

ENVIRONMENTAL AREAS & EXPECTED ORGANISATION FORMS & STRATEGIES

Aston University

Illustration removed for copyright restrictions

Source: Lawrence & Dyer[69]

kind of organisation is Burns & Stalker's[70] study of several advanced electronic firms in which their well-known concept of the 'organic form was developed. Miles & Snow's[71] 'Analyser' organisation is expected to evolve through this area to mature in Area 5.

Area 3

There has been little systematic study of organisations in this area even though very many small organisations exist under these environmental conditions. Examples of firms that are sometimes found in this area are restaurants and retail shops. Mintzberg[72] has reviewed the literature on such organisation forms and describes them as 'simple structures'. In this highly resource-constrained environment, a functional division of labour is generally observed and adaptation tends to proceed by survival of the fittest rather than through learning. Area 3 conditions approach Adam Smith's vision of perfect competition in which there is little room for error. Eccles[73] study of house-building firms points to informal contracting networks or quasi-firms as one organisational device that helps firms in this area to move into Area 5. Miles & Snow's[74] 'Defender' organisation is expected to move through this area into Area 6.

Areas 6 & 9

The organisation form characteristic of these two areas is described by Mintzberg[75] as a 'machine bureaucracy'. This is the area in which the popular stereotype of industrial organisations, the 'mechanistic' structure identified by Burns & Stalker[76] is found. This is also the environmental area of organisations familiar to FW Taylor and Henri Fayol. Another example of organisations typical of this area is the high performing firms in the standard container industry identified by Lawrence & Lorsch[77]. Miles & Snow's[78] 'Defender' organisation is expected to evolve through Area 3 to mature in Area 6

Areas 7 & 8

The organisation form characeristic of firms in these two areas is described by Mintzberg[79] as a 'professional bureaucracy'. Barnard[80] has documented one classic description of this form with an emphasis on executive professionalism, cooperation, shared purpose and with more than a tinge of paternalism. Weber's[81] classic government bureaucracy would be represented in this area. Writers such as Crozier[82] and Parkinson[83] have identified the negative features of these organisations where, since the environment does not place heavy demands on these organisations, internal politics becomes much more active, leadership styles have special weight, and the management of symbols is important to legitimate continuation in these areas. Pfeffer's[84] paper on management as symbolic action draws many of its examples from organisations characteristic of Areas 7 & 8.

Area 4

This area has not been widely studied, perhaps because private organisations are unlikely to remain long in this area of fairly lush resources combined with only moderate IC, This is the start-up area for many new ventures, organisations created to take advantage of new technologies or new markets, and also of the organisations of special interest to Schumpeter[85]. Such organisations are usually described as an informal group with a strong entrepreneurial leader - the 'entrepreneurial group' organisation form.

Area 5

This is the area which is of special interest to the Lawrence & Dyer model since it is the area that is most likely to foster readaptation. Only a limited effort has been made to describe the characteristic organisations and no generally accepted term has been developed for these organisations.

The earliest relevant work is the Lawrence & Lorsch[86] description of the high-performing firms in the specialty plastic and chemical industries. They found that these firms, faced with high environmental uncertainty, adopted structures that combined high differentiation and high integration. Miles & Snow's[87] 'Analyser' organisation is likely to evolve through Area 2 and mature in Area 5.

Another line of research dealing with organisation forms likely to appear in Area 5 is that of Ouchi[88]. His 'type Z' corporation, a Japanese-American hybrid, features widespread use of informal clan control mechanisms with the simultaneous and integrated use of market and bureaucratic controls. And finally, the literature on matrix structures (Davis & Lawrence[89], Sayles[90], Galbraith[91]), show one way of achieving high integration among highly differentiated functional contributors.

Lawrence & Dyer give the name 'Readaptive' to the form characterising organisations in Area 5 and point out[92] that while they would modify the characteristics of the 'Analyser' strategy, this is the type that comes closest to their Readaptive form. It is claimed that it is always difficult for an organisation to remain in this area because its present form of adaptation, no matter how fitting today, must eventually be superseded by another and then another. The firm that locks onto a currently rewarding way of doing business will sooner or later drift into Area 6[93].

Lawrence & Dyer[94] argue that remaining in Area 5 requires the sustained reconciliation of opposing tendencies - for example, the difficulty of reconciling innovation, efficiency and member involvement. Other polarities that must be balanced are short-term versus long-term orientations, internal competition versus cooperation, bureaucratic control versus entrepreneurship. As Weick[95] points out, this means that alternate or simultaneous expression of these opposed tendencies will be more adaptive than will an intermediate or compromise expression. This finding is consistent with the original Lawrence & Lorsch[96] research which found that conflict around polarities was a continuing element of organisation life in the highly differentiated and highly integrated firm where issues were best resolved by problem solving rather than by compromise, smoothing, forcing or avoidance.

3.4. Summary

Orthodox contingency theory links effective organisational performance to compatible relationships between the environment and organisation strategy and structure. Recent contributions to the literature on organisation theory claim that orthodox models fail to demonstrate why some compatible environment - organisation configurations result in the failure of effective performance in the long term. The new approach claims that readaptation is the key to effective performance in the long term and that readaptation is the outcome of an unique environment - organisation configuration. The literature on organisation theory recognises the confusion in the fragmented and conflicting results arising from cross-sectional studies and argues the case for longitudinal studies based on narrowly defined organisational populations which are comprehensively described so that the evolving relationship between the environment and organisation can be observed over time.

This study combines the Lawrence & Dyer and Abernathy models to construct a framework which tracks and exposes the environment - organisation configurations of two firms in the same industry over the same twenty-five year period and the findings are compared with the configurations claimed by the literature. This chapter summarised the two models informing this study and idenified the main concepts informing the analytical framework. The next section operationalises the concepts and describes the methodology employed.

3.5: Method

Chapter 2 reviewed the theoretical models informing this study. Chapter 3 presented the analytical model for examining the environment - organisation relationship longitudinally and comparatively and Fig 1 summarises the elements to be examined.

This section shows how these elements are operationalised and applied to the collection and analysis of the data presented in the Case Studies in Chapters 5 and 6.

3.5.1 Operationalising the elements

As Fig 1 shows, the elements to be examined are

- (i). The Environment
- (ii). The Organisation in terms of its solutions to
  - (a) the entrepreneurial problem
  - (b) the administrative problem
  - (c) the engineering problem
- (iii) Organisational performance in terms of
  - (a) efficiency
  - (b) innovation

These elements are applied to examine two organisations in the same industry over the same twenty-five year period.

Elements (i) and (ii)(a) and (ii)(b) are operationalised in terms of the twenty nine variables and 7-point scale instrument constructed by Miller & Friesen[97]. These variables are described in Appendix I.

Element 2(c) is operationalised in terms of the seven variables adopted by Abernathy[98] to characterise a productive unit and these variables are given a 5-point scale and are described in Appendix II

3.5.1.(i) Environment

Following Lawrence & Dyer[99], the environment is defined as the industry in which the organisation operates and is described in terms of Information Complexity and Resource Scarcity. Each of these two variables is given a 7-point scale and the scales are divided to construct a nine-cell framework of the potential industry environment as shown in Fig 2. Following Lawrence & Dyer[100] the sliding scale from low to high on the vertical axis of the Information Domain measures the complexity (IC) of its variables aspects of dynamism and betrogeneity. The sliding scale from low to high on the horizontal axis of the Resource Domain measures the degree of difficulty or hostility an organisation has in securing resources (RS).

The organisation's perception of the environment is characterised, following Miller & Friesen[101], in terms of dynamism, heterogeneity and hostiliy. These characterisics are scored on a 7-point scale to identify the environmental conditions relating to the selected points in time. Variables 1 to 6 in Appendix I describes these characteristics.

To obtain the IC score[102] the scores for dynamism and heterogeneity at each of the selected points in time were added together and averaged. The RS scores is shown as the score obtained for hostility at each of the selected points in time. The resulting IC and RS scores are shown in Tables 5 and 14 and these scores provide the co-ordinates which locate the organisation within the nine-cell environmental framework as shown in Figs 9 and 19.

3.5.1.(ii) Organisation

Following Miles & Snow[103] the organisation is described in terms of its solutions to the entrepreneurial, administrative and engineering problems informing the Adaptive Cycle at each of the selected points in time.

3.5.1.(ii)(a) Entrepreneurial Solution

Following Miller & Friesen[104] the entrepreneurial solution is described in terms of eleven variables characterising the strategy and strategy-making process within the organisation. These variables are scored on a 7-point scale to reveal the entrepreneurial solution at each of the selected points in time. Variables 19 to 29 in Appendix I describe these eleven characteristics.

3.5.1.(ii)(b) Administrative Solution

Following Miller & Friesen[105] the administrative solution is described in terms of the twelve variables characterising organisation structure. These variables are scored on a 7-point scale to reveal the administrative solution at each of the selected points in time. Variables 7 - 18 in Appendix I describe these twelve characteristics.

Following Lawrence & Dyer[106] the administrative solution includes an assessment of structural differentiation, integration, power balance and member involvement. Differentiation and integration are represented by variables 16 and 13 respectively. Power balance is assessed in the vertical dimension by variables 9 and 8 which refer to centralisation and delegation, and in the horizontal dimension by variable 17 which refers to the level of technocratisation. Member involvement is assessed in terms of team spirit (variable 14) which following Lawrence & Dyer[107] is the outcome of perceived effective levels of communication, power distribution, and human resource practices.

3.5.1.(ii)(c) Engineering Solution

Following Abernathy[108] the engineering solution is described in terms of the seven variables characterising a productive unit which expresses the relationship between the product and its related processing system. Each of these seven variables is scored on a 5-point scale to show the progression of the product and its related processing system at each of the selected points in time. Variables 1 - 7 in Appendix II describe these seven characteristics.

3.5.1.(iii) Efficiency and Innovation

Following Lawrence & Dyer[109] efficiency is assessed in terms of the level of integration (v13) and the overall measure of the effective use of resources as shown by the gross profit margin. Following Abernathy[110] efficiency is assessed in terms of the level of product - process standardisation represented in the engineering solution.

Following Lawrence & Dyer[111] innovation is assessed in terms of product-market innovation (v19) and, following Abernathy[112], in terms of the level of flexibility in the product-process relationship represented in the engineering solution. Following Abernathy[117] innovations are assessed as radical or incremental.

The pattern of solutions disclosed in elements 3.5.1.(ii) to 3.5.1.(iii) constitute the adaptive behaviour of the organisation and this pattern is related to the environmental position of the organisation in 3.5.1(i) and tracked over time to expose the adaptive relationship between the organisation and its environment and the effect of this relationship on organisational performance.

3.5.2. Data Collection and Analysis

The carpet industry was selected for study on the basis of the author's previous experience in this industry as a personnel specialist in the industry's largest company which was the subject of her MSc thesis on the scope for employee involvement in decision-making.

The Federation of British Carpet Manufacturers was approached with a view to identifying organisations to participate in this longitudinal and comparative study of organisational adaptation. The Federation provided the names of seven senior executives in the industry and five of these executives were interviewed (Appendix III) with a view to formulating the period to be examined, identifying the key changes in the industry in this period and identifying representative industry organisations. Two organisations participating in the preliminary interviews were selected by the author on the basis of their being operational in the period to be reviewed, their geographical proximity and their approach to the tufted product - process innovation. These two organisations agreed to be the subjects of the case studies presented in this study.

In both organisations access was given to documents that were generally available to members of the organisation. In addition, in both organisations all members of the current board with experience of the company in the focal period were interviewed on a semi-structured format to generate additional information and/or cross check information obtained from documents and to identify key dates. This information was used to construct the historical overviews of the two companies.

In each organisation a member of the board with experience of the organisation throughout the period covered was the subject of extended structured interviews (Appendix IV) to obtain the data for constructing the company profiles and this information was followed by further semi-structured interviews with past and present board members to check and clarify the information collected.

In total some 35 hours were spent on interviewing eleven board members in the two organisations. All interviews and document research was conducted during the period 1987 - 1988.

The data is presented first in the form of an historical overview of the organisation and second in a structured analysis of organisation environment, strategy and structure at each of the selected dates when the actual outcomes are located within the historical overview and compared with the outcomes expected by the two models informing the study. The historicised case study and scaled multi-variable approaches are thus combined to reveal the evolving organisation - environment relationship which is examined to provide a holistic, longitudinal and comparative perspective of organisational adaptation in the context of the sector as a relevant environment.

PART TWO: THE CASE STUDIES

CHAPTER 4: CARPET INDUSTRY: AN OVERVIEW 1940 - 1979

4.1. Introduction

Robinson[1] locates the origins of the British carpet industry in the late seventeenth century and the commencement of 'Turkoy work' which incorporated the method of knotting used in Turkey on an upright loom. The product names of wilton and axminster refer to the towns in which these types of carpet were first made in the mid-eighteenth century. Kidderminster carpet (also known as Ingrain or Scotch carpet) was first manufactured in 1735 in Kidderminster[2], and Kidderminster also claims the distinction of erecting the first brussels loom in 1749 on which a pile carpet could be woven mechanically[3]. In 1825 brussels was the first type of carpet to incorporate the French jacquard colour selection mechanism[4]. In 1830 the chenille axminster two-stage process was developed in Scotland, and in 1831 a method of printing pile yarn was developed in Scotland to produce a low-cost patterned or tapestry carpet[5].

Power was first applied to carpet weaving in 1840-45 by EP Bigelow in the USA, initially to ingrain looms[6]. Power was applied to brussels looms in 1849 and the license was acquired by John Crossley of Halifax who licensed other British manufacturers[7]. The impact of steam power on the industry has been documented elsewhere - see for example, Bartlett[8], and Smith[9] who shows that because of the high cost of looms the carpet industry was organised on the factory system well before steam power was widely applied in the 1850s[10].

Spool axminster weaving was invented in the USA in 1876 and permitted the first unlimited use of colour in carpet weaving[11]. The spool axminster process was introduced into this country in 1878 by Tomkinson & Adam, a Kidderminster firm[12]. In 1890 Brintons, also a Kidderminster firm, patented the gripper axminster process[13]. The production of tapestry and chenille axminster carpets declined in the 1930s when electric power was first used in the industry and there was a great expansion in the production of gripper axminster, especially 'axminster squares'[14].

4.2. 1940s

Following the outbreak of World War II carpet sales were progressively restricted and the supply of raw materials rationed and reduced. Labour was diverted and the industry's plant and equipment was turned over to the manufacture of blankets and other war products[15]. In 1941 the industry was invited to submit a scheme under the nucleus firm arrangements but was unable to do so and did not,therfore, develop bridging arrangements for post-war activities[16]. An Export Committee was later established and formed the basis of the Carpet Trade Executive Committee which dealt with post-war reconstruction issues and gave the industry some degree of national organisation[17].

Carpet production resumed in 1945[18] and by November 1946 the industry was actively seeking to develop a national forum of representation[19]. The Federation of British Carpet Manufacturers was launched in September 1948 when the industry was united under a single trade association for the first time in its history[20] By 1949, despite shortages of labour, materials and equipment, the industry produced 38.5m square yards of carpet representing some 70% of the pre-war output with a workforce of 22,000 , some two-thirds of the pre-war workforce[21].

4.2.1 structure

A BoT[22] review of the industry in 1945 shows that the majority of the sixty firms in the industry were privately owned and under the control of the owners who had generally introduced 'new blood' into key positions. The industry was found to be financially sound and well able to take care of is own recovery without any special government interventions other than the provision of incentives to encourage investment which was inhibited in private firms by the 1922 Finance Act[23]. It was estimated that every £1 of capital produced a turnover of £1 per annum at reasonable profits[24].

Silverman's[25] review of the industry at 1939 estimated there were 58 firms of which only 13 were registered as public limited companies. There were 30,970 insured workers and over 60% of the workforce was employed in ten firms, each with 1000 or more employees. Five of the 58 firms were the results of earlier combinations and these accounted for some 18% of the industry's capital, 17% of its workforce and 14% of its looms. The share of factories was slightly higher but still below 20%.

Of the 58 firms in the industry in 1939

40% were in the Northern District comprising the West Riding of Yorkshire and adjacent parts of Lancashire.

29% were in the Kidderminster & District, including Stourport and Bridgnorth

15.5% were in Scotland

15.5% were in Other Districts (mainly in the South, covering Wilton. Axminster & Gloucester.

Kidderminster and District employed 33% of the workforce and 36% of the capital employed in the industry, followed by the Northern District with 31% and 32% respectively, and Scotland with 30% and 28% respectively. By 1946 the industry had established a National Joint Committee and District Joint Committes which negotiated wages and conditions and provided a mechanism for consultation on mattters of mutual interest[26]. Industrial relations in the industry were good and overall the industry was characterised by pride of achievement coupled wih a sense of tradition and a high degree of skill[27]

4.2.2. Products

Just before World War II the industry produced a range of carpet products under the three major classifications of axminster/chenille, wilton/brussels and tapestry/others[28]. Products competing in the same quality/price sector were sufficiently similar to make them close substitutes and competition within a given product classification was on the basis of design and colour. Just before 1914 there were an estimated

5,000 designs in axminster alone[29] and at 1939 there were an estimated 1,000 new designs in stock[30].

By 1913 the industry was mainly concerned with the production of quality axminster and wilton carpets which accounted for some 67% of output and a reversal of the position at 1850 when the cheaper tapesty/other carpet products had accounted for some 60% of output[31]. A number of firms manufactured all three product types, although in practice firms tended to specialise in one type and manufacture the other types as well[32].

In the immediate post-war period the industry was required[33] to comply with BoT rulings with regard to the quantity and quality of carpets produced. In particular, the industry was required to produce a higher proportion of lower-grade carpets to meet the demand in the starved UK market where there was a significant increase in demand from lower income groups. Production of quality wiltons required government authorisation and was permitted to meet the demand from the contracts market only and provided such production did not interfere with the manufacture of sufficient quantities to meet UK and export quotas[34].

4.2.3. Production Facilities[35]

In general, factories were well equipped and compared well with other countries and the same pre-war weaving methods were in use. Loom manufacture over the last forty years had sustained gradual but significant improvements resulting in faster looms. Some looms were purchased from textile machinery manufacturers and others were built by carpet manufacturers themselves. The industry had not developed the modern scientific methods necessary for developing new machines and was not well-equipped for research into textile machinery. Two loom innovations - a split-shot axminster and a face-to-face wilton - were emerging from the experimental stage and offered the prospect of higher productivity.

The majority of looms were 27" wide. There were many 36" looms and a number of looms up to 54" wide. The most common widths in wide looms were 7'6" and 10'6" and wide looms had been developed for all major product types by the early 1900s.

Firms were generally equipped with looms that had been dismantled before the war and with whatever new looms were available and the opportunity was taken to improve workflow arrangements. Carpet machinery manufacturers were essentially textile machinery manufacturers with a carpet machinery section. Given the exceptional demand for textile machinery in the post-war period, the supply of looms was already inadequate and some 40% of loom orders were for export to countries starting-up domestic carpet manufacture

Some firms in 1947 had achieved an output of 2,000 square yards per employee which was still below the pre-war average of 2,110 sqare yards per worker achieved in the USA[28]. In practice, there were great differences in performance, even between firms weaving the same type of carpet and at least one firm in Scotland claimed to have achieved an output of 2,300 square yards per worker by improving workflow and introducing conveyor systems.

4.2.4. Distribution

Silverman[37] shows that although there had been some increase in sales to retailers, in 1939 carpet manufacturers generally sold their products mainly to wholesalers and in export markets resident agents were appointed and worked partly from consignment stocks and partly from special orders.

Trading practices were highly complex and manufacturers had different terms for given retailers and wholesalers, usually based on turnover. Price-fixing agreements had a long history in the industry and membership of a price fixing association was on the basis of the type of carpet manufactured so that manufacturers were members of more than one trade association[38]. Associations tended to develop haphazardly and were in essence rival groups[39].

Following the formation of the Carpet Manufacturers' Executive Committee in 1942 manufacturers adopted an agreed list of wholesalers who received a uniform discount rate and were required to give an undertaking to confine themselves to their legitimate function of distributing products to appropriate retail outlets on agreed terms[40]. Manufacturers also agreed to give selected retailers equal buying terms and this was justified on the grounds that whereas pre-war manufacturers had gained certain benefits from long-run production, in the post-war period manufacturers were organised on a large-scale production basis, whatever the order size[41].

4.2.5. Raw Materials

Silverman[42] reviewing the industry in 1939 notes that the last major change in raw materials had been in the nineteenth century when jute was introduced. Although attempts had been made to substitute various artificial fibres the special resilience of wool made it difficult to replace as the main surface fibre.

Most carpet manufacturers bought their yarn from specialist spinners. About 25% of the carpet firms had their own spinning capacity but, given the wide range of yarns used in carpet manufacture, such firms were generally only able to meet part of their own needs. It was estimated that about 50% of the industry's yarn consumption was met by the industry itself, and some carpet firms also supplied yarn to other carpet manufacturers[43].

By 1949 although woollen yarns were already de-controlled and cotton yarns were more readily available, jute yarns were still licensed and representations were made to the government to secure supplies of paper yarn which was popular with carpet manufacturers in the USA[44].

4.3. 1950 - 1969

The period 1950 - 1969 was dominated by the introduction in 1955 and growth of the tufted carpet-making process. The tufted process, developed in the USA, combined high-speed production with low labour costs and cheap rayon pile yarn to produce carpet well below the price of woven products[45].

Tufted manufacture started in the USA shortly after World War II and by 1963 represented 80% of volume sales[46]. In the UK tufted volume sales exceeded woven sales for the first time in 1969 although in value woven at £118.5m remained ahead of tufted at £65.6m[47].

In 1954, the year before tufted carpet was introduced, the woven industry employed 31,000 people and labour shortage, particularly in Kidderminster and Scotland restricted further output[48]. Although jute remained subject to government controls, manufacturers were able to purchase other raw materials freely and product-pricing and purchasing restrictions had been eased[49]. Although most manufacturers had experimented with synthetic fibres only 2.5% of output contained sythetic pile compared with 30% in the USA where the low performance of the carpet industry suggested that such innovations were not popular with consumers[50].

Between 1949 and 1954[51] total sales in the UK increased by 67% to almost 39m square yards valued at £53.5m. Exports accounted for 19% of total sales and imports accounted for 10% of sales and consisted mainly of cheap cotton carpets from Belgium which sold at prices scarcely above raw material costs. Australia was the single largest export market but import restrictions nurturing the newly established domestic carpet industry threatened export performance. In the USA, British manufacturers faced tough competition from Belgian manufacturers[52]. Axminster products sold 29.2m square yards representing almost three times the volume of wilton sales. Chenille output, competing with cheap cotton imports, declined significantly and many manufacturers were replacing chenille looms with spool and gripper axminster looms[53].

In 1955[54] credit restrictions were imposed in the UK market to curb inflation and correct the adverse trading balance. Purchase tax was increased from 25% to 30% making the industry's already high priced products even more expensive. Australia introduced a ceiling on imports and currency restrictions were removed in New Zealand. Distributors pressed hard for better terns but carpet manufacturers were determined not to introduce any system of retail rebates. In the meantime, the issue of 'collective discrimination' was being investigated by the Restrictive Practices Commission and legislation was pending.

Scott's[55] study of the diffusion of the tufting process shows that there were 71 firms in the industry in 1955. Although two new firms had entered the industry the majority had been in the industry for an average of 61 years. Five firms had adopted the tufting process and of these five, two were new entrants to the industry. Of the 71 firms in the industry 69% were privately owned. Twelve firms owned manufacturing capacity in overseas countries, almost entirely in Australia, New Zealand, South Africa and Canada. In the UK two small firms were owned by a Belgian firm. Eighteen firms were integrated backwards into spinning and two of these were also integrated forward into distribution. Fifteen firms manufactured products other than carpets and these products were generally of a textile nature or were plastic/linoleum floorcoverings. The industry's workforce in 1955 stood at 30,100 employees and the degree of concentration (as measured by the percentage of total employees accounted for by the five largest firms) stood at 37.7%.

Total sales in 1955[56] amounted to 54.650m square yards. Exports accounted for 16.7% of sales and imports accounted for 28.3%. Tufted goods appeared in the UK market for the first time in 1955 and accounted for 2% of sales volume. For the first time there was a decline in the demand for axminster goods and over-production of axminster squares indicated there had been a significant change in consumer tastes[57].

In 1959 the Restrictive Practices Court ruled that the industry's trading arrangments were against consumer interests and the system of wholesale and retail outlets operated under the auspices of the Federation of British Carpet Manufacturers was discontinued[58].

By 1960[59] the number of firms in the industry had increased to 76 and of these fourteen new firms had purchased tufting equipment and entered the industry between 1955 and 1960, and two mergers occurred in this period. Of the 76 firms in the industry, 31 had adopted the tufting process and of this 31, sixteen were new entrants to the industry. The industry employed 34,300 employees and total sales amounted to 71.54m square yards. Exports accounted for 10.8% of sales and imports accounted for 16.2%. Tufted products accounted for 20% of volume sales. The percentage of all wool woven carpets declined to 46% by 1962 when only 36% of axminsters and 78% of wiltons were all wool products[60].

By 1969[61] the number of firms in the industry had dropped to 62, and 22 of these had entered the industry between 1955 and 1969. There had been sixteen new entrants between 1955 and 1960 and during this period there had been two mergers. There were six new entrants betwen 1965 and 1969.

There were no new starters between 1960 and 1965 but there were ten mergers between 1966 and 1969. Mergers between quoted and unquoted firms resulted in a substantial increase in the number of quoted firms and by 1969 the majority of the firms in the industry were quoted on the Stock Exchange. The number of privately owned firms declined to 28 representing 45% of the industry. Of the 62 firms in the industry in 1969, 39 had adopted the tufting process, and 22 of these were new entrants to the industry. Fifteen firms owned manufacturing capacity in overseas countries. Twenty-one firms were integrated backwards into spinning and two of these were integrated forward into distribution. The number of firms with diversified products increased to twenty-six and the majority of these were new entrants to the industry. The industry's workforce in 1969 stood at 44,800 employees and the concentration ratio increased from 37.7% in 1955 to 54.9% in 1969. By 1969 Lancashire had become an established centre for tufted carpets and added a further geographical location to the carpet industry.

In 1969[62] the level of sales volume was 130.291m square yards. Exports accounted for 16% of sales and imports had declined to 7%. Tufted products accounted for 67% of total sales. By 1966[63] only just under 10% of all carpets were 100% wool and even wilton all wool products had declined to 42%. By 1968[64] the trend away from all wool carpets was halted and there was a small increase in the volume of all wool carpets.

4.4. 1970s

The decade was dominated by the oil crisis in 1973, the explosion in world commodity prices and the series of economic measures to curb prices and incomes which produced some of the worst trading conditions ever experienced by the carpet industry[65]. Wool prices doubled in 1973 and government controls permitted only half of this increase to be recouped by higher carpet prices[66]. Inflation by 1974 was running at 20% and hire purchase arrangements restricted consumer spending. One of the most alarming features of trading was that of increasing sales value and falling profits as interests rates increased[67]. In 1975 the trade associations representing the woven and tufted sectors of the industry merged to form the British Carpet Manufacturers Association[68].

A study by the Institute of Manpower Studies in 1978[69] shows that the industry, the second largest volume manufacturer in the world, accounted for approximately 0.15% of total UK employment in 1977 making it one of the smallest in the country. There were 147 firms in the industry employing 35,928 people in 1978[70] representing a decline in the workforce of 21% from the 1968 figure[71]. Sixteen firms each employing more than 500 employees accounted for approximately 60% of the industry's labour force[72]. Up to 1973 the numbers employed in the woven industry remained fairly static but between 1973 and 1977 fell by 36% from 35,002 to 22,331 in 1977. The numbers employed in tufted rose by 59% from 6,150 to 9,774 between 1968 and 1974 and by 1978 fell to 9,154 people. In 1978, just over 1.5% of non-operative employees were graduates[73] and 31% of all employees were female[74]

Traditionally the industry's pay rates were high and its IR record would be envied by most industries[75]. Between 1969 and 1977 output per worker (measured in thousand square metres per annum) in tufted rose from 9.1 to 12.3, and in woven output per worker rose from approximately 1.4 to 1.6[76].

Overall capacity utilisation in the industry in 1977 was estimated at 64% for woven and 56% for tufted[18].

Between 1968 and 1973[78] tufted sales rose by 82% from 45m square metres to 82m square metres. Wilton and Axminster held reasonably firm at approximately 12m square metres and 31m square metres respectively. Between 1973 and 1977 tufted sales rose at a slower rate (10% over four years) whereas axminster and wilton fell dramatically by 32% and 49% respectively. In value terms, total home carpet sales fell from £313m in 1973 to £222m in 1977. Axminster declined from £112m in 1973 to £68m in 1977, wilton declined from £51m to £28m. Tufted sales declined least from £134m to £112m.

Exports[79] in 1977, measured as a percentage of home sales, were tufted 35%, axminster 42% and wilton 50%, and many firms took the view that heavy discounting in the export market made such trade unprofitable. Imports[80] in 1977 represented 6.2% of industry volume sales and 7.7% of value sales and was mainly concerned with specialised carpet products. The industry faced two major import threats[81] - a short term one in the tufted sector and a long term one in the woven sector. In the tufted sector, the immediate threat was from tufters in the USA who benefitted from lower oil prices and consequent lower fibre prices which some major UK retailers had been quick to exploit. In the woven sector, the threat was from low-cost East European and Asian producers although these producers had yet to show their capability in large volume production.

In terms of its technological sophistication the industry was described as being 'highly technical' rather than 'high technology'. Some of the major technological developments over the past twenty years were shown as follows:

	Woven	Non-woven
1958	spinning hank dyeing winding spool setting steam/size/dry	continuous filament
	wire loom face to face looms spool looms gripper looms chenille spool/gripper looms	bonding machines tufting machines
1968	heat setting	secondary back foam back piece dyeing stock dyeing
		flocking needlepunch printing tufted level loop tufted cut & loop tufted level cut
1978	jumbo hank dye jumbo hank wind	needlepunching microwave dyeing continuous dyeing package dyeing
	automatic looms computer aided design auto card stamping	printing methods rotary screen, flat bed, Crawford Pickering, dye injection, heat transfer, independent needle, automatic shogging & others.

The industry was one of the first to invest in major printing lines and in 1977 had the only Chromotronic dye injection equipment under development and the only automated axminster looms[84]. Over the past ten years to 1977 improvement in the pattern capability of tufting machines and reduction in the down time in creel changing had been major areas of research attention[85]. With regard to future developments[86], no major changes were envisaged in spinning and dyeing. In the Preparatory stages, winding and automatic spool setting were areas of possible technical breakthroughs which could have a major impact. Similarly, automated axminster looms and the extension of multi-loom weaving in both axminster and wilton offered the potential for overcoming the cost disadvantages of woven carpets. No major developments were envisaged in tufting. It was felt that machine speeds had reached their limits and that attention would be focused on developing finer gauge products to enable tufting to move up market. Possible developments in printing and patterned bonded carpet could have a major effect on the industry and computer aided design could provide a direct input to gripper looms enabling the production of economic shorter runs. Industry employment levels were considered[87] likely to decline by anything between 4% and 58% and with such a wide variation the overall need was to increase labour flexibility both within companies and between companies and other industries by ensuring greater transferability of skills.

In conclusion, the industry in 1979[88] suffered from overcapacity and was particularly sensitive to the level of disposable income. The high technology option facing the industry implicity assumed fewer companies.

CHAPTER 5: TOMKINSONS CASE STUDY: 1869 - 1986

5.1 Foundation and Growth:

Fig 4 shows that the present company has its origins in the partnership of Michael Tomkinson and William Adams which was established in Kidderminster in 1869 when the two men, each contributing £500, pooled their talents (sales and engineering respectively) to exploit Adams' invention for mechanising the chenille axminster carpet weaving process.

Michael Tomkinson,the son of a succesful middle class merchant, was educated at Townsend House School and then at King Charles I School in Kidderminster. He received his business training with the firm of Schoolbreds, Tottenham Court Road, one of the best carpet retailers in Victorian London. Around 1862 Michael Tomkinson returned to Kidderminster and obtained a clerkship at Pemberton Talbot & Company, carpet manufacturers, in Mill Street, Kidderminster. When this firm closed down he purchased a quantity of their rug stock which he sold at a good profit and used the proceeds to start up as a yarn agent on his own account, managing his own finance, accounts and sales. He soon developed a reputation as a dynamic, efficient and decisive businessman with a wide circle of friends and business connections.

William Adams was born in Paisley and entered the well-established carpet firm of Templetons in Glasgow. In 1858 he became their Works

TOMKINSONS: ORIGINS & TRANSITIONS

Fig 4

Source: Directors' Report & Accounts 1959 - 1986

Foreman and had a reputation as a mechanical genius. During his time with Templeton he devised a method for mechanising the chenille weaving process but, having failed to persuade his employers to allow him to experiment with his ideas to convert their hand-operated chenille plant to steam power in line with their ingrain and brussels and wilton weaving, he left Templetons in 1863 and started up a small factory of his own in Coventry. He lost money and was taken over by HR Willis and Company, carpet manufacturers of Kidderminster, and became their Works Foreman and Yarn Buyer. It was while he was working with HR Willis that he again met Michael Tomkinson, then operating on his own account as a yarn agent, the two having previously met when William Adams was still at Templetons and Michael Tomkinson was working for Schoolbreds.

The new partnership was fortunate from the outset in having the goodwill and support of powerful men in the Kidderminster carpet industry, notably HR Willis and J Brinton. HR Willis, the firm at which William Adams was employed, was gradually running down his carpet business. The partners purchased hand-operated chenille plant from HR Willis and set up in business employing some twenty people in making carpet rugs at The Sling, Arch Hill, Kidderminster. Soon after start up the business was expanded when the partners purchased Brintons' axminster chenille equipment, Brintons (see Case Study 2) having decided at this time to concentrate their production on brussels and wilton carpets. With the purchase of Brintons' chenille plant came a contract to supply Brintons with match-rugs for their range of brussels and wilton carpets. This contract gave the partners the security to plan well ahead and leave time for William Adams to perfect and patent his invention and, in due course to erect his chenille power looms. The partnership itself ordered seventy-five of these looms at £75 each, and the chenille patent was extended on licence to Templeton's of Glasgow (Adams' former employer) and to R Smith in Kidderminster.

By 1871 Tomkinson and Adams had a workforce of 190 people and, after only two years in partnership, they exhibited their products at the International Exhibition in London and were able to claim that they made match rugs for the whole trade and that there were no floorcovering patterns with which they were not familiar. The success of the chenille power loom had increased output so rapidly that sales were extended into the export market, especially to the United States of America, where Michael Tomkinson established a strong personal friendship with Sloanes in New York. It was through Sloanes that Michael Tomkinson learned of the new spool axminster carpet making process that came to revolutionise axminster weaving.

5.2 Diversification and consolidation

The new spool axminster weaving process was developed in the USA by Halcyon Skinner, an independent inventor, working in partnership with Alexander Smith of Yonkers, New York, the largest carpet manufacturing firm in the world. The first spool axminster loom was erected by Alexander Smith in 1877 and was hailed as an immediate success. Michael Tomkinson, the first Englishman to see the new invention, returned to England with the British patent rights. With the help of William Adams, the first spool axminster loom was soon running perfectly and the first piece of Royal Axminster, the name given to the new product, was woven in Kidderminster, in 1878. Licences were granted by Tomkinson and Adams to six other carpet manufacturers - Southwells. Woodward Grosvenor, Morton & Sons, Jencks Dixon, Wards of Halifax and Templetons of Glasgow. Brintons declined the offer to participate in the new venture.

Royal Axminster captured the market and the partners soon had to extend their operations to cope with the increasing demand. Some idea of the size of the impact of the new spool axminster weaving process can be gauged by the before and after positions. Before the new process, three people were required to produce one and a half yards of axminster in a working day. The new spool power loom produced twenty to twenty-five lineal yards of 27" wide axminster carpet in the same time.

By 1888 Tomkinson and Adams were, after Brintons, the most highly rated carpet manufacturers in Kidderminster. The partners employed 800 people and produced 4,000 rugs per week. The firm bought yarn from outside spinners, scoured and dyed it, set up the pattern, wove the carpet, mended any defects, finished the carpet, and marketed , packed and despatched the goods. Their design studio, on which so much of their success depended, had a staff of twenty-four designers. In the chenille weave, the firm offered all widths from church seating to 28' widths and in all lengths. A speciality was railway rugs for first class carriages. Their operations were scattered around various locations in Kidderminster, including Mount Pleasant, where they eventually sited a factory which concentrated the business in one location. Warehouses were opened in London, Manchester, Melbourne and Montreal[4].

In 1893 another new product, Ingrain, was launched which was successful in overcoming the large quantities of cheap Moquette carpet dumped on the British market by Alexander Smith of New York. By 1894, the partnership's axminster production was four times that of 1893.

In 1896 Michael Tomkinson was successful in securing the British patent rights to Halcyon Skinner's latest invention - a wide axminster spool loom. Michael's son, Gerald, was responsible for installing the looms in Kidderminster and for overcoming the teething problems that the inventor had been unable to resolve. The new plant, called Kleitos, the name given to the now famous range of seamless axminster carpet squares made on these looms, remained in production at Kidderminster until the looms were progressively replaced from 1954 onwards by spool axminster looms supplied by Platts, the textile machinery manufacturers, with whom Tomkinsons, through Gerald Tomkinson, had a significant role in axminster spool loom developments[5]. After approximately 1900 when broad axminster spool looms began gaining acceptance in the industry, there is no record of any further significant spool axminster weaving innovations.

By 1903, Tomkinsons and Adams, although constantly evaluating and introducing new product lines, depended heavily for their success on the axminster spool loom and the bulk of their output consisted of seamless axminster bordered squares. Chenille carpets and hand-made rugs continued to be an important part of their product range, and the plant was eventually scrapped in 1963 to make room for a new carpet tufting process[6].

Michael Tomkinson concentrated on the selling and commercial side of the business and William Adams managed the production side where he combined his mechanical expertise with his gift for colour and skill in managing people[7].

John Tomkinson, Michael's brother, was also in the family business and acted as a combination of a personal assistant to Michael Tomkinson, Chief Clerk and Cashier. As well as being Michael's deputy, John Tomkinson was also responsible for two sales areas - Cooks of London, a firm of carpet wholesalers and the partnership's largest customer, and for the Channel Islands. John Tomkinson had two assistants, one of whom later became Secretary of the firm, and one who managed the purchasing side of the business.

Three of Michael Tomkinson's thirteen children joined the partnership. Herbert Tomkinson, educated at Winchester, joined in 1892, understudying his father who by then was a public figure, and took over many of his father's responsibilities in the general direction of the firm. Gerald Tomkinson, educated at Arden House and Rugby, joined the partnership on leaving school to work on the production and engineering side of the business. Geoffrey Tomkinson, educated at Arden House and Winchester, served a two-year engineering apprenticeship with Platts Brothers of Oldham, the textile engineers who built Tomkinson & Adams' carpet looms, before going to Kings College, Cambridge, where he obtained a BA in Mechanical Sciences and later in 1919 an MA. In 1905. Geoffrey went to Brazil as a construction engineer with the Great Western Railway Company and was given special responsibility by the London Agents for controlling operating costs of the railway construction programme. He returned to England at the start of World War 1 and joined the Inns of Court OTC. He returned from the War with the rank of Lt.Colonel, OBE,MC and joined the partnership in 1919 as Sales Director.

Two of William Adams' eight children joined the partnership. Peter Adams entered the firm at the age of fifteen and showed great artistic ability. He was sent to study at the Royal College of Art and later studied at the Academy School in Paris. On his return to Kidderminster he took charge of designing until his death in 1925. One of his trainees, the artist JP Bland, succeeded him as Head Designer, later Design Director, until his death in 1956. William Adams, a younger brother, also joined the firm and specialised in dyeing, a particularly difficult and highly skilled craft in the days of vegetable dyes. He also assisted his father in works management and was responsible for installing the first 400lb dye vat in the industry at Tomkinson & Adams.

5.3 Transitions

(i) Dissolution of the partnerships

Michael Tomkinson died in 1921 having retained control of the firm until the end. His eldest son, Herbert, who had joined the partnership in 1892 and understudied his father, took over Michael's responsibilities. John Tomkinson, Michael's brother, died in 1924 and Herbert Tomkinson became head of the firm in 1926

The founding partnership came to an end on 30.9.1927, six years after Michael Tomkinson's death. The Tomkinson half of the partnership remained at Mount Pleasant, and the Adams family started in business on their own account and built a new factory elsewhere in Kidderminster.

The Tomkinson part of the business was registerd as a private limited company, Tomkinsons Company Limited, in 1927 with Herbert Tomkinson as its first chairman. Herbert Tomkinson died in 1951 and was succeeded by his brother Gerald who died in 1959. Geoffrey Tomkinson, created a Knight Bachelor in 1955, became Chairman of the company. It is said, that family feuding over the direction of the company prompted their decision to establish the firm as public limited company under the control of an independent chairman.

(ii) Creation of the modern company and overview 1959 - 1986[10]

In 1959, Tomkinsons Company Limited became Tomkinsons (Holdings) Limited, a public limited company in which the Tomkinson family retained a controlling 75% share interest and a strong presence in the management of the new company.

The first chairman of the new company was Sir Geoffrey Tomkinson, the third son of the founder, Michael Tomkinson. Sir Geoffrey retired in 1960 and was succeeded as chairman by Norman G Lancaster, MBE, MA, FCA, who had joined the board when the company assumed public limited liability status. Norman Lancaster, a Chartered Accountant, was the vice-Chairman of Lucas (Industrial) Limited, and Chairman and Managing Director of Wolseley-Hughes Limited, a group of engineering and distribution companies based in the Midlands. He was also a member of the Midland District Board of Martins Bank Limited, Treasurer of the University of Birmingham and President of the Birmingham Chamber of Commerce. The records shows that seven of the eight main board members in 1959 were members of the Tomkinson family and, with the exception of one retirement in 1968, the composition of this board remained constant until 1974. By 1977, all but one member of the original board had retired and Mr KRG Tomkinson, the surviving member, was the only link with the new generation of non-family directors. Mr KRG Tomkinson himself retired in 1985 and with his retirement the family name disappeared from the board. The family continued to own a 55% share of the business and were represented on the board by a grandson of Gerald Tomkinson.

The period 1959 - 1969 witnessed a major review and restructuring of the family business and the introduction of new markets, product lines and manufacturing processes. At the close of this period, which marked the centenary of the founding partnership, the family business once specialising in axminster carpets had become a public limited company with four wholly owned subsidiaries manufacturing and selling axminster and wilton woven carpets, as well as a range of non-woven products manufactured by the new tufted process, and a spinning company supplying the woollen yarn needs of the Group. In addition, the company had selling organisations in France and Germany and owned a one-third share in a carpet manufacturing company in New Zealand.

The carpet industry experienced some of the worst trading conditions in its history throughout the 1970s in addition to which the woven carpet sector was challenged by the tufted carpet sector. For Tomkinsons, the period coincided with the transfer of executive power from the Tomkinson family to non-family managers as the members of the 1959 founding-board retired and a new generation of professional managers joined the company. The company which in 1958 depended entirely on woven axminster, in 1979 reduced its axminster capacity by 50% and brought axminster and tufted operations together under a single administration.

Despite the stringent trading conditions which continued into the 1980s, Tomkinsons pursued a policy of investment and commitment to improving efficiency and the quality of its products now promoted under the selling logo 'Mr Tomkinson makes a better class of carpet'. Sales turnover and profits increased at a time when many companies in the industry suffered the effects of declining markets and over-capacity in the industry. In 1983 the carpet manufacturing activities were restructured to reflect their target domestic and contracts markets

In 1985 Mr KRG Tomkinson, the last of the founding-board members, retired and the Tomkinson name disappeared from the executive board. The family still owned 55% of the shares and their interests were represented by Mr R Pugh-Cook, a grandson of Gerald Tomkinson, the only family member on the board.

Mr LD Maclean, who had joined the company in 1979 as Chief Executive, was appointed Chairman and Chief Executive in 1986. The company continued to manufacture and sell axminser, wilton and tufted carpets and in addition sold an increasing proportion of their output of woollen and worsted yarns. Products were focused to serve selected markets, primarily in the UK, where the Mr Tomkinson and Steeles brand names were established in the domestic and contract sectors respectively to promote products aimed at the middle to top price ranges where quality and styling were the main competitive features. Investment was directed at achieving product and service excellence while increasing operational eficiency and flexibility. The record of never having traded at a loss and of never experiencing the withdawal of support from its workforce is maintained.

5.4 Key events 1959 - 1986

(i) 1959 - 1964[11]

Up to 1959 Tomkinsons specialised in the manufacture and sale of axminster carpets. With the creation of the holding company in 1959, the axminster operation, located in Kidderminster, was registered as Tomkinsons Limited, a wholly owned subsidiary of Tomkinsons (Holdings) Limited, and continued operations as an autonomous unit, responsible to the parent company for financial and overall strategy direction.

In 1959, Tomkinsons (Holdings) Limited acquired the small family firm of I & C Steele Limited at Bloxham in Oxfordshire. Steeles, which on acquisition became a wholly owned subsidiary of the holding company, specialised in the manufacture and sale of wilton carpets for the contract sector of the market. Like its axminster counterpart, the wilton plant operated as an autonomous unit and Mrs Steele, wife of the firm's founder, continued as Managing Director of the subsidiary company.

The period 1959 - 1964 represented a time of both consolidation and extension, highlighted by three new ventures - the installation of a small experimental tufting machine and the creation of a woollen spinning facility, both at the Kidderminster site, and investment in a one-third share in a carpet manufacturing company in New Zealand. In addition to these new directions, investments were made in both axminster and wilton plants to increase production capacity and to improve efficiency.

The drive for efficiency included a restructuring of all management levels, with particular emphasis on increasing the efficiency of the sales and marketing organisation - 1959 being the year of the celebrated restrictive practices court case against the industry for its pricing policies. Each company was responsible for marketing and selling in both the domestic and contracts sectors. The axminster company was also initially responsible for selling tufted lines - an arrangement which proved highly distasteful to the axminster sales force who claimed the new product undermined the reputation of axminster itself.

By 1963 almost all equipment was less than fifteen years old. The programme of investment in more efficient plant and machinery was duly reflected in a satisfactory reduction of labour and in the overall reduction of production costs. The small machine-knotted axminster carpets section in Kidderminster was closed in 1963 to make room for further tufting development and employees were retrained and transferred to the new area.

These activities took place against a background of some difficult trading conditions when credit restrictions affected turnover although there was a stronger demand for axminster products, and the industry's shopfloor unions were exerting pressure for increased wages and shorter working hours. Despite these pressures at industry level, the changes at Tomkinsons were achieved with the cooperation of the workforce throughout the company.

The period ended on a high note with 1964 recognised as a record year for the carpet industry. Tomkinsons' axminster plant worked to capacity and delivery dates were under strain as the company awaited the delivery of new wide looms. Record demands were also noted for wilton products. Although sales of tufted products increased faster than any other lines, the investment here was unable to show a contribution to profits in view of the development and promotion cost incurred in this new product. There was no doubt, however, that tufted would gain considerable market share and plans were based on this assumption. The small woollen spinning plant which was commissionned in 1959 came into production in 1963 and made a significant contribution to strengthening the Group's competitive position through achieving higher efficiencies and quality control.

The export markets in Australia, New Zealand and South Africa proved to be particularly troublesome and, with a view to overcoming the recently imposed import restrictions in New Zealand, the company collaborated with two other British carpet manufacturers and took a one-third share in establishing a carpet manufacturing company in New Zealand.

Other initiatives in this period included the introduction of new man-made fibres as surface yarns, new buildings to house finishing operations for tufting and axminster products, and additional warehousing capacity in Kidderminster and Bloxham, the setting up of a selling organisation in Germany and the use of a computer bureau to provide sales analysis data.

The tufting and spinning operations were both accorded limited company status in 1964 and were registered as Ludlow Carpets Limited and The Mount Pleasant Spinning Company Limited. In creating these new companies, Tomkinsons noted the need to provide real opportunities for promotion and development for younger managers in the Group.

The outlook was sufficiently optimistic and plans were announced to increase the capacity of both these companies.

Ludlow continued to operate on the same site as axminster but now had its own production and administrative facilities, including a small sales force, although some facilities, eg maintenance and personnel services, were still shared and continued to be a source of friction. The name of the company, Ludlow Carpets Limited, was intended to create a separate identity for tufted products and reflected the intended relocation site - Ludlow in Shropshire, a relocation which did not materialise due to government restrictions on development areas.

(ii) 1965 - 1969[12]

The improvement in sales was not maintained in the period 1965 - 1967 as the effect of higher purchase tax on goods and continued economic controls depressed demand generally.

Axminster products were particularly vulnerable to these pressures and although the demand for high quality axminster was sustained, there was a drop in sales of middle and lower quality axminster products. Two 12' axminster looms were expected to be in production by the end of the year and additional looms were on order. Tufted products gained the ground lost by axminster and, although tufted sales increased and showed a modest contribution to profits, profitability of the product was still a cause for concern. Spinning operations were also problematic as essential equipment, intended to double existing capacity, had not been delivered and skilled labour could not be recruited to fill jobs in this plant.

To combat these conditions continued attention was focused on improving efficiency throughout the company. The measures taken included improving labour flexibility in terms of both skills and hours and special attention was given to restoring liquidity which had been strained as a result of the ongoing development programme. Selling prices in 1966 were still at 1964 levels as competition increased in what was now described as the 'fashion trade' conditions in the industry, particularly in the axminster sector. With this in mind, particular attention was given to improving sales forecasting and marketing in what had become a highly uncertain market environment. Steps were taken to introduce trial marketing techniques and to give design staff, in particular, the opportunity to get closer to consumer requirements. Special attention was directed at improving the marketing of tufted products. A new contracts range was launched, the celebrated Studio Three, which included axminster and wilton carpets. Mrs Steele, the Managing Director of Steeles (which specialised in wilton contract sales) resigned from the company.

By 1967 profitability improved and, although purchasing restrictions were eased and tufted sales had improved, axminster and wilton demand continued to be critical. Cash flow was improved by reducing stock levels of axminster products and writing down tufted stock values. Bernat Klein, the famous textile designer, was commissioned to produce axminster designs. The spinning plant was running to full capacity with all output being absorbed in axminster production. Mr NS Hughes joined the tufting company to reorganise marketing and to introduce techniques operating in the American tufting industry.

The following year, 1968, saw increasing demand for all three main product lines to such an extent that the company was unable to meet immediate deliveries of 12' wide axminster carpets as a result of its decision to reduce axminster stocks in the previous year. The benefits of the efficiency programme were reflected in the end of year results which showed better contributions to profit from axminster and, for the first time, substantial contributions from tufted as product lines were switched to meet mass market needs. Only wilton, despite higher turnover, showed a drop in profits. Spinning activities were operating at high levels of efficiency, despite continuing problems with shortages of skilled labour. The plant increased its profits substantially and plans were announced to increase spinning capacities still further.

1969 marked the centenary of the Tomkinson business. Despite higher turnover across all product ranges, profits were under pressure as the company struggled to compete in a market hampered not only by continuing government intervention in consumer spending, but also by considerable supplies of carpets being dumped on the market as companies in the industry collapsed. Tufted carpets were particularly vulnerable in this harsh trading environment and, despite an increase of 20% in sales turnover, profit margins were reduced as competitive pricing resulted in considerable pressure to reduce prices against a background of increasing raw material prices.

Faced with these pressures, and as a result of New Zealand Government action on foreign investments in that country, the company disposed of its one-third interest in the New Zealand carpet manufacturing company. The funds released by this move enabled the planned investments, particularly the extension of the spinnning capacity, to proceed. Spinning operations showed lower profits as wool prices increased and as the plant continued to face severe problems in recruiting skilled labour. A decision was made to transfer spinning operations to mid-Wales, a move which attracted government investment grants and which released space at the Kidderminster site to facilitate further expansion of tufting operations.

Despite increased raw material prices the wilton plant was able to increase both turnover and profits. Yet again, particular attention was given to improving and strengthening contract carpet operations by extending the contract range to include, for the first time, factored tufted products and by transferring all responsibility for the contract sector to Steeles, the wilton manufacturing subsidiary.

(iii) 1970 - 1979's

The industry experienced some of the worst trading conditions in its long history throughout the 1970s. There were raw material shortages and price increases, a sterling policy which created difficulties in export markets, government price controls, cheap imports - first from the USA and then Belgium, both benefitting from the oil subsidies operating in those countries. In addition, consumer spending was declining generally and the share of spending on carpets was reduced. Price competition in the industry increased as carpet firms went out of business and their stocks were dumped on the market. Despite the reduction in the number of firms, the industry still carried excess capacity, much of this being due to over investment in more efficient technology which, together with more efficient operating methods, gave higher levels of productivity.

Tomkinsons not only survived these adverse conditions but did so while maintaining its reputation for never operating at a loss and never experiencing a withdrawl of cooperation from its employees. In some years record profits were achieved although in others it was operating close to break-even point.

Profits were up 33 1/3 % in 1970 reflecting the company's new market-led orientation, its strong management team and the benefits of the ongoing drive to improve operating efficiency. Although contract sales were down, axminster and tufted sales improved. The spinning plant was re-located to Wales as planned and fully operational and making a good contribution to profits despite continuing recruitment and training difficulties. Further investment to increase production capacity by 50% was in hand, representing the Group's largest ever single investment.

This pattern of trading continued through to 1973 with profits up 42% on the previous year in 1971, demand for axminster up 21%, tufted up 50% and wilton up 11 3/4 %. The focus on improving efficiency remained a feature of company activities, with particular attention being given to improvements in production areas to overcome raw material shortages and price increases, particularly wool prices which were at their highest since World War II. Axminster loom efficiencies were improved and a new 15' spool axminster range was launched - a world-wide first and a major success. In tufting, efficiency measures included investment in a new foam backing plant in 1972 to reduce processing time and give more control over production scheduling and quality.

To exploit the advantages to be gained in improving efficiency throughout the Group, a new non-trading company, Tomkinson Development Limited, was established in 1972.

A major new project, warp printing, a new printed carpet process, was started in 1972, and a new company, St Mary's, established on the Kidderminster site to launch the new product directed at the medium-price market and expected to increase turnover by 20%.

Demand suffered in 1974, the year of Flixborough (where a fire in a chemical processing factory threatened supplies) and the three-day working week and profits were down on the previous year. Materials shortages and price increases handicapped axminster sales which were switched to a lower price range. Narrow wilton markets proved difficult although Steeles turnover and profits increased as factored tufted goods made a significant contribution to performance and augured well for the company's own tufted range scheduled for the following year. Despite an overall decline in demand, tufted increased its market share and profits were above the industry average. The spinning company made steady progress although output was restricted by the three-day week. St Mary's, the new printing venture, commenced production in January 1974 but experienced significant difficulties when production equipment required substantial modification.

By 1975, prices fell as both domestic and foreign competitors de-stocked, although the lower prices could also be attributed to improved technical and operating efficiencies. In these conditions, the lower-price axminster lines were particularly vulnerable and the company reversed its short-lived policy to trade-down axminster products. Tufted sales, despite a 25% increase in turnover showed less profitability as rising raw material prices had to be off-set against selling pices which were still at the 1965 level. Contracts also experienced hostile trading conditions despite the wider product range now also featuring its own tufted lines. Spinning, despite high material costs and labour shortages, made a contribution to profits and plans were made to exend production to include semi-worsted yarns.

The yarn printing project, started in 1972, failed to show the anticipated returns and the project was abandoned, the plant and equipment being sold back to the suppliers at cost price, under the terms of the purchase agreement.

Tomkinson Development, the non-trading company, was renamed Tomkinson Services. The Managing Director of this company, one of the first non-family graduates to join the firm, was appointed to the main board and was given a wider group brief which included the marketing of all new products and the achievement of improved co-ordination and communication within the Group without detriment to the autonomy of the subsidiary companies.

Mr KRG Tomkinson, one of three remaining directors of the main board in 1959, the others having retired, took over the Chairmanship from Mr NG Lancaster who remained on the board until he retired in 1977. A second new appointment to the main board was Mr R Pugh-Cook, a grandson of Gerald Tomkinson, who was appointed Managing Director of the Group, having joined the company in 1955 and actively involved in setting up the carpet manufacturing company in New Zealand.

Group profits declined again in 1976 although axminster profits were 50% up on the previous year and exports 100% up on the 1975 figure although trading conditions were still hostile. The company's assets were revalued and the surplus transferred to reserves.. Contract sales,in particular, met with severe competition as buyers looked to cheaper alternatives to the traditional wilton floorcoverings,and Steeles again extended its product range to include a wider range of factored tufted carpets.

Tufted operations experienced a trading loss due to rising raw material prices and a downturn in the lower price market which also faced fierce price competition as both UK and German manufacturers de-stocked. Tufted products were refocused up-market and the new product range had considerable success in both UK and overseas markets.

Raw material prices also affected spinning operations, particularly wool prices, although forward buying reduced the full impact of the price increases. The new semi-worsted plant was now fully operational and gave excellent results. Plans were agreed to increase spinning capacity by

50% and to sell yarn externally and, with this in mind, the company was re-named Mid-Wales Yarns Limited and identified as a major investment area.

Substantial savings and benefits accrued from the activities of the redefined Group Services company as project teams exploited the considerable expertise available within the Group and the Savings related Share Option Scheme generated much interest. Even the transport department, with an extended fleet, made a contribution by undertaking not only more of the company's own deliveries but by also undertaking outside work. The Report and Accounts for 1976 notes that although co-ordination had improved considerably, there was still scope for better communication and a better understanding of and commitment to the benefits of teamwork throughout the Group.

The depressed trading conditions in the domestic market continued in 1977, putting considerable pressure on cash flow and the need for tighter controls as raw material prices increased, particularly wool prices which increased by 28%. and carpets began losing their share of consumer spending. Sales were switched to export markets to relieve some of this pressure but inevitably currency exchange rates and longer credit periods put a strain on cash resources.

Axminster products experienced the worst trading periods in its history but, nevertheless, managed to show a profit. Steeles contract sales improved at home and overseas as the company's factoring policy enabled the company to demonstrate greater flexibility in meeting customer requirements. Tufted sales in this sector improved and carpet tiles in luxury qualities were a particular feature.

Tufted operations, however, showed substantial losses which prompted a major review of all tufting operations. The outcome of this review was a new strengthened management team, including the appointment of a new Managing Director, Mr T Hughes, a new product range, the writing-off of overseas debts and yarn stocks, and a team of new overseas agents.

In spinning, the increased 50% capacity came on stream and the increased level of sales and sale of surplus assets, contributed significantly to Group profits. The company was now well positioned to offer a wide range of wool, worsted and synthetic yarns and 28% of its production was sold outside the Group.

The project teams working under the direction of Group Services made significant progress in promoting a better understanding and awareness throughout the Group. Co-ordination had improved and the launch of the new ranges, concentrating on plain colours and a new approach to patterning, demonstrated the integration between the various units within the Group and with the Group's fibre suppliers.

In 1977, Mr KRG Tomkinson stepped down as Chairman when Mr NG Lancaster retired and his son, Jeremy Lancaster, joined the board and was appointed Chairman. Mr EF Tomkinson, a member of the fouding board, also retired that year.

Cash flow was critical in 1978 as the company funded new product ranges and increased levels of work-in-progress to service new large contracts. Like many other companies in the industry at this time, Tomkinsons took advantage of the Government's Temporary Employment Subsidy to maintain employment levels in 1978. To effect savings in administration, distribution and management costs, both axminster and tufting operations were brought together under a single administration to form a new company, Tomkinsons Limited. The assets and liabilities of the former Tomkinsons Limited (the axminster operations) and Ludlow carpets (tufting operations) were transferred to a new parent company, Tomkinsons Carpets Limited (formerley Tomkinsons (Holdings) Limited). Mr T Hughes resigned from the main board on 31.12.78. having been appointed some twelve months previously to run the tufting company..

Axminster products faced heavy discounting in the UK market and sales were switched overseas and the company was successful in securing valuable orders in the USA for hotels and casinos. Tufted new ranges sold well overseas particularly in the highly competitive European market, resulting in a substantial contribution to Group profits. Contract sales, with its wide product range, recovered and did well with wilton but tufted ranges were still difficult. Even Spinning, the usually strong performer, was unable to take advantage of the strong demand for semi-worsted yarn when the new plant had taken longer than expected to achieve the required levels of output. Management changes were made and further investment was planned in woollen plant to ensure that the company remained competitive in supplying yarns to both the woven and tufted carpet sectors.

Profits fell again in 1979 despite the measures taken in 1978 short-term borrowing increased considerably in 1979 and additional action was necessary to bring production capacity into line with requirements. Mr Lowry Maclean, trained at MITs Sloan Business School in the United States and experienced in both the British carpet and the American textile industries, was headhunted and appointed to the main board as Group Chief Executive on 1.6.79.

The market for patterned axminster, in which the company had a considerable stake, suffered largescale contraction and contributed to the losses made in this division. Demand for high quality axminster remained and axminster products were refocused accordingly and axminster marketing featured quality tufted plains and textured lines. Axminster stocks were reduced and plans were announced to reduce axminster capacity by 50%.

Tufted operations showed profitable growth based on a considerable increase in turnover. The strong product development team were well ahead of competitors in developing new lines, and the indications were that tufted sales value would soon exceed axminster sales enabling the company to withdraw from unprofitable export commitments.

Contract sales were again successful , particularly with specialised tufted products. Wilton sales also increased but experienced strong competition from axminster products. The company was actively promoting a new range of contract axminster carpets, manufactured within the

Group, with a view to increasing its share of this important new contract sector.

Spinning turned in a good performance with its plant now fully operational and, under an excellent management team, demonstrated its flexibile capability in meeting demand for both woven and tufted yarns. The bulk of its ouput continued to be used within the Group but a significant quantity of semi-worsted yarns was sold to other manufacturers.

Following the retrenchment in axminster capacity and the merger of the tufting and axminster operations, the workforce was reduced from 720 to 445 and management staffing was cut by half. These changes resulted in some management resignations, including Mr RWL Pitt an executive board director. Nine new senior managers were recruited, five of them MBAs, underlining Mr Maclean's policy of emphasising managerial rather than carpet expertise in senior appointments.

In summary, the 1970s witnessed some of the worst trading conditions in the carpet industry's long history. Many carpet firms failed as cheap imports, government economic policy and increasing raw material prices put companies under severe pressure. The period witnessed the growth of the tufted carpet sector and the decline of patterned axminster carpets. The company continued its policy of investment in securing both efficiency and innovation and Tomkinsons not only survived but did so without experiencing a trading loss and, in some years, achieving record turnover and profits.

Axminster production, once the only product manufactured by Tomkinsons, was reduced by 50% as tufted products gained market share and the two manufacturing divisions were merged under a single management. Steeles, which initially relied on wilton products only, extended its range to include both axminster and tufted lines.

Spinning production was re-located to Wales and in addition to meeting the company's own yarn requirements became a supplier of woven and tufted yarns to other carpet manufacturers.

The constitution of the 1959 founding executive board changed from being a predominantly Tomkinson-family board to a predominantly non-family board.

Towards the end of the period a new chief executive was appointed from outside the company. Management changes included the appointment of nine new senior managers, five of them MBAs, signalling an emphasis on management rather than carpet expertise in the new regime.

(iv) 1980 - 1986[14]

Although demand showed signs of improving from 1983 onwards, reduced consumer spending, high interest rates, strong currency, increasing raw material prices, cheap imports from the USA and from Belgium, fewer housing starts and the miners' strike all contributed to the industry's difficulties in the period 1980 - 1986.

Trading conditions were difficult in all sectors of the industry in 1980 with reduced consumer spending, high interest rates and a strong currency. Tomkinsons focused attention on improving the cost-effectiveness of selling and improving the market presentation of its products under a new retailer-directed slogan - Mr Tomkinson makes a better class of carpets. Tufted sales improved, and plans were announced to increase production capacity in fine-scale, softly coloured designs. The planned reduction of axminster capacity proceeded according to plans with the goodwill and support of employees at all levels. Contract sales had a good year and had established a strong profile in the high quality sector which still favoured a high wool content in carpets. In spinning, demand for wool yarns was lower and changes were made to relocate plant to give a more compact unit with considerable strength in the tufted yarn market at a time when demand for such yarn exceeded supplies.

Profits for 1980 showed an 88% improvement on the previous year and substantial improvements were made in liquidity. Assets were again revalued and the surplus over 1974 book values was transferred to reserves. Imports from the USA declined but a new threat emerged from Belgian tufted imports and trading conditions remained bleak. Sales turnover increased by 14% under the 'Mr Tomkinson' marketing image and the company's new product strategy of offering only carefully researched products providing reasonable profit margins. Further investments were made in equipment, including more effective handling mechanisms and computers on the shopfloor to monitor work in progress and in design, to enable the company to produce even more distinctive quality ranges and to do so more efficiently. Particular attention was directed at reducing the level of faulty production. High exchange rates made exports unprofitable and the company made strategically planned withdrawals from such commitments. Both contracts and spinning operations performed well, the latter still operating in conditions in which demand exceeded supply.

These measures, introduced with the co-operation and commitment of employees throughout the Group, resulted in faulty production being reduced from some 15-20% to 2%. Profits and liquidity improved again in 1981 and the company was able to eliminate interest charges in one of the most challenging periods of change and a year in which the industry faced bleak trading conditions.

Belgian imports increased in 1982 as both domestic and overseas markets declined and the industry faced the worst effects of the UK recession. Tomkinsons carefully research-positioned products performed well and with the loyalty of employees, customers and suppliers, company profits were up 88% on the previous year on an increase in turnover of 4% - this at a time when the UK market had shrunk by 15% since 1979 and carpet stocks were being dumped at prices reaching a record low of 9p a square yard as companies went into receivership.

These outstanding results encouraged the company to recruit new employees who were technically well qualified and who could demonstrate a strong commitment to achieving excellence.The company announced plans to launch a new employee savings-related share option scheme to take advantage of the beneficial tax treatment under the Finance Act 1980. To comply with company legislation the company changed its name to Tomkinsons plc and at the same time the assets and liabilities of the parent company were transferred to the axminster and tufting manufacturing subsidiary, Tomkinsons Carpets Limited (formerly Tomkinsons Limited), except for land and buildings which remained assets of the parent company.

The industry benefitted from some increase in demand in 1983 alhough it still faced problems with Belgian imports. Tomkinsons turnover remained flat but all operations traded profitably as margins improved due to the continuing success of the 'Mr Tomkinson' market image and the company's commitment to improving quality, service and efficiency. The low tax charges for the year reflected the company's £1.4m investment to achieve these aims. Profits increased by 36% on the previous year and the company recorded an increase in profits for the fifth successive year. Steeles. the Oxfordshire company, was redesignated the Contracts Division for the company with special responsibilities for all contract sales within the Group. The spinning company, now supplying some 30% of the Group's yarn requirements and still operating under conditions where demand exceeded supply, was recognised as supplying yarns equal to the best in Europe.

Increasing raw material costs and high overheads relied on a high marketing performance to increase turnover, while the profitability of products and operational efficiency resulted in all divisions trading profitably, but although still in profit, the five-year record of increasing profits was not maintained in 1984. Product excellence and further gains in efficiency were highlighted as major objectives and further investments were planned and directed accordingly. 30% of the Group's yarn requirements were now supplied through Mid-Wales Yarns which continued to operate at high levels in a market where demand exceeded supply. The quality of yarns produced were recognised as being equal to the best in Europe, and further investment was made to increase output.

In 1985, the company recorded profits which were 208% above the previous year on a turnover which was up 13% on the previous year. These outstanding results were achieved in a year in which the UK economy suffered from high interest rates, few housing starts, the miners' strike and continuing inflation. The results demonstrated the effectiveness of the company's strategy which concentrated on supplying well-styled and profitable products to selected markets under the Mr

Tomkinsons brand. The product image was strong in the UK market which absorbed over 80% of the Group's output, and overseas, the company benefitted from concentrating in the USA which enjoyed a buoyant economy.

In November 1985, Mr KRG Tomkinson retired from the executive board, the last of the 1959 founding board members. For the first time since its foundation in 1869 the firm was without a Tomkinson by name on the board, although the family was still represented by Mr Richard Pugh-Cook, a grandson of Gerald Tomkinson. Mr J. Curwen, MSc. Dip Inst M, M Inst M, was appointed to the executive board on 2.12.85. having been the marketing director of Tomkinsons Carpets Limited for a number of years. Mr Jeremy Lancaster stepped down as Chairman on 11.2.86 and was replaced by Mr Lowry Maclean as Chairman and Chief Executive.

The Report and Accounts for 1985 state the main objectives of the company as being to continue to supply the retail sector where the company would continue to develop the excellence of key retail accounts; to build on solid growth in contracts; and in exports to focus on the USA markets where the company had already established a considerable profile.

Profits and Turnover increased in 1986 by 69% and 19% respectively and despite high investment to improve product quality long-term borowing had been eliminated. The company continued to emphasise its commitment to organic growth in the UK market where the Mr Tomkinson and Steeles brands were well established.

In summary, against a background of continuing emphasis on and investment in promoting innovation and efficiency, Tomkinsons redefined its product range and markets. This strategy of carefully researching and positioning profitable products was supported by promoting and servicing its product range under a new market image - Mr Tomkinson makes a better class of carpet.

During the period, the company increased its turnover substantially at a time when other companies were feeling the effects of declining markets and over capacity in the industry. Within this period the company was renamed Tomkinsons plc and its two main carpet manufacturing subsidiary companys were refocused to reflect markets rather than products. Mid-Wales Yarns, the third subsidiary company, extended its range of products to include both woven and tufted yarns to meet a large part of the company'a own yarn needs and also supplied yarns to other carpet manufacturers. In 1985 Mr KRG Tomkinson, son of Geoffrey Tomkinson and the last of the 1959 founding-board directors, retired and the Tomkinson name disappeared from the executive board, although the family continued to hold a 55% share interest in the company and was represented by Mr Richard Pugh-Cook, the grandson of Gerald Tomkinson. Mr. L Maclean, who had joined the company as Chief Ececutive in 1979, took over as Chairman and Chief Executive of the company in February 1986.

CHAPTER 6: TOMKINSONS: PRODUCTS, CORE TECHNOLOGY AND OUTLINE PRODUCTION PROCESS

6.1 Introduction:

As Chapter 5 has shown, until 1959 the founding company specialised in axminster carpets. With the creation of the holding company in 1959, the company diversified, by acquisition, into wilton carpet manufacture and also began experimenting with the new tufting carpet process.

The axminster and wilton units, located at Kidderminster in Worcestershire, and at Bloxham in Oxfordshire respectively, continued to operate under their former management regimes as wholly owned subsidiaries of the holding company.

The tufted unit, located at the site of the axminster company, initially operated as a cost centre of the holding company and was accorded company status in 1964 when it continued to operate on the axminster site. All three companies were under the chairmanship of Mr KRG Tomkinson, an executive board director with responsibility for production. Mr Tomkinson also initiated and controlled the day to day operations of the tufted operation.

In 1978 the axminster and tufting operations although retaining separate market identities were brought together under a single administration and the following year axminster capacity was reduced by 50%. Further restructuring of the carpet manufacturing activities in 1983 resulted in two wholly owned subsidiaries representing domestic and contract markets and manufacturing axminster and tufted, and wilton and tufted respectively - although the wilton company also had wide access to factoring facilities outside the Group.

The remainder of this chapter describes the axminster, wilton and tufted units in terms of their own distinctive products, core technology and manufacturing process. Major changes in these areas are noted with a view to identifying the incidence of radical and incremental innovations within the period under review.

6.2 Axminster: Products, Core Technology & Outline Production Process

6.2.1 Products and Core Technology[3]

The characteristics of the distinctive axminster weave and the evolution of the distinctive manufacturing process from handloom weaving to powerlooms have been documented elsewhere - see for example Tatersall[3] and Bartlett[4]. For the purposes of this study[5] it is necessary to point out that the distinguishing characteristic of the product is its unlimited capacity for incorporating colour and pattern. The quality of the product is determined by the quality of fibres used and by the number of tufts of yarn per square inch of cloth. Carpet looms are constructed to weave to a given pitch and product variations to suit particular market sectors is determined by pattern/ colour/pile height and the overall quality/density of the fibre per square inch. Generally speaking, competition in the axminster sector is on the basis of quality and pattern although price is a competitive factor in the lower quality domestic market. Successful patterns offer the advantage of long production runs although the competitive advantage here has a relatively short span as patterns are easily and quickly copied.

The partnership of Tomkinsons and Adams was founded in 1869 to manufacture axminster rugs, initially using the hand-operated chenille axminster process and soon afterwards by the chenille powerlooms invented and patented by William Adams. The partnership ordered seventy-five of these looms for their own use and licensed the chenille patent to other manufacturers, including Templeton's of Glasgow (William Adams' former employer) and to R Smith in Kidderminster.

By 1871, with some 170 employees, the firm exhibited at the International Exhibition in London and claimed that they made match rugs for the whole trade and that there were no floorcovering designs with which they were not familiar. The chenille power looms increased output so rapidly that sales were extended to overseas markets, especially to the United States of America, where Michael Tomkinson established a strong personal friendship with Sloanes of New York and through Sloanes gained access to the new spool axminster weaving process.

The first spool axminster loom, developed in the United States by Halcyon Skinner, an independent inventor, was erected in 1877 by Alexander Smith of Yonkers, New York, and proved an immediate success. As previously noted, Michael Tomkinson secured the British patent rights to the new spool axminster process and in 1878 launched the first British spool axminster product, Royal Axminster, a 5-pitch carpet, which captured the market.. The partnership granted licences to six other British carpet manufacturers. Brintons (Case Study Two) declined Tomkinsons' offer to participate in the new venture.

By 1888, with 800 employees, the partners produced 4,000 rugs per week. Some idea of the impact of the new spool axminster process can be gained by comparing the output of the old and new processes. The old process required three people to produce 1½ yards of axminser in a working day. The new process which in 1879 was also producing 7-pitch cloth, produced 20 to 25 yards of 27" wide axminster in the same time[6]. As previously noted, in the chenille weave the firm offered all widths from church seating to 28' widths in all lengths, and railway rugs for first-class carriages.

In 1896 Michael Tomkinson secured the British patent rights to Haylcon Skinner's wide axminster spool loom. Michael's son, Gerald Tomkinson, was responsible for installing the axminster wide looms in Kidderminster and succeeded in overcoming the teething problems which the inventor had been unable to resolve, giving Tomkinsons the distinction of being the first manufacturer in the world to produce wide-loom axminster carpets. The new plant, called Kleitos, the name given to the famous range of seamless axminster carpet squares made on these wide looms, remained in production at Kidderminster until the looms were progressively replaced from 1954 onwards by modern versions of the loom supplied by Platts, the textile machinery manufacturers, with whom Gerlad Tomkinson collaborated in developing the spool axminster loom[7].

By 1903 the bulk of the partnership's output consisted of seamless axminster bordered squares, although chenille axminster carpets and hand-made rugs continued to form an important part of their product line[8].

As already noted, after approximately 1900 when axminster spool broadlooms began gaining wide acceptance in the industry, there is no record of any significant spool axminster weaving innovations. Incremental changes were, however, introduced over the years, the most significant being the split-shot system in 1926 and, in the 1950s, broadlooms with single-span tube frames were perfected. Both these and other developments acted to increase the operating speed and reliability of the looms. Tomkinsons, working with Platts, are recognised as having a significant role in improving spool axminster loom performance.

A spool axminster loom is constructed to produce carpet with a particular pitch (ie the number of tufts per inch in the horizontal row) which cannot be altered within a given loom, although different looms may be constructed to accommodate a lesser or greater pitch within a range of 4 pitch to 15 pitch. Generally speaking the greater the pitch the finer the quality of the carpet. Product variations may be incorporated within a given pitch by varying the number of vertical rows per inch so that overall product quality is determined by the type of fibre used and the density of that fibre per square inch. Technically the spool axminster process can incorporate an unlimited number of colours and thus has a highly flexible pattern capability. In practice, the number of colours and patterns depend on market taste.

Tomkinsons adopted its present 7 pitch axminster cloth in the 1930s and this pitch is widely used in the industry today. Around this basic 7 pitch construction the company manufactures for stock a range of products aimed at the middle to top end of the market for domestic sector. Major quality and styling changes are introduced annually, or more frequently to meet market requirements. In addition, the company manufactures axminster carpets to customer specification for the contracts sector.

Production of chenille axminster carpets was not resumed after World War Two. The small and highly specalised machine-knotted axminster plant, committed to very expensive customised orders, was dismantled in the 1960s.

While the basic structure of the axminster product has remained unchanged since the company adopted a 7 pitch cloth in the 1930s, major product change has been in terms of yarn innovations led by the major fibre manufacturers. Before the 1950s wool was the standard surface fibre. This material has superior qualities in terms of resilience and dye properties. It is not, however, a particularly robust fibre and has to be used in significant quantities to produce a hardwearing surface which results in an expensive final product. In addition, wool supplies are notoriously erratic and subject to price and quality fluctuation. During the mid-1950s and early 1960s the company introduced nylon as a surface fibre and experimented with vaious combinations of wool and nylon mixtures. By the late 1960s, Tomkinsons had adopted the industry-wide 80/20 wool/nylon blend which remains the industry norm today. Other product innovations include the quality and range of dyes and surface treatments such as fireproofing, mothproofing and stain resistance. Design concepts were also modified to suit the conracts sector where axminster products featured in Steeles Studio Three range.

Loom efficiencies were improved throughout the 1960s as existing looms were modified and/or replaced by 12' looms. By 1971 looms were able to weave 15'wide carpets and Tomkinsons achieved a world-wide first with the launch of a new 15' wide axminster range.

By the 1970s when the woven industry faced severe price competition, Tomkinsons in line with many other manufacturers, resorted to very cheap acrylic surface fibres and the quality of some of their axminster products dropped to as low as four rows per inch in the period 1974-75. This policy was quickly reversed as demand for quality axminster resumed, particularly in the contracts sector which formed an important outlet for axminster production throughout the 1970s when tufted products gained an increasing volume share of the domestic carpets sector.

In 1978 the Group faced severe cashflow difficulties and a large decline in axminster demand. The axminster and tufting companies was brought under the control of a single administration to form a new company, Tomkinsons Limited, although they continued to trade as separate identities. The following year axminster capacity was reuced by 50%. The product range was reduced to reflect carefully positioned products offering higher profit margins and were sold under the new 'Mr Tomkinson makes a better class of carpet' logo. The introduction of the logo was itself an innovation as branding in the woven industry has a low profile and advertising and promotion tends to be on an industry rather than an individual company basis. In 1983 the axminster unit was aligned more closely with the tufting unit to concentrate on manufacturing and selling colour co-ordinated carpets for the domestic sector.

In 1986 the company manufactured six ranges of axminster carpet for the domestic sector of the market. Five of the qualities fell very much within the industry average and faced tough competition. The sixth product line was geared to the top-end of the domestic market and here Tomkinsons had only two competitors. Customised axminster carpets are still accommodated as necessary.

In summary, the axminster product range is based on a cloth construction which has remained unchanged since the 1930s. Product innovation has been in terms of changes in raw materials, particularly surface and backing fibres and the width of the carpet woven. Major styling changes are introduced annually and manufactured for stock. The production system permits pattern changes to be incorporated relatively quickly - for example, to accommodate market shifts in pattern and colour, or to make carpet to customer order for the contract sector. Loom technology has changed little since the early 1900s with the adoption of broadlooms although there have been modifications which improved the running speed and reliability and resulting in automated axminster looms.

6.2.2 Outline Production Process

Figure 5 presents in diagramatic form the stages involved in making spool axminster carpet and this sequence of stages has remained unchanged throughout the period under review.

Table 1 lists the technological and process changes that have been implemented during this period and describe the basic purpose of these changes. As this information demonstrates, there have been a number of improvements at all main stages of the manufacturing sequence which have been aimed at improving the

Tomkinsons: Outline Axminster Production Process — Fig 5

> > >	Pre-dyed Yarn received into Store	
Stage 1	W I N D I N G	Transferring yarn from hanks to cheeses
	↓	
Stage 2	S E T T I N G	Yarn is wound from cheese to spools in design sequence
	↓	
	(Threading)	Yarn ends are drawn into position on spool
	↓	
	CHAINING	Spools chained into position on loom including backing fibres
	↓	
Stage 3	W E A V I N G	Simultaneous integration of surface and backing materials
	↓	
Stage 4	F I N I S H I N G	
	↓	
	I N S P E C T I O N	
	↓	
	M E N D I N G	
	↓	
	B A C K I N G	
	↓	
	S H E A R I N G	
	↓	
	M E A S U R E D & R O L L E D	
	> > >	Transfer to Warehouse

Source: Interviews

Table 1

Tomkinsons: Axminster Production Process Changes 1959 - 1986

Process	Change	Effect
1. Winding	Cheeses in mid-1950s	More yarn per cheese Saving down time
	Holts Model K Gilboss Savio Axwell	Faster Machines to reduce unit costs Yarn & dyeing changes to improve quality/ handling and costs
	Yarn innovations	Performance/quality/cost
2. Setting	Tensions adjusted by pneumatic system	More even spool loading to facilitate weaving
3. Weaving	Pneumatic stop motions introduced - most developed internally some by loom suppliers	Multi-loom weaving from mid-1950s - company pioneered this change
	Lubricating systems Tecalamit one-shot	Less wear & tear on looms
	Loom construction materials changed	Faster speeds eg from 14 rpm to 20 rpm
	Wider Looms	Product improvement/ costs
4. Finishing	Lighted picking tables	Easier fault finding/mending
Backing	Most significantly to latex backing	Improve product appearance
	Ovens & Equipment	Process larger quantities
Shearing	Updating machinery	Reliability and speed - costs and product quality

Source: Interviews

overall efficiency of the manufacturing operation and/or improvements in product appearance/performance.

As Figure 5 shows, the production process consists of four main stages and utilises plant and equipment which is dedicated and specific to axminster production. The processing system, utilising equipment which is generally available to the carpet industry, is organised on a progressive flow system geared to batch production of products aimed at the domestic sector. The same production facilities service customised orders for the contracts sector, the degree of emphasis given to accommodating such orders depends largely on the performance of the domestic sector. As noted, the contracts sector proved an important outlet for axminster products when the domestic axminster sector was under pressure from tufted products.

Following the sequence of production given in Figure 5 , at Stage 1 yarn is received into the axminster store and is then scoured and dyed and dried according to batch requirements. As Table 1 shows, innovations at this stage have been directed at improving the quality of colour and/or achieving savings in time and costs. Efficiency here also depends on the scheduling of dye colours to reduce unnecessary downtime incurred in cleaning vats to prevent colour contamination. Significant efficiency gains were achieved from 1959 through backward integration into yarn spinning. (The spinning subsidiary company is managed as a separate unit which services all three carpet manufacturing units and it is not included in this review of product and process profiles).

At Stage 1 also, the yarn is wound from hanks to cheeses. Changes here include investment in high-speed and more reliable winding equipment capable of producing larger cheeses to achieve savings in labour costs and also improving the quality of work, and improving efficiency in terms of greater throughput and reduced downtime.

At Stage 2, setting involves transferring the yarn from the cheeses to the spools in the correct colour and quantity of yarn to correspond with a given pattern supplied by the Design Studio. As Table 1 shows, there has been little significant change here other than minor modifications to improve the consistency of tensions to reduce downtime at the weaving stage.

Spools are then threaded to draw yarn into position for weaving and the spools are then chained together on the loom in a sequence which corresponds with a given pattern, the number of spools being determined by the quantity of carpet to be woven. As Table 1 shows, there have been no changes in this stage during the period under review.

Weaving at Stage 3 involves the simultaneous integration of backing and surface fibres to form the carpet. As Table 1 shows, innovations at this stage have been aimed at improving efficiency through increasing the width and operating speeds and reliability of looms, automatic fault detection mechanisms and one-shot lubricating systems. Improvements in machine efficiencies contributed to labour efficiencies through reduced maintenance costs and the de-skilling of weaving operations enabling the introduction of multi-loom weaving.

Stage 4, finishing, includes a number of operations from quality inspection to rolling the carpet for transfer to the warehouse. The carpet is inspected and faults are corrected manually. The only major change here is in the design and lighting of inspection tables. (A system for continuous 'behind the loom' inspection and mending was tried and discarded due to the obvious bottleneck arising out of the pacing of machine-controlled weaving and manual inspection and mending). After inspection and mending the carpet backing is reinforced and here the single most signifcant innovation is the change from sizing, the traditional backing agent, to latexing which many traditionalists in the woven carpet industry, including the Tomkinsons family. initially opposed. Investment in latexing and ancillary equipment has enabled the processing of larger quantities at greater speeds and in improvements to product performance. Like the weaving operation, the backing operation is automated and includes an automatic fault detection mechanism.

The final stages in finishing involve shearing the surface pile of the carpet and measuring the carpet. As Table 1 shows, improved efficiencies have been achieved through investment in equipment giving greater running speeds and more reliable machine performance. The carpet is then rolled and transferred to the warehouse. The warehouse itself is outside the control of the axminster production activity and is not included in this review. The warehouse, however, has also been the focus of significant investment to improve efficiency through for example new buildings, improved workflow arrangements, mechanisation and computerised stock records.

6.3 Wilton: Products, Core Technology & Outline Production Process

6.3.1 Products and Core Technology

The history of wilton, introduced to Britain from Europe around 1720, and the distinctive nature of the product and the evolution of its distinctive weaving process have been documented elsewhere - see for example, Tattersall[10] Bartlett[11] and Robinson[12]. For the purposes of this study[13] it is necessary to note that the distinctive feature of the product is its high material content and consequent durability. The quality of the product is determined by the quality of fibres used and the number of tufts per square inch of cloth. Looms are constructed to weave to a given pitch and product variations are achieved by pattern/colour/pile height and the overall density of fibre per square inch. Traditionally the surface pile was uncut and the carpet was known as brussels. Later the pile loops were severed to produce a cut-pile or velvet carpet known as wilton. Pattern and colour variations are less flexible in comparison with axminster, and the number of colours that can be carried is determined by the construction of the carpet loom.

The product is expensive because of its inherently high material content and competition is on the basis of quality and pattern. Competition in the contracts sector relies on the capability for executing wide-ranging specifications in terms of design concept, product performance, customer service and reliable delivery.

Power was applied to brussels looms in 1845 by Bigelow in the United States and licensed to John Crossley of Halifax[14]. The most significant advance since that time was the development of the face to face loom in 1947 by Van de Wiele of Belgium[15]. The face to face loom weaves two carpets simultaneously with considerable savings in both materials and labour and because the carpet surface is not visible at the weaving stage, looms incorporate electrical stop and fault identification mechanisms. Since the development of face to face weaving and its extension to wide looms, the trend has been to increase the running speed and reliability of the loom and Robinson[16] claims that yarn strength is the limiting factor to achieving even greater speeds. Wide looms up to 12' wide were introduced around 1900[17].

Tomkinsons diversified into wilton carpet manufacture in 1959 when it acquired I & C Steele & Co Limited, a small family business in Bloxham, Oxfordshire. On acquisition Steeles became a wholly owned subsidiary of Tomkinsons (Holding) Ltd and continued to operate under its former management structure under the Chairmanship of Mr KRG Tomkinson, the executive board director responsible for production.

I & C Steele & Co Ltd, specialists in wilton carpets, was established in 1946 when two brothers set up their one second-hand 27" wilton loom in a shed in Halifax, Yorkshire[18]. Within twelve months the need for more space together with the shortage of labour in Halifax prompted the relocation of the business to Bloxham in Oxfordshire. By 1950 Steeles had three 27" wilton looms producing 8-pitch traditional wilton designs in all wool plain velvets and brussels for the top end of the retail sector and the interior designer trade. Ian Steele was responsible for all production activities and Clive Steele covered the commercial side of the business. Selling was undertaken either by Clive Steele or by their agent, John Schilling.

In 1951 the company began specialising in contemporary designs and a new range of carpets was launched in collaboration with Tibor Reich, the Hungarian-born designer. The promotion of the new range in a market steeped in traditional designs required careful planning and execution. Tibor Limited and Permoglaze Limited joined Steeles in staging a 'colour and texture' exhibition in large furnishing stores throughout the country. The first of these designs, Banbury Cross, continued in production until 1969 and pioneered the persisting small-design vogue in the contracts sector. Tomkinsons successfully extended this small-design capability to its domestic ranges in the tufted sector, and small-design patterns are now an industry-wide feature.

The partnership between the brothers terminated in 1956 when Ian Steele returned to New Zealand to establish an axminster carpet factory. In 1957, shortly before moving into a new purpose-built factory in Bloxham Clive Steele died. Mrs Helen Steele, his wife, took over the business and continued as Managing Director when the firm was acquired by Tomkinsons (Holdings) Limited.

Early attention was given to improving the efficiency of the jacquard process by standardising the card system and bringing the card-stamping process completely within the company[5]. In 1961 a warehouse was built and measures introduced to increase the flexibility of operations. The intended efficiencies had not been achieved by 1962 when Mrs. Steele retired from active involvement in the company and was succeeded as Managing Director by Mr JP Church, MSIA, a designer, who had been with the company for some years.

The factory was extended in 1966 to accommodate four new Van de Wiele 27" high speed looms capable of operating nearly one-and-a-half times faster than their orignal looms and incorporating the latest stop motions which automatically stop the looms and indicate the nature and location of faults.

After extensive trials during the early 1960s pile yarn was changed in 1964 to the 80/20 wool/nylon industry standard.

In 1965 Steeles introduced their Studio 3 range of contract carpets for architects and interior designers. A specially commissioned conference was arranged to launch the new collection of co-ordinated contract carpets in wilton and in axminster from the Kidderminster factory. A second edition of Studio 3 was launched in 1969 when Steeles was described as providing a bespoke carpet service to cover the requirements of most contract customers. The contract range included 100 standard colours, four qualities, two widths and a choice of over fifty designs.

Mr Richard Pugh-Cook was appointed Managing Director in 1971 when Mr Church retired due to ill-health. By the early 1970s new contract outlets emerged requiring the capacity to process larger and more diverse orders. A new warehouse was provided and a new shearing machine was installed to accommodate the demand for larger batches. Both the axminster and tufting companies in Kidderminster were also involved in the contract sector with some confusing and conflicting outcomes when all three were servicing the same accounts. The tufting unit in Kidderminster was not geared to small batch production so Steeles installed its own beam-end tufting machine to service the demand for complementary woven-tufted ranges in the contract sector. In addition, the company used factoring facilities to secure supplies of woven and non-woven products to provide a comprehensive service in the contract sector.

Mr NAT Marsh, the company's first sales representative and the current Managing Director, took over from Mr Pugh-Cook in 1976. Steeles faced declining markets for narrow wilton carpets as the contracts sector increasingly required broadloom wilton. By the mid 1970s Steeles was mainly involved in producing carpets for pubs and looms were adjusted to four-frame wilton to accommodate the larger scale designs required for such contracts. Competition with axminster in this market increased from the mid-1970s onwards and by 1979 and Steeles again concentrated on manufacturing narrow wilton and brussels carpets for the topmost end of the retail and the interior designer sector requiring greter flexibility and efficiency in processing smaller batch sizes. At the same time the company extended its range of services to the contract sector and to this end strenghened its own small but highly specialised contract sales force and design team whose skills reflected the needs of architects and specifiers rather than traditional carpet expertise. Extensive use was made of factoring facilities to meet the increasingly diverse range of carpets required in the contract and interior designer sector and its own range of products was standardised and reduced accordingly..

Following the restructuring of the Tomkinson Group in 1983 Steeles was designated the Contracts Division and assumed responsibility for all contract activity within the Group. The company retained responsibility for manufacturing wilton products but its small tufting operation was relocated to the Kidderminster site. By this time Steeles own production was almost entirely 100% wool brussels manufactured to order for the interior designer trade.

Although still manufacturing carpet to customer order, the company was by 1985 essentially a selling and service organisation specialising in the contract and interior designer sector of the market. Although products manufactured within the group are promoted, Steeles has access to wide factoring facilities and freelance designers so that it is able to offer a wide range of products, including carpet tiles, to the contracts and interior design market sector. The company exercises strict inspection and quality control over its carpet suppliers and, if necessary, has access to specialist knowledge and expertise located elsewhere within the Group. In 1986, Steeles accounted for some 25% of Tomkinsons' turnover and for some 30% of profits.

In summary, the company originally manufactured wilton and brussels carpet for the top end of the retail sector and interior designer trade. As wilton products were increasingly priced out of the domestic sector, sales were focused on the contracts sector exclusively. From the mid-1970s narrow wilton found it difficult to compete in the contracts sector Steeles diversified into specialised tufted carpet and concentrated its woven production on 100% wool products for the interior designer trade. At the same time the company extended its range of services to the contracts sector and relied heavily on factored products to supply this sector. In 1983 the company was made responsible for all contract sales within the Group. It remained responsible for manufacturing wilton carpet but the tufted operation was re-located to the Kidderminster site. By 1986, although still continuing to manufacture a limited range of brussels and wilton carpet to customer order, Steeles had wide access to factored carpets and had become a selling organisation servicing the contracts sector.

6.3.2 Outline Wilton Production Process[20]

Fig 6 presents in diagramatic form the main stages involved in making wilton carpet and this sequence of stages has remained unchanged throughout the period under review.

Table 2 lists the technological and process changes implemented during the period under review and describes the basic purpose of these changes. As this information demonstrates, there were a number of changes in the manufacturing process aimed at improving the overall efficiency of the process and/or the product itself.

TOMKINSONS: OUTLINE WILTON PRODUCTION PROCESS

Fig 6

> > > Yarn (pre-dyed) is received into stores

Stage 1 W I N D I N G — Yarn is wound onto cheeses

↓

Jacquard cards stamped — In accordance with design paper

↓

Stage 2 C R E E L I N G — Yarn, jacquards & backing materials assembled on loom

↓

W E A V I N G — Simultaneous integration of surface & backing yarns

↓

Stage 3 F I N I S H I N G

↓

I N S P E C T I O N

↓

M E N D I N G

↓

B R U S H I N G & S H E A R I N G

↓

..........backing if necessary

F I N A L I N S P E C T I O N

> > > transferred to Despatch

Source: Interview[20]

Table 2

TOMKINSONS: WILTON PRODUCTION PROCESS CHANGES 1959 - 1986

1959	Yarn supplies - some internal sourcing from Kidderminster - jacquards standardised & brought in-company
1961	Plant capacity increased to provide more storage
1964	Additional 27"/36" looms installed
	From 100% wool to 80/20 wool/nylon
1966	Plant capacity increased to accommodate 4 new Van de Wiele 27" high-speed looms one and a half times faster than previous looms/ with automatic stops etc
1972	New shearing machine installed Back-sizing plant installed
1979	Increased design speciality and use of all wool
	Number of standard lines reduced

Source: Interviews

As Fig 6 shows, the production process involves three main stages. The equipment used is generally available to the carpet industry and is organised on a job-shop basis requiring flexibility in the execution of customised orders.

At Stage 1, pre-dyed yarn is received into the wilton stores and is transferred to the winding section where it is wound from hanks to cheeses. Up to 1969 all yarn was purchased from outside the company. From 1969 onwards although more yarn was supplied from the Group's own spinning subsidiary, a wide range of yarns is required to service contract orders and most yarns are still purchased from outside suppliers. The main changes at this stage have been in the types of yarn used and the treatment of these yarns. As previously noted, 100% wool was used until 1964 when the company adopted the industry-wide 80/20 wool/nylon blend for standard products. By the late 1970s the company had reverted to mainly 100% wool yarns for special orders. At Stage 1 also jacquard cards identifying the pattern and colour commands are punched in accordance with a given design. Initially a range of different card systems were used and some punching was done on commission. The card system was standardised on the Hardaker system and by the early 1960s all punching was undertaken within the company.

A Stage 2 the jacquard cards and cheeses are manually assembled on the loom in a sequence determined by a given pattern in preparation for weaving. The carpet is woven in an 8-pitch construction which was adopted in 1946 on 27" narrow looms. The fundamental construction of the cloth remains the same, customised variations being predominantly in terms of pattern, colour and yarn quality. As Table 2 shows, four 27" Van de Wiele looms with an automatic fault detection mechanism were installed in 1966 and two further looms were installed in 1972.

At Stage 3 the woven carpet is inspected when faults are identified and mended manually. The carpet is then brushed and sheared. A new shearing machine was installed in 1972 to give more reliable performance and faster processing.

A small backing facility, built by Tomkinsons' Kidderminster unit, was installed in 1972 but is not generally in any great use as quality wilton carpet does not require any backing reinforcement. Before this date any backing that was required was undertaken by the Kidderminster site.

After final inspection the carpet is transferred to Despatch for direct forwarding to the customer. A warehouse facility was provided in 1961.

6.4 Tufted: Products, Core Technology & Outline Production Process

6.4.1 Products and Core Technology

Tufted carpets[21], developed in the USA from the candle-wick process, represent the most significant product and process innovation in the carpet industry since spool axminster was developed (also in the USA) in 1877. Wide tufting machines were developed by 1946 and production in the USA started shortly after World War II and by 1963 accounted for 70% of carpet sales. In the UK, tufted production started in the mid 1950s and by 1964 accounted for some 35% of carpet sales. By 1969 tufted volume sales exceeded woven sales for the first time[22].

The development of the product and its distinctive core technology is reviewed elsewhere - see for example Robinson[23]. For the purposes of this study[24] it is sufficient to note that the product is non-woven, the pile-effect being achieved by stitching the surface fibre to a primary backing. Quality of the carpet is determined by the type of pile yarn, the type of primary backing and the number of stitches (rows) per linear inch. Tufting machines, in effect multi-needle sewing machines, are fast and highly automated, and are constructed to a specific gauge (ie the needles per inch and the equivalent of pitch in a woven carpet). Early machines were particularly suited to man-made fibres and produced plain or textured carpets at low cost, giving access to price-sensitive domestic consumers outside the range of woven carpets. Developments in tufting technology facilitated a limited design capability and the use of wool as a surface material. These developments permit competition on the basis of pattern and quality and give access to wider markets, including the contracts sector.

Tomkinsons began investigating tufted manufacture in 1958 when two directors went to the USA to study the new process. In 1959, although the board remained divided on the issue, the company purchased a single 36" 3/16 gauge rug-making tufting machine and, under the leadership of Mr KRG Tomkinson, began experimenting with tufted methods. The equipment was installed on the axminster site in Kidderminster and initially only the machining operation was carried out - the foam backing to the carpet was undertaken on commission by Lintafoam in Lancashire. Although identified as a separate profit centre, the tufted unit was largely serviced by the axminster company.As other UK manufacturers entered tufting, Tomkinsons concentrated on product development and benefitted from their long experience in the woven sector and the successful transfer of yarn blending, designing and dyeing techniques

In 1961 a 15' 450rpm tufting machine was adapted from 3/16 to 5/32 gauge and installed with the expert guidance of Edgar Pickering, then head of Singer-Cobble Sales, the tufting machine manufacturers, and with the help of various yarn and other raw material suppliers. The first commercial product was developed in collaboration with the Gainsborough Group of carpet wholesalers who purchased the bulk of the first output of '150', a cheap 100% viscose tone-on-tone mottle carpet - very different from Tomkinsons' one-off super-luxury Anglo Persian and Anglo Smyrna wovens. The immediate success of '150' resulted in a second similar range '201'for distribution through retailers. The product, sold through the axminster company, created friction with the sales team who were concerned that the reputation of axminster itself was damaged by association with tufted. The immediate success of these tufted ranges, however, encouraged further experiments in collaboration with suppliers and investment in new techniques and other lines in various blends of synthetic and wool fibres were manufactured to customer order.

In 1964 several circular knitting machines and an autoclave were installed. This new knit-de-knit process produced a twist pile fabric using a 100% acrylic pile renowned for its long-wearing properties and resistance to soiling. A new twist-pile product was launched and was still being manufactured in 1969, a unique achievement for a tufted product which at that time had a very short market life. Tufted sales increased faster than any of the Group's other product lines but, given the high investment and promotion costs, failed to make any actual contribution to profit. The product had, however, been clearly accepted by the market and the tufting operation, now representing a significant investment, was registered as a wholly owned subsidiary. The new company, Ludlow Carpets Limited, continued to operate on the Kidderminster site, and with its own small sales force (literally one man at this time) aimed to promote a separate market identity for tufted carpets. A new foam-backing plant and one of the first piece-dyeing facilities in the UK were installed in 1965 and made a significant contribution to savings and quality control enabling Ludlow to provide a quick service to customers at economically viable stock levels - a major consideration prompting the investment - and the success of the multi-level piece dyed carpets which represented a major technical breakthrough in the tufting industry..

By 1966 the company was producing four main tufted product lines - three for the retail trade and one, a 50/50 courtelle evlan hard twist cloth, for the wholesale trade.

In the depressed trading environment of the late 1960s, axminster sales declined in favour of tufted. Fierce price competition at the cheaper end of the market, however, inhibited realistic pricing and profit margins were critically narrow. In 1967, Mr NS Hughes, experienced in the American tufting industry, joined the company to reorganise operations and marketing . The following year Mr Hughes was appointed Managing Director of Ludlow and also joined the Group main board. The first tufting machine was modified to incorporate a moving needle which enabled the first limited patterning. A second tufting machine, Singer-Cobble's latest 120 end Scroll loop pile model, was installed and a new patterned loop-pile carpet was launched to complement the cut pile ranges from two plain 15' tufting machines.

Working in collaboration with Allied Chemicals, Ludlow launched its now famous Deep Pools range using a completely new type of nylon yarn which enabled the company to exploit its expertise in design and colour.

This range with a strong pattern and colour definition moved Ludlow into the volume market and proved to be one the company's top selling lines.

Sales continued to increase and additional patterning equipment, two more tufting machines and three further piece-dyeing machines were installed. Tufted products increasingly competed in the contracts sector. Ludlow, however, found it difficult to accommodate the small batch sizes required in this sector and Steeles, the contract specialists, installed its own tufting machine to process such orders and/or commissioned tufted products from other manufacturers.

By 1969 Ludlow's product range was extended to all sections of the domestic market. With the move into volume production attention was directed to improving profit contribution through achieving higher efficiences in all departments. By 1971 tufted turnover was at a record level and profit margins had improved to the industry average of 9.3%. Investment to improve the efficiency in warehousing and a new foam backing plant in 1972 achieved even greater cost savings. More attention was given to supporting exports which by 1972 represented 22% of turnover and in 1973 a new sales and distribution centre was opened in Germany. A new product was launched in 1974, the year of Flixborough and the three-day week, and although market share improved, overall demand was well down on previous years.

In 1975 the industry faced higher raw material prices and fierce price competition as carpet stocks were dumped on the market when companies went into receivership. By 1976/1977 trading conditions deteriorated and carpets lost their share of consumer spending. Ludlow traded at a substantial loss and all operations were subjected to a major review resulting in the strengthening of management and the appoinment of a new Managing Director, Mr T Hughes. Product lines and overseas selling arrangements were revised to take account of the cash crisis. A new product, Mardi Gras based on a new design approach and one of the first to use polypropylene, was launched in 1977 and continued to be a strong selling line in 1986. To effect savings in overheads the axminster and tufted units were brought under a single administration in 1978 when Mr Hughes resigned. A new Group Chief Executive was appointed in 1979 and products were substantially revised and refocused to represent those contributing reasonable profit margins. Marketing and selling operations were refocused and promoted under a new selling logo - Mr Tomkinson makes a better class of carpet. Performance in 1979 showed profitable growth based on a considerable increase in turnover.

Investment in the latest hydrashift technology (developed by Cobbles and offered first to Tomkinsons) in 1980 promoted a new design approach in fine-scale and softly coloured quality tufted carpets based on a narrower range of co-ordinated colours. The new range, promoted as 'practical plains' was launched in 1981 under the Mr Tomkinson brand which played down the 'axminster' and 'tufted' labels. The range proved highly successful and performance benefitted from the efficiency generated by the focused product/market approach.

By 1983 profit margins had improved as tufted gained market recognition under the Mr Tomkinson brand and accounted from some 85% of Group volume. Attention was directed to increasing the efficiency with which the company demonstrated its commitment to fashionable styling and quality products. To this end axminster and tufted were further aligned with their target market and were designated the Domestic Carpets Division. A new high speed 900rpm Cobbles tufting machine was installed and a further machine was fitted with hydrashift. Further machine modifications achieved running speeds of 1000rpm and even finer gauges to give greater density of surface pile in cut pile, looped or patterned tufted products.

6.4.2 Outline Production Processes

Figure 7 presents in diagramatic form the stages involved in making tufted carpet and this sequence of stages has remained unchanged throughout the period under review.

Table 3 lists the technological and process changes that have been implemented during this period and describe the basic purpose of these changes. As this information demonstrates, there have been a number of improvements which have been aimed at improving the overall efficiency of manufacturing operations and/or product appearance/performance.

As Fig 7 shows, the production process consists of four main stages and utilises plant and equipment which is dedicated and specific to tufted production. The processing system, utilising equipment which is generally available to the carpet industry, is organised on a progressive flow system geared to batch production of carpets aimed at

Figure 7

TOMKINSONS: OUTLINE TUFTED PRODUCTION PROCESS

> > Yarns received pre-dyed on cones

Pre-formed backing material received

↓ ↓

	YARN STORE	
	↓	
Stage 1	C R E E L I N G	Yarn & backing assembled on tufting machine
	↓	
Stage 2(a)	M A C H I N I N G	Yarn is sitched onto backing material
(b)	INSPECTION & MENDING	Cloth is inspected for faults and corrections made with electronic gun while machining continues
	↓	
Stage 3	F I N I S H I N G	
	STEAMING	
	B R U S H I N G & S H E A R I N G	
	↓	
Stage 4	B A C K I N G	Foam backing or latexing applied depending on quality
	I N S P E C T I O N	

> > > transferred to Warehouse

Source: Interview[26]

Table 3

Tomkinsons: Tufted Production Process Changes 1959 - 1986

1. Tufting Machines

1959 - single rug-making tufting machine making 36"wide carpet at 3/16 gauge

1961 - First full width (15') Cobble tufing machine installed and converted from 3/16 to 5/32 gauge cut-pile. Tufting speed 450rpm

1968 - moving needle bar fitted to first machine to enable zig-zag pattern
- second machine installed - Cobble 1 cut-pile 5/32 gauge

1970 - first 3 pile height scroll 5/32 loop pile Cobble V machine tufting speed 480rpm. First pattern machine using single colour nylon & differential pile height, then differential dye nylon giving more than one colour and pattern made by differing yarn

1971 - second 3 pile height scroll 5/32 loop 120 end Pickering machine. Tufting speed 530rpm.

1972 - Additional Cobble scroll machines. Tufting speeds 590rpm

1974 - first cut-loop Singer II tufting machine - 540rpm. New pattern ability from low loop base with high cut pile

1979 - Cobble ST77 1/8 gauge - to give finer density carpet

1980 - first hydrashift fitted to an existing machine. Needle bar staggered to give first patterned cut-pile machine. Later several machines converted from 5/32 to 1/8 gauge or from straight to staggered bar and cam movers fitted

1983 - Cobbles high speed straight cut-pile machine - 900rpm Converted ST77 machine fitted with hydrashift running at 800rpm moving bar. Also new ST85 running at 1000rpm straight and 2 bar graphics running at 800rpm

2. Backing - initially on commission at Lintafoam
1965 - on site foam backing plant
1972 - backing plant updated

3. Materials - from nylon only to Acrilan and wool:nylon blends to polypropylene (for which UK is the biggest market) also yarn printing/twisting
- dyestuffs/limited piece dyeing

4. Labour - Semi-skilled with some updating for hydrashift. No union requirement to recruit skilled workers. Dyeing requires highly specialised skills which are similar to axminster but not interchangeable between the two processes

Source: Interview[26]

the domestic sector. The same production facilities service customised orders for the contracts sector but the significance and incidence of such orders declined as tufted products acquired a larger share of the domestic carpet turnover from the mid-1970s onwards.

At Stage 1 pre-formed backing material and yarn, pre-dyed and wound on cones, are transferred from the tufting stores and assembled in the creels behind the tufting machine in preparation for machining. The backing material is purchased and yarn is supplied either from the Group's own yarn spinning subsidiary or is bought-in, depending on the type/quality required. Innovations through yarn engineering, carried out by the fibre suppliers themselves, often working in collaboration with other raw material suppliers and Tomkinsons, made a significant contribution to product and tufting machine development. Thus changes in the types of yarn from 100% viscose to various blends, including wool/nylon blend, promoted product differentiation through, for example the visual effect of twist pile and differential dyes. The use of wool blends in surface fibres enabled the product to compete in the higher price end of the market. The improvement in yarn performance played a significant role in enabling tufting machines to operate effectively at higher running speeds.

At Stage 2 the yarn is machined onto the backing material. As Table 3 shows, a number of changes have been implemented aimed at improving the product and/or increasing the running speeds of the tufting machines. Various modification (eg moving needles) aimd to achieve a patterning facility which has evolved from a limited striped and zig-zag pattern to the latest hydrashift independent moving needles which gives significantly more flexibility in the type of designs and the number of colours that can be used. As Section 6.4.1 above notes, the runnng speeds of the tufting machines have increased from 450rpm in 1961 to 1000rpm in 1985 and at the same time higher gauges enable better quality carpets to be produced. At Stage 2 also, the carpet, while it is still being machined, is inspected for faults and mended with an electronic gun.

At Stage 3, the carpet is removed from the tufting machine to be steamed, brushed and sheared. Changes here include investment in faster and more reliable equipment to achieve a continuous process in these sequences.

At Stage 4, a foam backing is applied to the carpet to secure the surface fibre to the backing material and to facilitate cutting and laying the carpet. As Section 6.4.1 above notes, backing was initially undertaken on commission by Lintafoam, Lancashire. In 1965 a backing plant was installed at the Kidderminster site to improve quality control and operational efficiency. In 1983 backing operations were further improved by investment in computer controlled equipment which achieve a continuous process in these sequences and give consistency at higher speeds.

CHAPTER 7: TOMKINSONS: PERCEIVED ENVIRONMENT, ORGANISATION FORM AND STRATEGY PROFILES 1959 - 1986

7.1 Introduction

Chapter 5 traced the development of the organisation from its genesis as a partnership in 1869 to the creation of the modern company in 1959 and identified the key events in the period 1959 - 1986.

Chapter 6 presented a descriptive account of the company's three main products, related core technologies and production processes, and identified the main changes in the period under review.

Chapter 7 uses the theoretical models informing this study to identify the evolving organisation environment and strategy/structure relationships in the period 1959 - 1986. The basic environment-strategy-structure model is extended to identify the evolving product-process strategy in the same period.

The variables characterising the environment and strategy and structure are those selected by Miller & Friesen[1] and have been identified in Chapter 3. The relationship between the product and its related production system is described in terms of Abernathy's[2] model of a productive unit, the variables characterising the model have also been identified in Chapter 3.

The variables are used here to construct a profile of the perceived environment, organisation structure and strategy, including product-process strategy, at four points in time - namely 1959, 1969, 1975 and 1986.

The resulting configurations are used to classify the organisation form and strategy that evolved in the period under review. The findings are then discussed in the context of Lawrence & Dyer's expected environment and organisation form and strategy relationships and the implications of this relationship for organisation efficiency and innovation.

7.2 Tomkinsons: Perceived environment 1959 - 1986

The external environment is described in terms of dynamism, heterogeneity and hostility. (See Chapter 3 for a discussion of these characteristics.)

Table 4 lists the scores obtained, for the characteristics of dynamism, heterogeneity and hostility at the selected points in time.

Fig 8 provides a graphic represenation of the data in Table 4.

Table 4

TOMKINSONS: PERCEIVED ENVIRONMENTAL CHARACTERISTICS SCORES 1959 - 1986

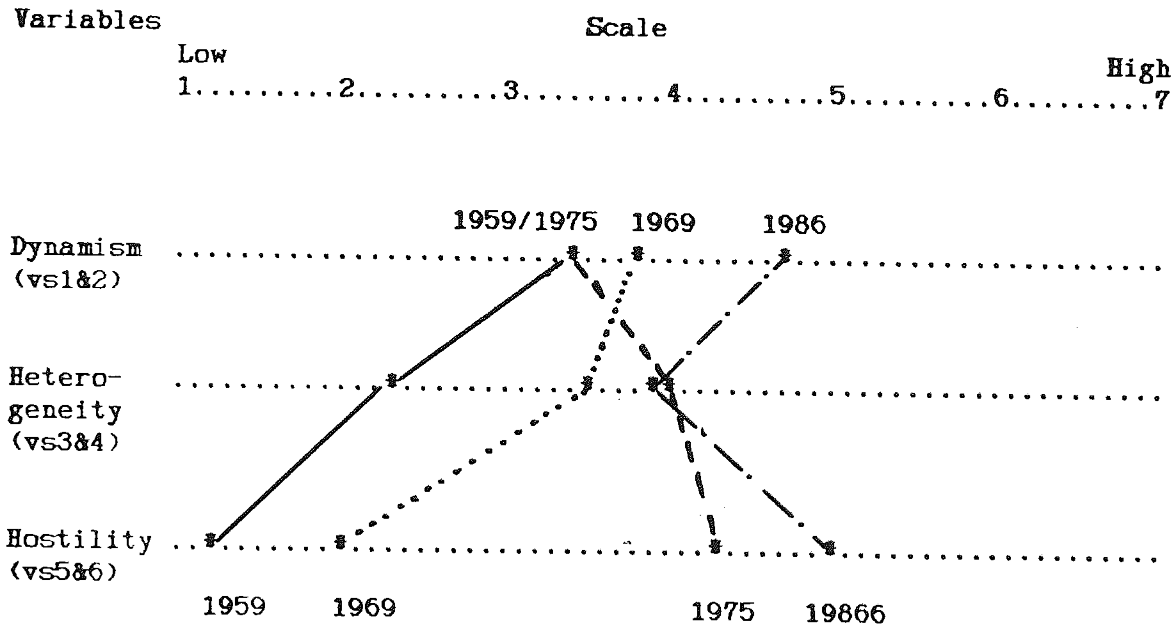
Variables	Period			
	1959	1969	1975	1986
Dynamism (vs1 & 2)	3.4	3.8	3.4	4.7
Heterogeneity (vs3 & 4)	2.3	3.5	4.0	3.9
Hostility (vs5 & 6)	1.2	2.0	4.3	5.0

Source: Interviews

Scale: See Appendix I

Figure 8

TOMKINSONS: PERCEIVED ENVIRONMENT CHARACTERISTICS 1959 - 1986



Source: Table 4

The data shows that all three variables characterising the perceived environment were subject to change in the period under review.

Dynamism is concerned with the unpredictability of competitor behaviour, customer tastes and technologies. As Table 4 shows, the scores for dynamism changed from 3.4 in 1959 to 4.7 in 1986 reflecting changes in consumer tastes, production technologies and competitive practices. As the historical overview shows, the company experienced changes in all these areas as it diversified its products, markets and technological base.

The score for the variable describing environmental heterogeneity changed from 2.30 in 1959 to 3.90 in 1986. Heterogeneity is concerned with the differences in competitive tactics, customer taste, product lines, etc., across the organisation's respective markets. The historical overview confirms that there was very little difference in the competitive stance between axminster and wilton products, both of which represent standardised products and well defined markets and competitive practices based on quality/styling. Tufted products, on the other hand, competed on the basis of price and required a different marketing and production approach. The shift in scores betwen 1959 and 1969 then reflect the company's emergence as a manufacturer of tufted products by 1969. The relative stability of the score values between 1969 and 1986 reflect the stabilising of competitive characteristics of tufted products in this period and the emergence of a dominant product in the industry.

The score for the variable describing environmental hostility changed from 1.2 in 1959 to 5.0 in 1986 and represents the most significant environmental change in the period under review. Hostility is concerned with increasing price competition, severe regulatory restrictions, shortages of labour, shortages of raw materials etc. As the historical overview shows, the company invested heavily throughout this period at a time when price competition intensified in the industry. Woven product sales decreased in favour of tufted sales and the tufted sector, as has been noted, competed primarily on the basis of price and narrow profit margins. The period 1970 - 1983 in particular witnessed some of the worst trading conditions in the history of the carpet industry as government economic controls, raw material price increases and subsidised imports intensified price competition.

In summary, the environment throughout the period 1959 - 1986 was perceived to be increasingly dynamic, increasingly complex and increasingly hostile.

Table 5 converts the scores for these three environmental characteristics - dynamism, heterogeneity and hostility - to correspond with the two environmental variables of information complexity and resource scarcity to construct the nine-cell environmental framework

Table 5

TOMKINSONS: PERCEIVED ENVIRONMENT SCORES 1959 - 1986: CONVERSION

Variables	Period			
	1959	1969	1975	1986
INFORMATION COMPLEXITY				
=				
Dynamism	3.40	3.80	3.40	4.70
+				
Heterogeneity	2.30	3.50	4.00	3.90
-Total	5.70	7.30	7.40	8.60
÷ 2				
Information Complexity =	2.85	3.65	3.70	4.30
RESOURCE SCARCITY				
=				
Hostility	1.20	2.00	4.30	5.00

Source: Table 4

prescribed by Lawrence & Dyer. (See Chapter 2 for a discussion of the Lawrence & Dyer model).

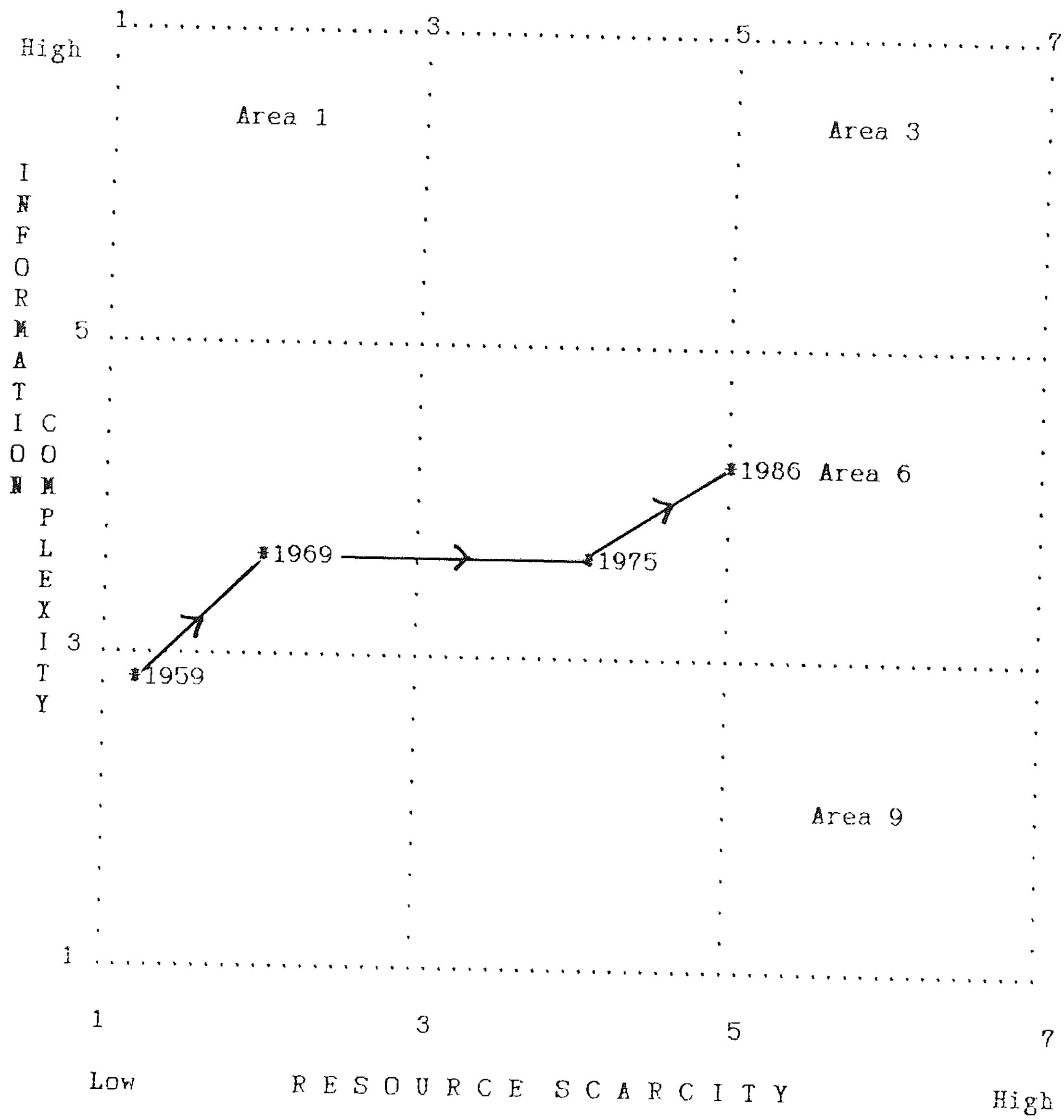
Figure 9 presents the Lawrence & Dyer Environmental Framework showing the two variables of information complexity and resource scarcity. Each of these two variables is provided with a seven point scale and the scale has been divided to construct a nine-cell environmental framework.

The sliding scale from low to high on the vertical axis of the information domain measures the complexity of its variable aspects, dynamism and heterogeneity. As the degree of complexity in these aspects increases, so does the amount of information an organisation needs to make informed choices in regard to the products and services it provides. Increasing levels of complexity are expected to result in higher levels of organisational differentiation and are also expected to increase the potential for innovation.

The sliding scale from low to high on the horizontal axis of the resource domain measures the degree of difficulty an organisation has in securing the resources it needs to assure successful operations. The resouces here are concerned with raw materials, capital, labour, etc., all of which are normally secured in exchange for the goods and services the organisation provides. As resource scarcity increases it is expected that the organisation must increase the mechanisms available for co-ordinating activity if it is to be efficient. This is the process of organisational integration, and integrative mechanisms may

Figure 9

TOMKINSONS: PERCEIVED ENVIRONMENT 1959 - 1986



Source: Table 5

take the form of control systems, centralised planning, decentralised liaison staff and task forces.

The scores in Table 5 provide the co-ordinates which locate the organisation within this nine-cell framework and thus identify the perceived environmental niche occupied by the company at each of the four points in time.

As Fig 9 shows, the company is perceived to be operating in the benign Area 7 conditions of low information complexity and low resource scarcity in 1959, moving into the entrepreneurial environment of Area 4 with intermediate levels of information complexity and low resource scarcity in 1969, and moving into the readaptive environment of Area 5 with intermediate levels of information complexity and resource scarcity in 1975 and remaining in that readaptive area at 1986, although moving significantly towards the boundary of the machine bureaucracy environment of Area 6 by the latter date.

The next section identifies the characteristics of the organisation's three main productive units at the same four points in time, and the remaining sections deal with structure and strategy to identify the expected and actual relationship with the environments identified here.

7.3 Tomkinsons: Productive Unit Profiles 1959 - 1986

The three main products and their related production systems are described in terms of the seven variables characterising Abernathy's model of a productive unit. (See Chapter 3 for a discussion of these variables).

Profiles are constructed for each of the three main productive units at four points in time - 1959, 1969, 1975 and 1986 - to identify the evolving relationship between the product and its related production system with a view to assessing whether this relationship promotes or inhibits efficiency and innovation.

7.3.1 Axminster Productive Unit

Table 6 lists the scores obtained for the seven variables characterising the productive unit at four points in time.

Fig 10 presents a graphic display of the information in Table 6.

Table 6

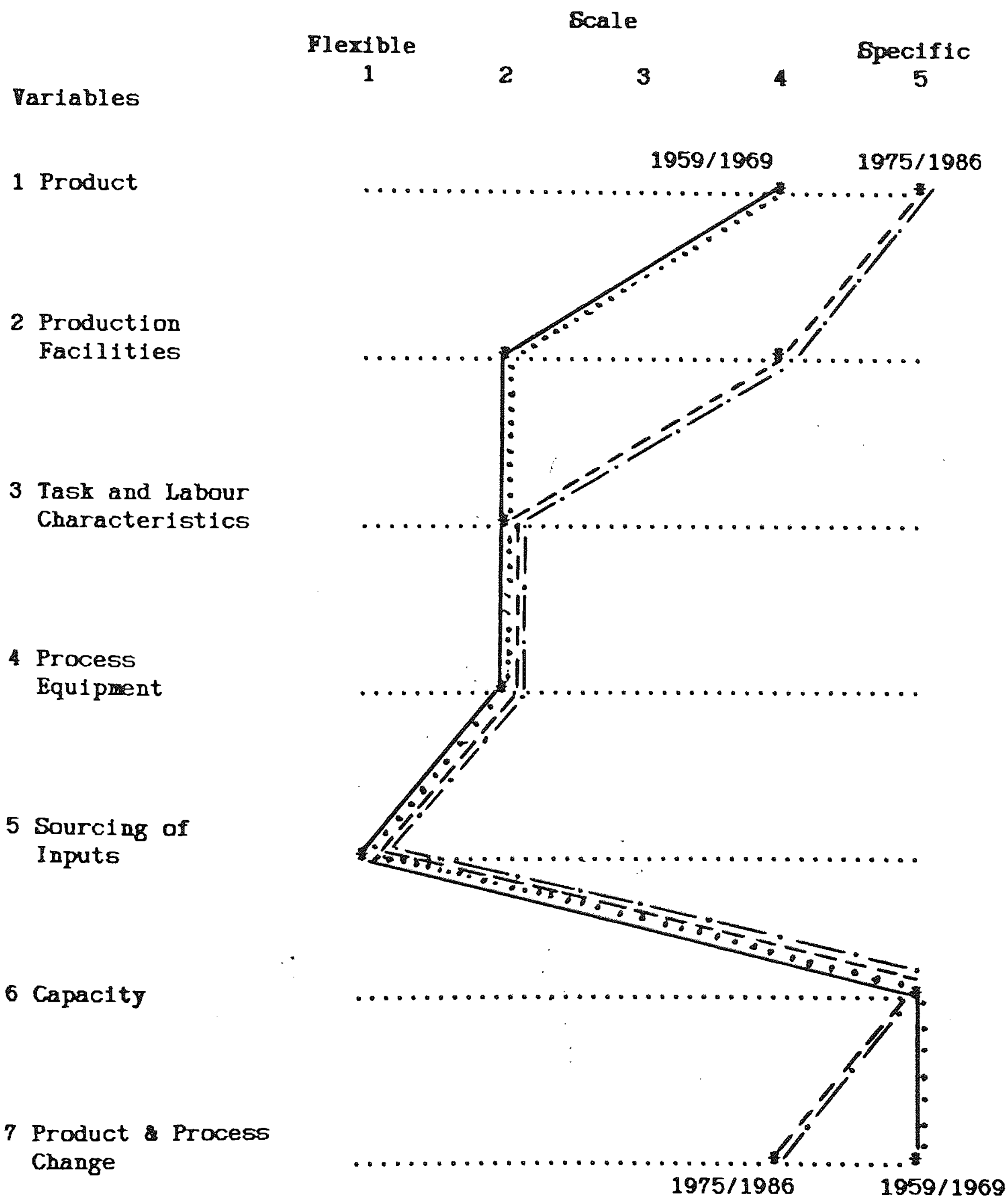
TOMKINSONS: AXMINSTER PRODUCTIVE UNIT SCORES 1959 - 1986

Variables	1959	1969	1975	1986
1 Product	4	4	5	5
2 Production Facilities	2	2	4	4
3 Task and Labour Characteristics	2	2	2	2
4 Process Equipment	2	2	2	2
5 Sourcing of Inputs	1	1	1	1
6 Capacity	5	5	5	5
7 Product & Process Change	5	5	4	4

Source: Interviews

Figure 10

TOMKINSONS: AXMINSTER PRODUCTIVE UNIT PROFILE 1959 - 1986



Source: Table 6
Adapted from Abernathy[7]

The profiles show that in the period under review the profiles for 1959 and 1969 were the same, and the profiles for 1975 and 1986 were the same. Three of the seven variables characterising the productive unit changed in this period and all changes occurred between 1969 and 1975. The characteristics and behaviour of all seven variables are examined below.

(a) Product

As Fig 10 shows, the product (variable 1) is described as being at Level 4 at both 1959 and 1969 and at Level 5 at both 1975 and 1986. Following Abernathy[a], at 1959/1969 the product was highly standardised with options for different market segments constituting minor variations and at 1975/1986 was standardardised and subject to only incremental change.

These descriptions are confirmed by the data in Chapters 5 and 6.2 which shows that the company adopted its 7-pitch axminster policy in the 1930s and serviced mainly the top to middle price ranges of the domestic axminster market. Production was on a customised and/or batch basis with product variation in terms of quality and style, and subject to annual major styling changes, although more frequent styling changes were accommodated if necessary to meet market shifts.

During the late 1950s and early 1960s product innovation reflected mainly surface yarn changes until the late 1960s when the industry standard 80/20 wool/nylon mix was adopted.

From the late 1960s onwards when the domestic sector was under pressure from cheaper tufted products, axminster output was increasingly re-directed to the non-price competitive contracts sector then serviced mainly by wilton carpets. In 1971 Tomkinsons achieved a world-wide first with a new 15' product range. Axminster products were temporarily redefined to service the cheaper end of the domestic sector in 1974/75, but this policy was quickly reversed and products revised and again directed to the non-price competitive domestic and contracts sectors.

In 1979, following a 50% reduction in axminster capacity, the number of axminster lines was reduced and refocused to reflect those offering reasonable profit margins and the range of colours used was reduced accordingly.

By 1986 axminster production was again geared to service the top to middle price ranges of the domestic sector only, but with a smaller range of products. Six ranges of axminster carpet were produced, five qualities within the industry average and facing tough competition. The sixth line, aimed at the top end of the domestic market, had only two competitors. Manufacturing is for stock and is subject to annual styling changes, or more frequently if market needs so dictate.

The information here indicates that there have been no significant product changes since the 1930s when the company adopted its present industry-wide 7-pitch spool axminster policy.

(b) Production Facilities

Fig 10 shows that production facilities (v2) at 1959 and 1969 were at Level 2 which, following Abernathy, is described as progressive flow facilities with aspects common to more than one product. At these two dates the production facilities represent a number of subordinate operations served by diverse technologies which are independent of one another so that they can be flexibly employed to service both customised orders and production for stock. With such a system although inventories are high and much management attention is required to balance throughputs, the system is flexible and change can be readily accommodated but operating efficiencies are low.

As the historical overview has shown, investment throughout the period aimed at improving efficiency and at certain stages of production, particularly weaving and backing operations, the investment was in securing highly efficient processes. These changes are reflected in the profile for 1975 and 1986 which show the production facilities at Level 4, that is, closely balanced and commonly paced facilities that are mechanically controlled. While each of the production stages shown in Fig 5 is mechanically controlled, the stages are independent and such control does not represent a wholly integrated mechanically controlled system. Facilities are commonly paced in terms of scheduling to ensure co-ordination at the weaving stage and much attention was given to improving efficiencies in directing these flows. At the weaving and backing stages, however, the facilities are organised and controlled by a component. As Chapters 5 and 6 have shown, throughout the period under review investment was directed at improving efficiency and the highly automated looms and backing plant reflect such investment.

(c) Task and Labour Characteristics

Fig 10 shows that task and labour characteristics (v3) remained at Level 2 throughout the period. Following Abernathy[11], labour is typically semi-skilled and tasks are of long duration requiring some on the job training.

While there have been no significant changes to the nature of tasks carried out at the various production stages shown in Fig 5, there has been a significant reduction in the numbers employed at each of the stages to complement the investment in modern equipment. Most significantly, the developments in loom technology resulted in multi-loom weaving which was pioneered by Tomkinsons. The erosion of the skilled status of axminster weaving is documented elsewhere, (see for example Bartlett [illegible], Smith [illegible]) and the semi-skilled status of weaving was already established throughout the period under review. As Chapter 5 has noted, many employees in this unit have long family relationships with the company, some spanning several generations. Shopfloor personnel are usually members of the Power Loom Weavers & Textile Workers Union. Joint Committees at plant level implement and monitor terms and conditions of employment which are negotiated at national level for the industry and supplemented at local level through Plant and District Joint Committees.

(d) Process Equipment

Fig 10 shows that process equipment (v4) serving the axminster productive unit was at Level 2 throughout the period. Following Abernathy[14] such equipment is specially designed machines for key tasks. As para (b) above and Fig 5 demonstrates, the production system consists of a number of co-ordinated but independent subordinate stages. Investment in technology to improve efficiency represents an updating of the technology appropriate to the various stages rather than an integration of the stages.

Stages 1 and 2 of the production system (Fig 5) which translates quality and styling are of significant importance in making a quick response to market demand for quality and styling and these production stages retain high flexibility.

The basic construction of the carpet cloth itself (strictly speaking the design, in Abernathy's model) has litle competitive significance and here the equipment is automated. As Chapters 5 and 6 have shown, considerable attention has been directed to refining the technology at this production stage to obtain high levels of efficiency in speed and quality of output. Looms are highly specific to a particular carpet cloth construction and, even though looms are highly automated, the process of incorporating the colour and pattern on the loom at Stage 2 (chaining) remains a manual task and retains flexibility.

Similarly, the final sequences of production at Stage 4 adding a backing to the product is not a significant competitive feature. The equipment here is highly automated and extensively integrated and has been designed and procured as a system.

(e) Sourcing of inputs

As Fig 10 shows, the types of material used and the sources of these materials (v5) are described as being at Level 1 throughout the period. Following Abernathy's materials are thus commonly available through normal distribution channels.

A variety of raw materials are used in making a carpet but most significantly dyes, yarn and latex, all of which as Chapters 5 and 6.2 show, have made a significant contribution to product and process innovations in the period under review. With the exception of some yarns, all raw materials are purchased and suppliers tend to be well established large firms such as ICI, Courtaulds, Monsanto. In 1959 Tomkinsons diversified into spinning woollen and semi-worsted pile yarns which are used in axminster and tufted production respectively but which, given the range of yarns used, does not totally satisfy production requirements. The adoption of the industry-wide 80/20 wool/nylon blend represents a standardisation of fibre strength only as there are many variations in the constituent elements which react differently in processing, for example to dye absorption. As Chapter 5 shows, backward integration into yarn spinning aimed to improve quality control and reduce costs rather than to secure adequate supplies of yarn.

(f) Production Capacity

Fig 10 shows that production capacity (v6) is at Level 5 throughout the period. Following Abernathy[6] production capacity here represents tightly balanced operations that are organised in units synonymous with the product. As Chapter 5 has shown, the dyeing, winding, setting, weaving and finishing operations have been integrated in this company since the late nineteenth century. The profile here shows a high level of specificity indicating that any efficiencies to be gained by such integration have been fully exploited.

(g) Patterns of Product and Process Change

As Fig 10 shows, patterns of product and process change (v7) is shown at 1959 and 1969 as being at Level 5 which, following Abernathy[6], indicates that changes are mainly minor and are the result of process improvements enhancing product consistency. At 1975 and 1986 the characteristic reverted to Level 4 which, following Abernathy[6] indicates that major changes are introduced selectively and there may be long periods between such changes. As Chapters 5 and 6.2 show, while quality/styling changes are a competitive feature and subject to annual review there has been no radical product or process innovation since axminster wide-loom weaving was adopted in the late nineteenth century. From the mid 1970s onwards when axminster markets declined, investment in new technology and revised processing systems, together with reduced product lines and tight raw material specifications, aimed to achieve more efficient flexibility in responding to market requirements in terms of quality and styling.

In summary, the profiles show that at 1959/1969 the product was highly standardised. The full economic benefits of this high standardisation were not, however, realised since the supporting production system was at a highly flexible level. While this level of flexibility inhibits efficiency, the productive unit retains the capacity to innovate. The pattern of innovation at 1959/1969 shows incremental product and process changes. The product and process changes between 1969 and 1975 result in a profile which shows that at 1975/1986 the product was standardised and serviced by a production system which, with the exception of one characteristic (v2), retained the 1959/1969 level of flexibility. The exception, production facilities (v2), were redefined to a higher level of specificity. As with earlier profile, the profile at 1975/1986 indicates that the full economic benefits of product standardisation have not been attained as the supporting production system retains a high level of flexibility. While this level of flexibility retains the capacity to innovate the overall eficiency of the productive unit is low. The pattern of innovation at 1975/1986 reverted to a more flexible level at which innovation is infrequent and arises mainly out of cost reduction and/or product refinement considerations.

7.3.2 Wilton Productive Unit

Table 7 lists the scores obtained[19] for the seven variables characterising the productive unit at the selected four points in time.

Fig 11 presents a graphic display of the information in Table 7. The profiles show that in the period under review the profiles for 1959 and 1969 were the same, and the profiles for 1975 and 1986 were the same. Three of the seven variables characterising the productive unit changed in this period and all changes occurred between 1969 and 1975. The characteristics and behaviour of all seven variables are examined below.

(a) Product

As Fig 11 shows, at 1959 and 1969 the product (v1) is described as being at Level 1 which, following Abernathy[20], is a product made to customer order and specification. At 1975 and 1986 the product is shown at Level 5 which is, following Abernathy[20], a highly standardised product subject only to marginal adjustments.

As Chapter 6.3 shows, the industry-standard 8-pitch wilton construction was adopted when the company was established in 1946 and remained unchanged throughout the period under review. At 1959 and 1969 wilton carpet was manufactured on a customised basis for the top end of the retail and interior designer trade and there were, consequently, no

Table 7

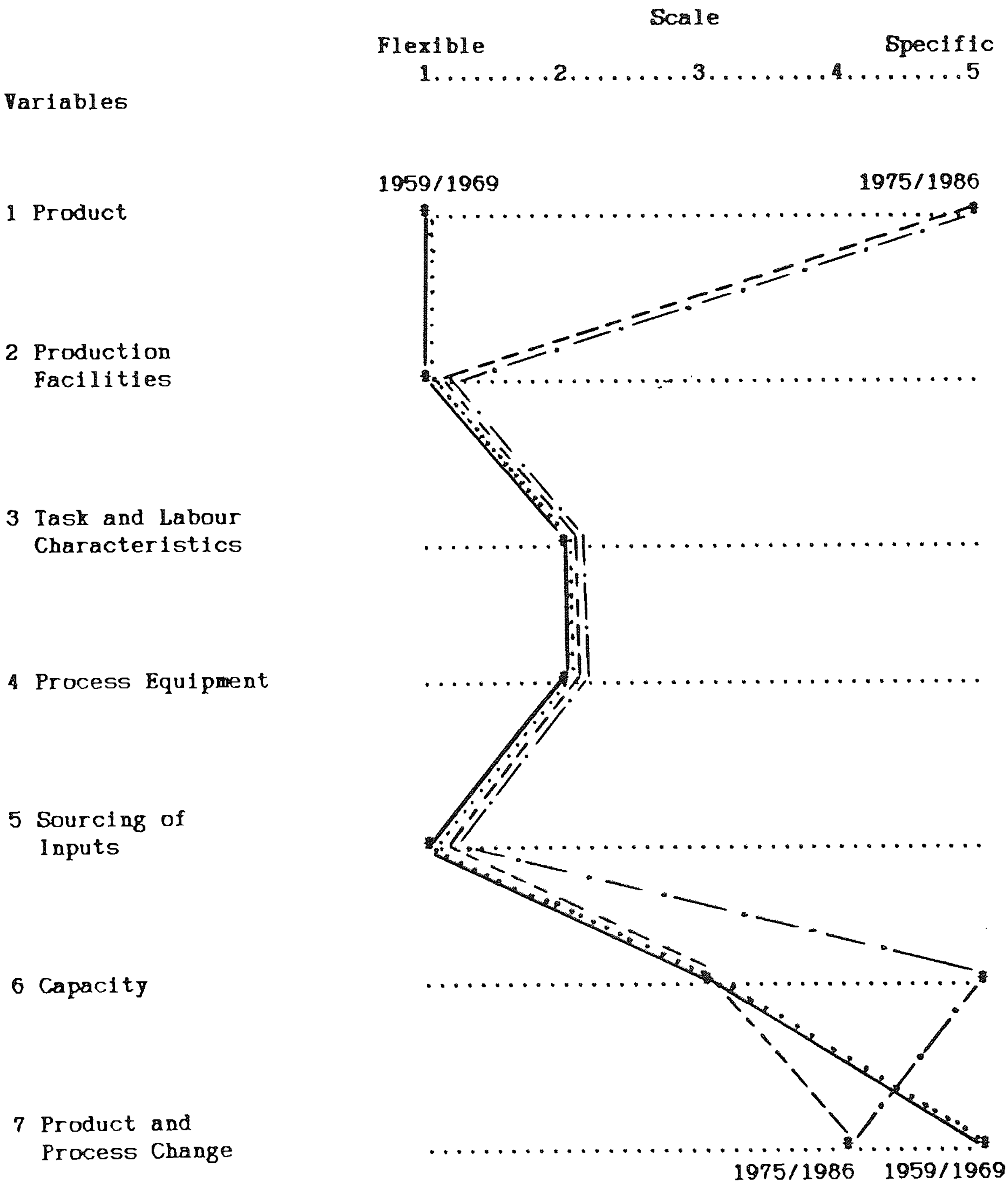
TOMKINSONS: WILTON PRODUCTIVE UNIT SCORES 1959 - 1986

Variables	1959	1969	1975	1986
1 Product	1	1	5	5
2 Production Facilities	1	1	1	1
3 Task and Labour Characteristics	2	2	2	2
4 Process Equipment	2	2	2	2
5 Sourcing of Inputs	1	1	1	1
6 Capacity	3	3	3	5
7 Product & Process Change	5	5	4	4

Source: Interviews

Figure 11

TOMKINSONS: WILTON PRODUCTIVE UNIT PROFILE



Source: Table 7
Adapted from Abernathy 22

standard product ranges. Styling was included in the company's service to this sector and some of the more popular styles, eg Banbury Cross, were often repeated. As wilton sales in the retail sector declined from the mid-1960s onwards, the company concentrated on servicing the growing contracts sector. From the mid-1970s onwards when new outlets in this sector emerged and required a wider range of products, Steeles standardised its own range of wilton products and serviced the contracts sector through factoring. The shift to Level 5 at 1975/1986 then represents this standardisation of product lines and the narrowing and consolidation of the raw materials used.

As Chapters 5 and 6.3 confirm, there has been no radical change in the wilton range of products in the period under review. Incremental changes, for example in the change from 100% wool to the industry standard 80/20 wool/nylon blend in 1964, were introduced although were not as significant as in axminster, since 100% wool remains a feature of wilton products. Similarly, small scale styling was pioneered by this company in 1951 and remains a design hallmark in the industry.

(b) Production Facilities

Fig 11 shows that production facilities (v2) remained at Level 1 throughout the period. Following Abernathy, such facilities represent job-shop adaptable flow facilities geared to customised jobs and using process equipment which has been specially designed for key tasks. As Fig 11 shows, this represents a highly flexible production system servicing a highly flexible product at 1959/1969 and a highly standardised product at 1975/1986.

The data indicates that the potential for efficiency has not been fully exploited at 1975/1986. Given, however, that strategy focuses a bespoke carpet service to the contracts and interior desiner sector, efficiency in terms of comparable unit costs is not a competitive issue. The system thus enables the company to respond flexibly in terms of quality/styling and service which are the significant competitive factors in this sector.

(c) Task and Labour Characteristics

Fig 11 shows that task and labour characteristics (v3) have remained at Level 2 throughout the period under review. Following Abernathy[24] employees are typically semi-skilled and are engaged on long-duration tasks requiring some on the job training. The appropriation of the high craft skill in wilton weaving has been documented elsewhere - see for example Bartlett[26],Smith[4] Throughout the period reviewed here there is little craftsmanship in weaving, loom automation having had more impact on the nature of maintenance skills. Wilton weaving continues to be accepted as a high status task within the carpet industry and attracts higher pay rates. The workforce here is not unionised, small and drawn from a largely rural community, and labour-turnover is low.

(d) Process Equipment

Fig 11 shows that process equipment (v4) remained at Level 2 throughout the period. Following Abernathy[27], such equipment is specially designed for key tasks. As Chapter 6.3 shows, wilton looms are constructed to weave carpets to a given pitch. The company initially used three 8-pitch narrow wilton looms. In 1966 four fully automated Van de Wiele 8-pitch narrow looms were installed, capable of weaving one and a half times faster than the earlier looms. In 1972 two further Van de Wiele looms were installed.

As Fig 6 outlining the production process shows, the available equipment includes a small backing facility which is used on an occasional basis only since backing is not required on quality wilton products.

(e) Sourcing of inputs

As Fig 11 shows, the materials used and the sourcing of these materials (v5) remained at Level 1 throughout the period. Following Abernathy[28] such materials are commonly used and available through normal distribution channels. Although there has been no change in the general classification of these materials, as Chapter 6.3 shows changes in supplier generated yarn blends were accommodated and the 80/20 wool/nylon blend was adopted in 1964. As in the axminster unit, suppliers are large, well established organisations such as Allied Textiles and Lisles. From the mid-1970s onwards although more yarn supplies were available through the Group's own yarn spinning subsidiary the company requires a diverse range of yarns to execute contract specifications and the bulk of Steeles requirement was purchased from outside suppliers.

(f) Production Capacity

Fig 11 shows that production capacity (v6) was at Level 3 from 1959 to 1975 and at Level 5 at 1986. Following Abernathy, at 1959 to 1975 such capacity is organised and controlled by product market consideration and includes production of most components of the product. Following Abernathy at 1986, capacity represents tightly balanced operations organised in units synonymous with the product.

The change here reflects the company's policy to service the contracts sector through factored products and limit and standardise the range of products manufactured on site and to achieve higher efficiencies through strict scheduling of work in progress and to include all sub-processes on site, including card stamping and backing.

(g) Pattern of Product and Process Change

As Fig 11 shows, the pattern of product and process change (v7) is at Level 5 in 1959/1969 and at Level 4 at 1975/1986 indicating a reversal from a specific to a more flexible mode.

Following Abernathy, The pattern of change at 1959/1969 reflects product enhancing minor changes arising out of process improvements and this is consistent with the data in Chapter 6.3 showing yarn modifications and changes in loom technology mainly affecting the visual quality and performance of the product.

Following Abernathy[illegible], at 1975/1986 there are long intervals between major product changes although the frequency of minor product changes may increase. The increase in the level of of flexibility here reflects improvements in processing systems designed to improve the flexibility to incorporate minor product changes - strictly speaking, it is the ability to incorporate quality/styling that has become more flexible. Although there are many facets in achieving efficient flexibility, styling itself plays an important role, particularly in wilton where the weaving process incorporates into the body of the carpet all the coloured yarn required to execute a pattern. As Chapter 6.3 shows, small scale styling, now a widespread feature in the industry, was pioneered by this company.

In summary, the wilton productive unit profile demonstrates the evolution of the product from a highly flexible to a highly specific state which is served by a highly specific core technology and flexible production and process systems. At the weaving stage only the process equipment is highly automated. Such a configuration indicates that efficiency has been off-set against retaining operational flexibility to achieve marginally differentiated products. The configuration is consistent with the company's policy to provide a bespoke carpet service to the contractor and interior designer sector where price is not a significant competitive feature.

7.3.3 Tufted Productive Unit

Table 8 lists the data obtained[33] for the seven variables characterising the productive unit at three points in time - 1969, 1975 and 1986. The profile for 1959 is omitted as the company had only one experimenal tufting machine at this time and did not enter the tufted market until 1961.

Fig 12 presents a graphic display of the information in Table 8. The profiles show that in the period under review the main changes occurred between 1969 and 1975, the profile for 1986 being the same as that for 1975. Of the seven variables characterising the productive unit, five show significant levels of change (ie one degree or more) and two variables remained constant throughout the period. The characteristics and behaviour of each of these variables are examined below.

(a) Products

As Fig 12 shows, the product (v1) was at Level 4 in 1969 and at Level 5 at 1975 and 1986. Following Abernathy[34], the product in 1969 is highly standardardised with options for different markets constituting minor variations, and by 1975 was standardised and remained standardised through to 1986.

Table 8

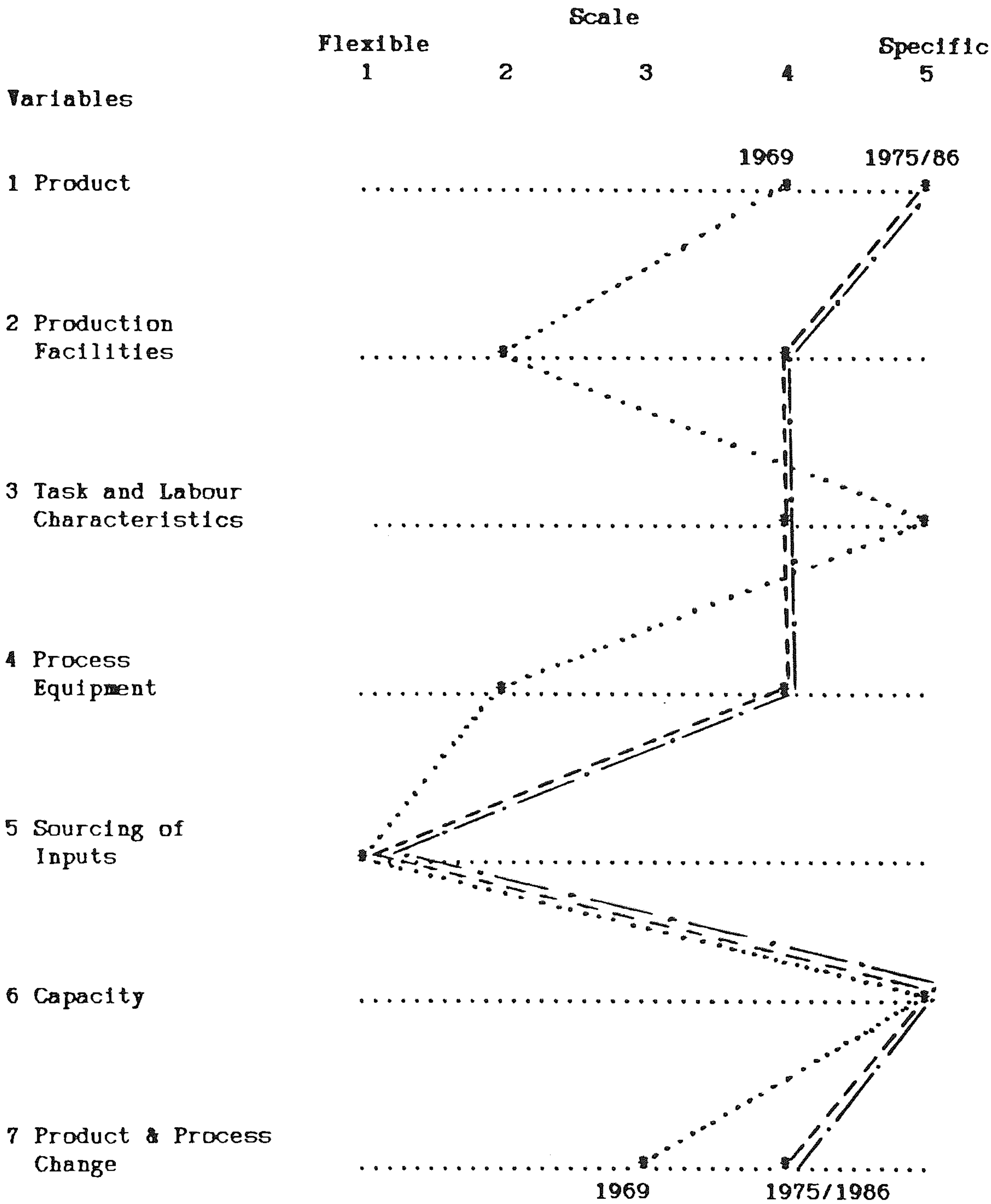
TOMKINSONS: TUFTED PRODUCTIVE UNIT SCORES 1969 - 1986

Variables	1969	1975	1986
1 Product	4	5	5
2 Production Facilities	2	4	4
3 Task and Labour Characteristics	5	4	4
4 Process Equipment	2	4	4
5 Sourcing of Inputs	1	1	1
6 Capacity	5	5	5
7 Product & Process Change	3	4	4

Source: Interviews

Figure 12

TOMKINSONS: TUFTED PRODUCTIVE UNIT PROFILE 1969 - 1986



Source: Table 8
Adapted from Abernathy 35

This profile is supported by the data in Chapter 6.4 which shows the early tufted process was only capable of using man-made fibres to manufacture plain or 'textured' cheap carpets aimed at consumers outside the price range of woven carpets. As more UK manufacturers entered the tufting industry, Tomkinsons concentrated on exploiting its expertise in the woven sector to develop a stylised tufted carpet and in 1961 launched its first commercial product - '150', a very cheap all viscose two-tone carpet for wholsesalers. A second and similar range, '201' based on a blend of synthetic and wool fibres, was launched for the retail trade soon afterwards. In addition, other lines in various blends of synthetics and wool were manufactured tailored to customer requirements. By 1966 the company was producing four main tufted ranges (three for the retail trade and one for the wholesale trade) including the highly succcessful twist-pile range (launched in 1964) and the multi-dye level piece dyed carpets (launched in 1965) which represented a significant technical breakthrough in dye and styling techniques for the tufted industry.

By 1969, Ludlow's product range was extended to all sections of the domestic market. Tufted gained a significant share of the UK domestic market but fierce price competition in this sector inhibited realistic pricing and profit margins were low. The famous Deep Pools range with its strong pattern and colour definition proved highly successful and ensured the company's rapid move into the volume tufted market. By 1971 tufted turnover was at a record level and profit margins had improved to the industry average of 9.3%.

A new product was launched in 1974 and although market share improved overall demand was well down on previous years. In 1975 the industry faced higher raw material prices and fierce price competition as carpet stocks were dumped on the market when companies went into receivership. By 1976/77 Ludlow traded at a substantial loss when all operations were subjected to a major review. Product lines and overseas selling arrangements were revised to take account of the growing cash crisis. A new low price product, Mardi Gras based on a new design approach and one of the first to use polypropylene, was launched in 1977 and continued to be one of the company's strongest selling lines in 1986. A major cashflow crisis in 1978 brought tufted and axminster operations together under a single administration and in 1979 products were substantially revised and refocused to emphasise those contributing reasonable profit margins. Selling and marketing operations were refocused and promoted under a new selling logo - Mr Tomkinsons makes a better class of carpet. Performance in 1979 showed profitable growth based on a considerable increase in turnover.

Investment in the latest hydrashift technology in 1980 promoted a new design approach in fine-scale, softly coloured range of quality tufted carpets based on a narrower range of co-ordinated colours. The new range, promoted as 'practical plains', was launched in 1981 under the Mr Tomkinsons brand and proved highly successful and both turnover and profit improved.

By 1983 profit margins had improved as tufted gained further market recognition under the Mr Tomkinson brand and accounted for some 85% of Group volume. Attention was directed to increasing the efficiency with which the company demonstrated its commitment to fashionable styling and quality products. To this end, axminster and tufted operations were further restructured to focus their target domestic market where the Mr Tomkinson brand emphasised excellent carpets and sales service without differentiating woven and tufted products.

(b) Production Facilities

Fig 12 shows that production facilities (v2) were at Level 2 in 1969 and at Level 4 at 1975 and at 1986. Following Abernathy[36] such facilities in 1969 are described as a progressive flow configuration servicing a particular product and in 1975/1986 represent closely balanced commonly paced facilities organised and controlled by a component.

The four main stages of production outlined in Fig 7 are independent and sequentially performed. Apart from Stage 1 which has remained a manual operation throughout the period, the remaining three stages are independently controlled by a component at each stage and co-ordinated through scheduling to achieve a balanced system. The shift from Level 2 to Level 4 in 1975 represents the investment to improve efficiencies at each stage of the production system and the flows between these stages and is supported by the data in Section 6.4 which shows, for example, the investment in increasingly higher levels of automation in tufting machines and backing facilities which accompanied the streamlining of product strategy from 1975 onwards.

(c) Task and Labour Characteristics

Fig 12 shows that task and labour characteristics (v3) were at Level 5 in 1969 and at Level 4 at 1975 and at 1986. Following Abernathy[37], in 1969 the task is predominantly equipment monitoring with some interventions if equipment fails, requiring predominantly process maintenance skills. At 1975 and 1986 the nature of work shows more flexibility in that it involves mixed skills and tasks, some operative and some monitoring of equipment.

The workforce here is unskilled and in 1969 was drawn from outside the pool of woven skills available in the local labour market. As axminster operations declined employees were transferred into tufted and were represented by the Power Loom Weavers and Textile Workers Union. After 1975 and through to 1986, as part of the drive to increase the efficiencies of all operations, employees in this section were required to operate flexibly to cover all production jobs, although in practice job interchangeability is confined to the range of tasks at each stage of production.

(d) Process Equipment

As Fig 12 shows, process equipment (v4) is at Level 2 in 1969 and at Level 4 in 1975 and 1986. Following Abernathy[38], in 1969 such equipment is described as including some specially designed equipment for key tasks, and at 1975/1986 this equipment is integrated at some stages to form islands of automation.

As Chapter 6.4 and para (b) above show, process equipment at each of the four production stages has been refined throughout the period under review to achieve higher levels of efficiency and at the machining and backing stages may be described as being islands of automation, the shift to Level 4 from 1975 onwards reflects the increasing sophistication of such equipment.

(e) Sourcing of inputs

Fig 12 shows that the raw materials used and the sources of these materials (v5) remained at Level 1 throughout the period under review. Following Abernathy, such material is commonly available through normal distribution channels.

A number of different materials are used in the construction of tufted carpet but most significantly yarn, dyes, primary backing and latex. While the overall description and classification of materials has remained unchanged in this period, Chapter 6.4 shows that there have been significant changes in yarn and dye formulations (some of these developed by the company in collaboration with its suppliers) which contributed directly to the development of the product and to the development of tufting machine technology, for example in enabling higher running speeds and the use of wool yarns. There are a vast number of variations in yarns and dyes which are the main elements in translating styling and quality and they are, therefore, of significant competitive importance. Suppliers, as in the woven sector, are large well established firms such as ICI. Courtaulds, Montedison. A significant proportion of the company's yarn supplies was available through the Group's yarn spinning subsidiary and thus afforded competitive advantage in terms of efficiency and availability of inputs. However, given the variety of yarns used internal supplies remain a source rather than the only source of yarn supplies. The low score here indicates that in terms of its constitutent materials, especially yarns dyes and other surface treatments, the product retains a high degree of flexibility.

(f) Capacity

Fig 12 shows that capacity (v6) was at Level 5 throughout the period 1969 - 1986. Following Abernathy this represents a highly developed state in which capacity is very specific, composed of tightly balanced homogenous operations synonymous with the product and is provided by a decentralised and independent facility. Increases in such capacity are achieved by designing entirely new plants.

Chapter 6.4 shows that the equipment and processes involved in the manufacture of tufted products were specific to that product and provided by an independent facility dedicated to tufted output throughout the period 1969 - 1986, all subprocesses having been integrated at the Kidderminster site from 1965 onwards when a foam backing facility was provided on site, this process having previously been undertaken on commission outside the company. Within the period under review increases in capacity have been achieved by installing revised versions of existing equipment capable of operating at higher speeds, additional units of such equipment and, more significantly, through more efficient scheduling and use of equipment.

(g) Pattern of Product and Process change

Fig 12 shows that the pattern of product and process change (v7) was at Level 3 in 1969 and at Level 5 in 1975 and in 1986. Following Abernathy[illegible], the pattern of change at 1969 is characterised by incremental changes with periodic major product redesign to increase functional product performance. At 1975 through the 1986 the pattern of change is characterised by long periods between major model changes which are selectively introduced and emphasise refinements.

This pattern of change is demonstrated Chapter 6.4 which shows that between the period 1961 to 1969 new products were introduced frequently as major process and raw material changes advanced the styling capability of tufted products. By 1969 the range of products had been extended to suit a variety of markets and were consolidated at this level and subject to annual sytling changes in line with industry practice. The focus of change between 1969 and 1975 shifted to improving operational efficiency through major investments in technology and work systems.

In 1975 the company faced fierce price competition in the lower-price markets and product lines were revised upwards. Following a cashflow crisis in 1976/1977 a new range based on a new styling approach and using polypropylene fibre was launched and attention directed to increasing the efficiency of operations. In 1978/79 product lines were refocused to less price sensitive markets where quality and styling were major competitive issues. To this end major changes in styling concepts and investment in the new hydrashift patterning equipment promoted the launch of a new 'practical plains' range in 1981 exploiting the company's reputation for styling. At the same time improvements in operational efficiency was pursued through investment in new technology and revised systems. This emphasis on quality, styling and efficiency continued through to 1986.

In summary, the profiles show that at 1969 although the product is highly standardardised the full economic benefits of this standardisation have not been achieved since the supporting production system is unevenly developed. While this imbalance exists although the productive unit cannot be regarded as highly efficient it retains the capacity to be flexible in response to product innovation and this is reflected in the profile for innovation at 1969_{42}.

Innovations between 1969 and 1975 shifted the profile more evenly to the right of the scale so that the product is standardised and the supporting production system is, with one exception (v5), significantly more specific indicating that the potential for economic benefits at 1969 have been realised. The profile at 1975 indicates that there is still more scope for gaining efficiencies through closer alignment of the production system with the product. This scope for change is reflected in the profile for innovation at 1975 which shifted more firmly in the direction of incremental product and process change. As at 1969, however, while this imbalance exists although the productive unit cannot be regarded as highly efficient it retains the capacity to be flexible in response to product innovation at its present level. The 1975 position is retained at 1986.

One variable, sourcing of inputs (v5) remained constant at a highly flexible level throughout the period indicating considerable scope for both radical and incremental product and process changes. The low score here indicates that in terms of its constitutent materials the product retains a high degree of flexibility.

7.4 Tomkinsons: Organisation Structure and Strategy 1959 - 1986

7.4.1 Introduction

(i) Structure

Organisation structure is described in terms of the twelve variables selected by Miller & Friesen[43] as discussed in Chapter 3.

Table 9 lists the scores obtained[44] for each of the variables at four points in time - 1959, 1969, 1975 and 1986.

Fig 13 presents a graphic display of the information contained in Table 9.

(ii) Strategy

Following Miller & Friesen[43] strategy-making represents the behavioural repertoire the organisation adopted to enable it to cope with its environment.

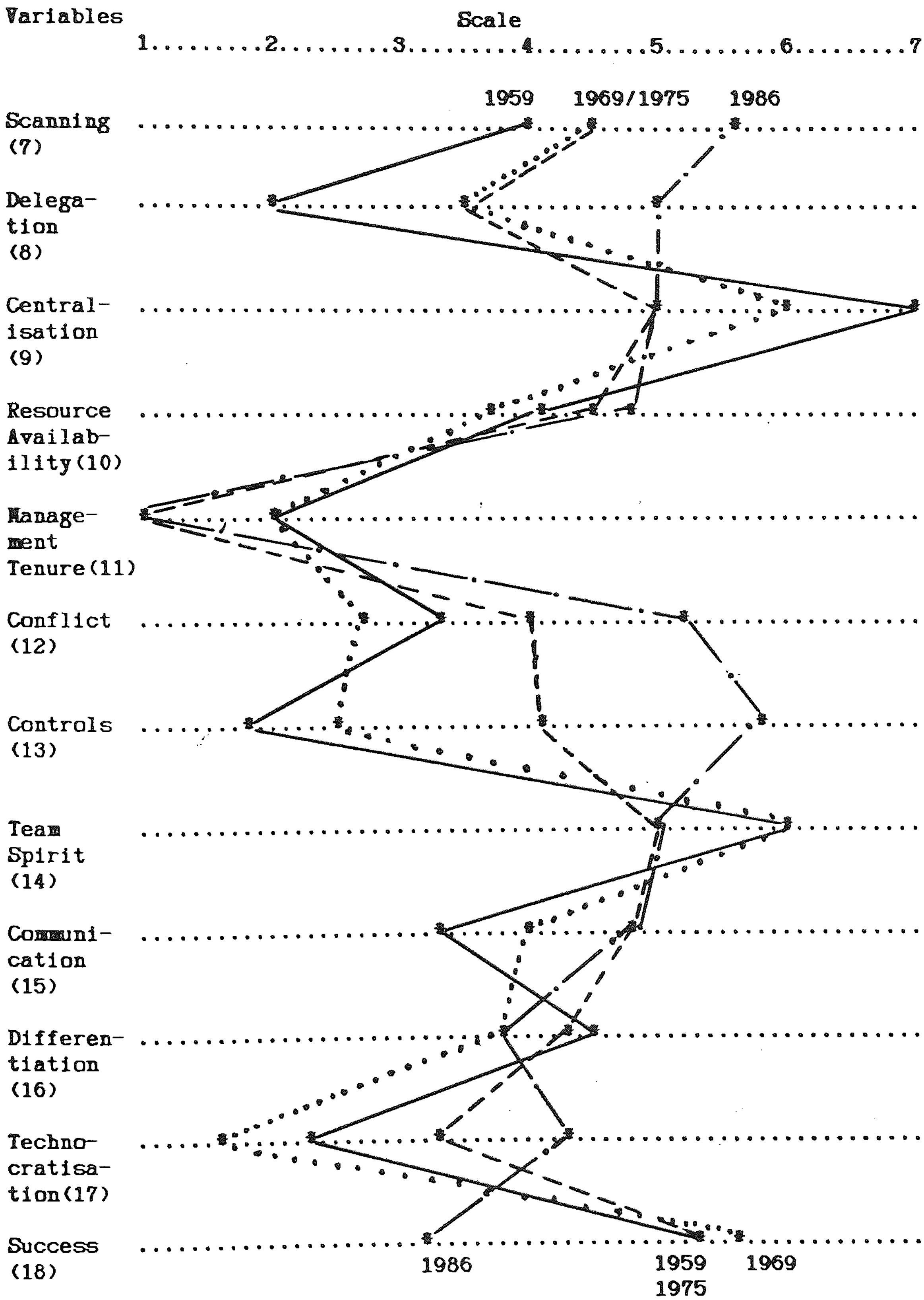
Table 9

TOMKINSONS: ORGANISATION STRUCTURE SCORES 1959 - 1986

Variable	1959	1969	1975	1986
7/Scanning	4.00	4.50	4.50	5.60
8/Delegation	2.00	3.50	3.50	5.00
9/Centralis'n	7.00	6.00	5.00	5.00
10/Resource Availability	4.10	3.70	4.50	4.80
11/Tenure	2.00	2.00	1.00	1.00
12/Conflict	3.30	2.70	4.00	5.20
13/Controls	1.80	2.50	4.10	5.75
14/Teamspirit	6.00	6.00	5.00	5.00
15/Communic'n	3.30	4.00	4.75	4.75
16/Differ'n	4.50	3.80	4.33	3.80
17/Technocr'n	2.30	1.60	3.33	4.33
18/Success	5.30	5.60	5.30	3.20

Source: Interview 44

TOMKINSONS: ORGANISATION STRUCTURE 1959 - 1986 Figure 13



Source: Table 9

The strategy-making process is described in terms of the eleven variables selected by Miller & Friesen[46] as discussed in Chapter 3.

Table 10 lists the scores obtained[47] for these eleven characteristics at four points in time - 1959, 1969, 1975 and 1986.

Fig 14 presents a graphic representation of the information in Table 10.

(iii) Efficiency and Innovation

Efficiency and innovation are discussed in terms of both the Lawrence & Dyer[48] and Abernathy[49] models and thus draws on information from the structure, strategy and productive unit profiles to elaborate the claims made.

The next section presents the structure and strategy profiles at each of the four points in time, assesses efficiency and innovation, and compares the realised outcomes with the expected outcomes in terms of the models informing the analysis.

Table 10

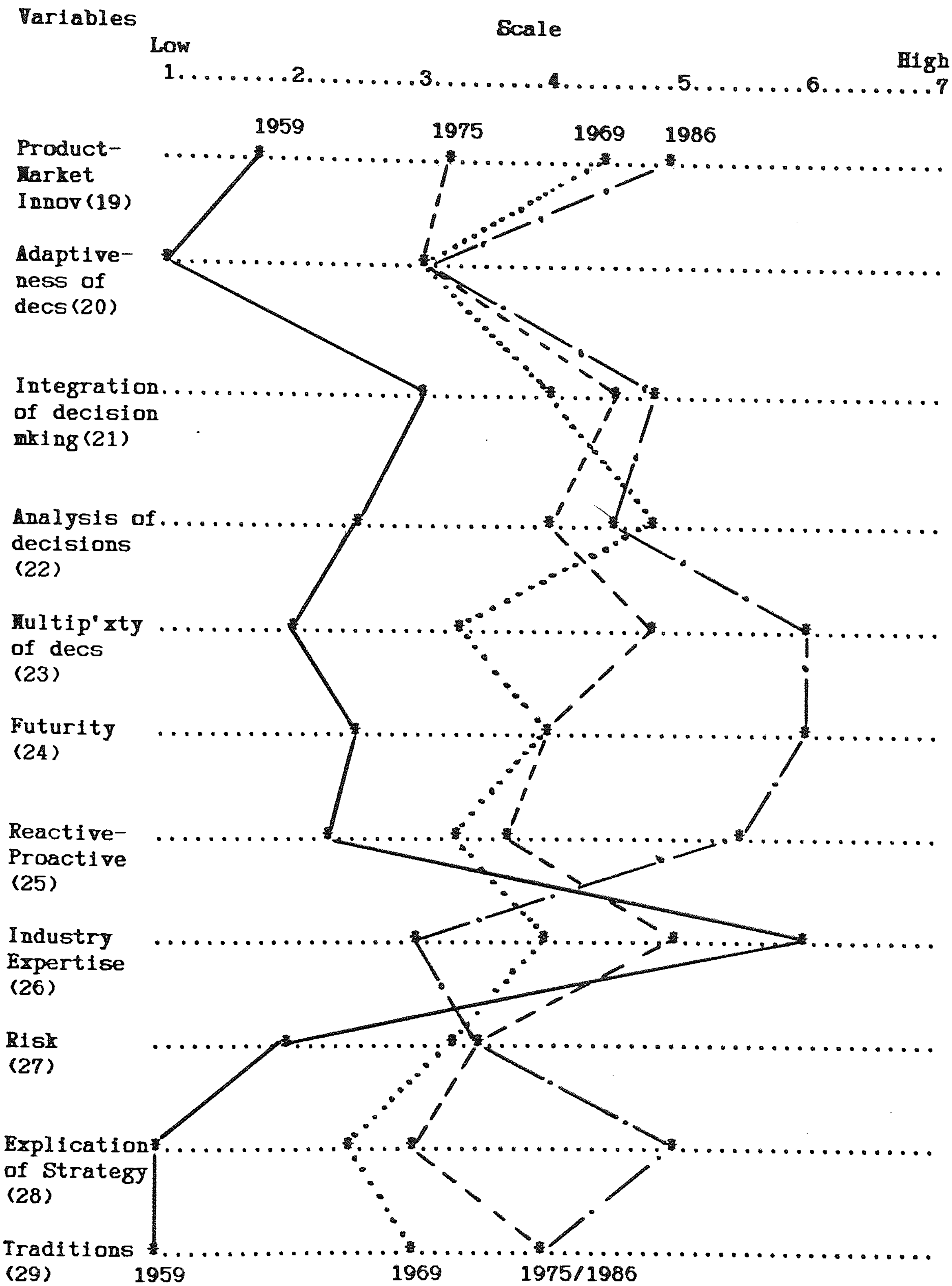
TOMKINSONS: ORGANISATION STRATEGY SCORES 1959 - 1986

Variables	1959	1969	1975	1986
19/Innovation	1.70	4.40	3.25	4.90
20/Adaptive'ss of response	1.00	3.00	3.00	3.00
21/Integ'n of dec making	3.00	4.00	4.50	4.80
22/Analysis of dec mkg	2.50	4.80	4.00	4.50
23/Multiplexity	2.00	3.30	4.80	6.00
24/Futurity	2.50	4.00	4.00	6.00
25/Reactive - Proactive	2.30	3.30	3.70	5.50
26/Industry Expertise	6.00	4.00	5.00	3.00
27/Risk Taking	2.00	3.25	3.50	3.50
28/Explication of strategy	1.00	2.50	3.00	5.00
29/Traditions	1.00	3.00	4.00	4.00

Source: Interview[47]

TOMKINSONS: ORGANISATION STRATEGY 1959 - 1986

Figure 14



Source: Table 10

7.4.2 Environment, Structure and Strategy profiles for 1959

(i) Environment and expected structure and strategy

The co-ordinates in Table 5 locate the organisation in Area 7 of the nine-cell framework. Lawrence & Dyer argue[50] that the low IC and low RS conditions characterising this area provide little incentive for constituent organisations to pursue either efficiency or innovation. Such organisations are expected[51] to manifest a Professional Bureaucracy structure and a Reactor strategy. Providing the environmental conditions are maintained, organisation survival is assured. In the event of environmental change, such organisations are expected to be notoriously non-readaptive.

(ii) structure

Table 9 lists the scores for each of the twelve variables characterising organisation structure at four points in time. Fig 13 presents a graphic display of the scores for these variables at 1959.

As Fig 13 shows, the configuration of variables at 1959 show a highly centralised structure (v9) with decision making power concentrated at the topmost levels of management. The historical overview in Chapters 5 and 6 shows that despite adopting public limited company status the

Tomkinson family remained in control of the company by virtue of their majority shareholding and held seven of the eight main board directorships. These family members headed up the major divisions and functions in the company and all decision making authority was vested in the family, although this authority was exercised mainly on an informal basis as is evidenced by the low score for internal controls (v13) and the low score for delegation (v8). Differentiation (v16) is at a moderate level and co-ordination was achieved at the topmost level of the organisation by mutual adjustment between the family members . At lower levels co-ordination relied on a mixture of standardisation of work processes and standardisation of skills, particularly in the key wilton and axminster units which relied on skilled and semi-skilled operators in several key aspects of the production process, notably in loom maintenance and in weaving.

The company had established strong working relationships with suppliers and customers and exploited the technical expertise afforded by these relationships and this, together with the high level of industry expertise of topmost management (v 26) and skill-base of certain key production processes is reflected in the low level of technocratisation (v17).

The high centralisation (v9) and low delegation (v8) and technocratisation(v17) scores indicate that power distribution was heavily skewed in favour of top management. Since, however, the main divisions and functions were represented at both strategic and executive levels by the same Tomkinson family members, power distribution in both vertical and horizontal dimensions was perceived to be evenly distributed. The low technocratisation (v17) score also obscures the perceived high industry expertise of top management (v26) and the reliance on skilled operators in certain key production processes.

Conflict (v12) is low. Respondents reported that while family members were sometimes in conflict with one another this conflict was resolved at family level and rarely affected inter-functional relationships, the functions in any case being operated in a non-interdependent way. The high team spirit score (v14) reflects the emphasis given to the informal methods of co-ordination and is enhanced by a workforce in which many employees had a long family relationship, often spanning several generations, with the firm. As the historical overview shows, the company was proud of the co-operation of its workforce and its strike-free industrial relations record.

Lawrence & Dyer[1] associate the Area 7 environment with a Professional Bureaucracy structure which they charactertise in terms of low differentiation, low integration, human resource practices (HRPs) which emphasise bureaucratic mechanisms, and a power distribution which is skewed in favour of a dominant clique. The evidence in this structural profile supports two of these four characteristics. As expected, integration (v13) is low and power distribution (vs 8,9,17) is skewed in favour of a dominant clique. Contrary to expectations, however, differentiation (v16) is moderate and team spirit (v14)is high indicating that HRPs emphasise clan and market mechanisms in addition to the expected bureaucratic mechanism.

The emphasis given to informal methods of co-ordination through mutual adjustment and the reliance on standardisation of skills in certain key production processes, together with the low level of delegation, technocratisation and lack of formal control systems, all suggest the profile is sufficiently compatible with Mintzberg's characterisation of a Professional Bureaucracy. The high level of centralisation is, however, inconsistent wih a Professional Bureaucracy profile and in this case study reflects the high involvement of the owning family in both strategic and operational issues.

The evidence here then supports Lawrence & Dyer's expected Area 7 and Professional Bureaucracy relationship. The discrepancy in differentiation and HRP characteristics are both likely to be distortions arising from the family owned and managed business in which the various functions operated in a non-interdependent way and in which the workforce reflected the strong company tradition of employing local families, some having almost as long an association with the firm as the founding family.

It is important to note that the structural profile at 1959 coincides with the re-organisation of the firm as a holding company with two wholly owned subsidiaries and may thus reflect a transitional structure.

(iii) Strategy process and strategy

Table 10 lists the scores obtained[4] for the eleven variables characterising the strategy making process at four points in time. Fig 14 presents a graphic display of the information in Table 10 for 1959.

As Fig 14 shows, the strategy-making profile for 1959 indicates Tomkinsons had a low record in both product-market innovation (v19) and in its adaptiveness to environmental changes (v20). Processes for achieving an integration of decisions across the company (v21) are at a low-moderate level, as is the degree of analysis to which decision-making is exposed. The low score for the multiplexity of decisions (v23) shows an approach which is geared to problem-solving on a one-off basis with only a low-moderate consideration being given to a long-term perspective (v24). The low score given for the characteristic describing the general outcome of strategy in terms of whether the organisation is generally seen to be a follower or a leader in the industry (v25) shows that Tomkinsons tended to react to environmental changes rather than being at the forefront of innovation, and the low score for the company's approach to risk taking (v27) is consistent with the reactive response indicated. The topmost level of management is shown to have a very high level of industry expertise (v26). The low score for an explicit and conscious corporate stategy (v28) is consistent with the low score for perceptions of tradition informing company strategy (v29) indicating frequent change which is also consistent with the reactive response to environmental change (v25).

The low product-innovation (v19) and adaptiveness of response (v20) scores are both consistent with Mintzberg's characterisation of strategy in a Professional Bureaucracy and with the historical overview which shows that there had been little radical innovation in the two carpet manufacturing subsidiaries. These scores nevertheless mask the high frequency of incremental product change which was a feature of competitive behaviour in the woven sector.

The low-moderate emphasis given to achieving an integration of decisions (v21) and the degree of analysis to which decision-making is exposed (v22) together with the low score for the multiplexity of decisions (v23) are all consistent with an organisation operating with a highly stable product and predictable, non-price orientated competitive behaviour. As Chapter 6 has shown, the axminster and wilton product strategy was geared to meeting customer requirements at the middle-to-topmost end of the product market where price was not a critial competitive feature. Decision-making in the organisation thus reflects problem-solving geared to resolving present customer requirements (v24) rather than being concerned with the attainment of future goals. This approach is thus consistent with the low scores for the awareness of strategy (v28) and traditions (v29) informing the overall direction of such strategy.

The overall approach is cautious (v27) and consistent with the strong reactive score (v25) reflecting an organisation which chooses to operate in a well-established environment in which top management has a high degree of expertise (v26). The decision to diversify into wilton carpet manufacture, the incremental approach to adopting tufted technology and the integration backward into yarn spinning, encapsulate this cautious approach to new ventures.

Such a profile identifies an adaptive strategy-making mode which Mintzberg[56] associates with an organisation in which there is a powerful force for maintaining the status quo and a division of power among the members of a dominant coalition. Given such a division of power decision-making proceeds incrementally and is aimed at problem-solving to reduce uncertainty and overcome existing problems rather than with evolving long-run strategies. In such circumstances, the strategy-making process is characterised by disjointed and fragmented decisions as the organisation demonstrates the 'nibble rather than a good bite' approach which is a characteristic of decision-making in the adaptive mode.

Section (ii) has identified the organisation structure in 1959 as a Professional Bureaucracy. While Mintzberg[47] demonstrates strategy-making in a Professional Bureaucracy in the context of American universities, there is no research evidence identifying strategy-making in a Professional Bureaucracy in the manufacturing sector. The evidence provided in the Tomkinson case study identifies a high degree of congruence with the 'university' model. For example, in both contexts, strategic processes emerge as 'professionals' in the organisation rely on standardisation of skills to meet 'client' needs where, so long as the 'course' is standard, the professional contributors know exactly what is expected of them. In such a system there is little need for formal planning and, therefore, the technostructure and formal control systems are undeveloped. Horizontal differentiation is high and such co-ordination as is necessary over and above co-ordination through standaridsation of skills is achieved through mutual adjustment. In much the same way Tomkinsons relied on its professionals heading up the various divisions and functions to respond to consumer demand for changing qualities, patterns and colours in both domestic and contracts markets. Planning and decision-making was geared to resolving problems arising out of this relatively short-term product focus and represents a reactive response to environmental demand. Co-ordination was achieved by the mutual adjustment of the various functions working together to develop a particular order to meet customer requirements. The 'collegiate' style is reinforced in the family-dominated executive board where such members in addition to their strategic functions held operational responsibility for the production units and the main functions. Thus, although power is highly centralised it was also dispersed within the family and, therefore, could be said to be both vertically and horizontally decentralised in line with Mintzberg's[58] model.

Following Mintzberg[58] the evidence in this case study confirms that, like the university sector, Tomkinsons was providing a personal service-type operation based on a standardised programme, operating in a relatively complex but stable environment and using a technical system that was neither highly regulating nor sophisticated.

Lawrence & Dyer[60] associate Area 7 with a Reactor strategy in which both efficiency and innovation have a low priority. The profiles for 1959 support the expected low emphasis given to low product-market innovation (v19) and efficiency (v13). Miles & Snow[61] note that the outcome of a Reactor strategy is both inconsistent and unstable since the organisation lacks a set of response mechanisms which it can consistently put into effect when faced with a changing environment. Such a strategy is essentially a residual strategy which is adopted when one of the other three 'pure' strategic responses (ie Defender, Prospector, Analyser) have been improperly pursued.

The evidence indicates a Defender solution to the entrepreneurial problem of defining the product-market domain which, following Miles & Snow[62], is typically concerned with creating stability through providing a limited set of products directed at a narrow segment of the total potential market and where competitive behaviour is defensive and expressed in terms of competitive pricing or high-quality products. Tomkinson's solution is in terms of providing a limited range of axminster and wilton products to the non-price competitive segments of the domestic and contracts markets respectively. Effective performance in the Defender mode requires high technological and operational efficiencies in the engineering solution and mechanistic structural and processing mechanisms to monitor and control efficiency. The evidence indicates that in both axminster and wilton productive units the engineering systems were flexible and not efficient, and the Professional Bureaucracy structure and process mechanisms operated as a facilitaing rather than a controlling system and were more in line with a Prospector entrepreneurial mode. The overall configuraion is thus inconsistent and therefore qualifies as a residual or Reactor strategy.

The expected low efficiency outcome is confirmed in respect of both the administrative (v13) and engineering (productive unit profiles) solutions. The expected low innovation outcome is confirmed in terms of product-market innovation (v19) but, as previously noted, this score masks the frequent incremental product innovation which was a feature of this organisation's competitive behaviour and which is reflected in the annual styling changes.

The findings for 1959 then support Lawrence & Dyer's expected Area 7 and Reactor strategy relationship and low efficiency outcome. The findings support the expected low outcome in respect of radical innovation but notes the high level of incremental product innovation.

As previously noted, the profiles for 1959 coincide with the reconstitution and restructuring of the company in 1959 so that the findings here may identify transitional arrangements. Although not yet functional, it is important to note this company's investment in yarn spinning indicating a strengthening of its engineering solution in line with a Defender mode and also its experiment with tufted carpet manufacture.

(iv) innovation and efficiency

The low scores for product-market innovation (v19) and adaptiveness of responses (v20) are both consistent with the historical overview and profiles of the productive units (Figs 10,11 & 12) which confirm that there had been no radical product changes since the present cloth constructions were adopted for axminster and wilton in the 1930s and early 1900s respectively. These scores are thus consistent with both the Lawrence & Dyer[84] and Abernathy models of innovation which relate such outcomes to low IC and a dominant design respectively.

It should be noted, however, that the scores nevertheless mask the high frequency of incremental product change which was a feature of competitive behaviour in the woven carpet sector. Such incremental product change is consistent with Abernathy's[66] model of innovation but is not taken into account in the Lawrence & Dyer[67] model.

Both the productive unit profiles and the structure scores (v13) indicate that efficiency was not given a high priority. The finding here is thus consistent with Lawrence & Dyer's[68] expected influence of low RS in Area 7. As previously noted (see Section 7.3.) the productive unit profiles are also consistent with Abernathy's[69] model which argues that even with the emergence of a dominant design when high efficiencies are possible, price competition is avoided by offsetting possible efficiency gains against the capacity to incorporate incremental product innovation.

With regard to innovation, the findings here provide qualified support for Lawrence & Dyer's[70] claim that low IC is expected to result in low innovation. The findings in this case study confirm that while radical product-market innovation has little emphasis and may thus be related to the low level of IC, incremental product innovation has been emphasised. In terms of Abernathy's[71] model, the findings here support both the expected radical and incremental outcomes.

With regard to efficiency, the findings here support both Lawrence & Dyer's[72] claim that low RS is expected to result in low efficiency outcomes, and Abernathy's[73] claim that with high product standardisation efficiency may be offset against retaining flexibility and incremental product innovation if price competition is to be avoided.

7.4.3 Environment, Structure and strategy profiles for 1969

(i) Environment and expected structure and strategy

As Fig 9 shows, the co-ordinates in Table 5 locate the organisation in Area 4 of the nine-cell framework. Fig 8 demonstrates that environmental complexity had increased to an intermediate level and that both elements of complexity, that is heterogeneity and dynamism, had increased, the former having increased more significantly. As the historical overview shows, the increasing level of IC reflects the 'fashion trade' trends in the industry and the company's increasing product and technology diversification which by 1969 included tufted carpets and the manufacture of spun yarns in addition to the two woven carpet products of axminster and wilton.

Lawence & Dyer describe[74] Area 4 as the place where new ventures are born and argue[75] that the area has not been widely studied so that organisations operating in this area have been the subject of more speculation than actual study. Since organisations in this environment are typically described as informal groups with a strong entrepreneurial leader Lawrence & Dyer[76] give the label 'Entrepreneurial Group' to the expected organisation form. Increasing levels of IC are expected to increase the level of differentiation. Increasing dynamism is expected to emphasise an organic structure while increasing heterogeneity is expected to increase decentralisation. Since RS is low, integration is not expected to increase. Such organisations are expected[77] to adopt a Prospector strategy which exhibits a strong concern for product and market innovation but which is not usually completely efficient. Since the organisation is typically small, an emphasis on clan HRP mechanisms is expected and member involvement is not expected to be problematic.

(ii) structure

Table 9 shows the scores for the twelve variables characterising structure at four points in time. Fig 13 presents a graphic display of the scores for these variables at 1969 and 1959.

As Fig 13 shows, only four of the twelve variables characterising the organisation structure changed by one degree or more between 1959 and 1969; two variables (ie management tenure (v11) and team spirit (v14)) held constant, and the remaining six variables show only slight score variations.

The four variables showing a shift of one degree or more at 1969 are

Centralisation (v9)

Delegation (v8)

Controls (v13)

Communication (v15)

As expected, centralisation (v9) is lower though still at a high level with a score of 6 on a 7-point scale. As the historical overview shows, management tenure (v11) was highly stable in this company and the 1959 founding executive board members were still in control of the company in 1969.

The level of delegation (v8) increased as expected as diversification required operational activities to be divorced from the executive board and as the new ventures, particularly into tufted carpet manufacture and spinning, brought new specialist managers into the company.

The expected increase in the level of differentiation (v16) has not occurred. While Fig 13 shows there was in fact a decrease in the level of differentiation the difference in score values between 1959 and 1969 is small and it can be reasonably concluded that differentiation remained at more or less the 1959 level. Although RS remained at a low level there is an unexpected increase in the level of integration (v13) which although still at a low level indicates more formalised controls and is complemented by the increasing level of communication (v15).

Apart from these four changes the structural profiles for 1959 and 1969 are very similar. These changes indicating the emergence of more formalised control systems and the emergence of middle line managers as key figures in the organisation suggest some movement away from a Professional Bureaucracy form towards a divisionalised form. Such changes are in line with Mintzberg's[79] claim that a divisionalised form often emerges from the loose federation of firms operating in different product markets and, following Mintzberg[79], it is noted that such a transition in the context of a Professional Bureaucracy is to a

Socialised-Personalised Divisional form. Thus the continuing high level of centralisation is consistent with such a transition, as is the increase in the level of vertical decentralisation (v8), and the increase in formal control systems(v13).

As the historical overview shows, however, the divisionalised form in Tomkinsons was incomplete in that despite the separate product divisions many critical functions were located within the axminster company and shared with the other divisions - for example, personnel management, research and development, maintenance and design. The evidence suggests that the divisions were operating as loosely coupled units of the holding company and the low-moderate level of control systems indicates that there was little central direction to effectively integrate activities. The low priority given to achieving integration is consistent with the low level of RS at 1969.

Lawrence & Dyer[6] associate Area 4 with an Entrepreneurial Group organisation form in which power is with the founding group and in which there is a strong concern for product and market innovation but little emphasis on efficiency. Both differentiation and integration are expected to be at a moderate level. HRPs are expected to emphasise clan mechanisms and member involvement.

The findings in this case study support four of the expected six characteristics. As expected, power is with the founding group (v9), there is a strong concern for product - market innovation (ie tufted/spinning), and differentiation (v16) is at a moderate level and team spirit (v14) is high indicating employee involvement is high despite the measures to improve efficiency by increasing labour flexibility. Contrary to expectations, however, but consistent with an emerging divisionalised form, efficiency was given some emphasis during this period as is evidenced by the increase in formal controls (v13) although the score is still low, and HRPs continue to emphasise bureaucratic, and market mechanisms in addition to the expected clan mechanism.

To the extent that the divisions are essentially operating as entrepreneurial groups (particularly, for example, the wilton unit with its factoring facility) with little more than their legal relationship linking them together, the organisation form may be said to be consistent with Lawrence & Dyer's[81] characterisation of an Entrepreneurial Group form. The findings in this case study then support Lawrence & Dyer's claim[82] that an Entrepreneurial Group form is consistent with an Area 4 environment.

(iii) strategy process and strategy

Table 10 lists the scores obtained for the eleven variables characterising the strategy-making process at four points in time. Fig 14 presents a graphic display of the information in Table 10 for both 1969 and 1959.

As Fig 14 indicates, the profile for 1969 shows significant changes in all of the eleven variables characterising the strategy-making process, all of these changes resulting in scores which shift the profile from the low to the moderate position on the 7-point scale.

The profile, however, remains consistent with Mintzberg's[53] adaptive strategy-making mode although the high emphasis given to the analysis of decisions (v22) is more consistent with a planning strategy mode[54].

The strategy-making profile for 1969 shows a higher commitment to product-market innovation (v20) although the score is still within the moderate range. The cautious approach to responding to environmental change (v20) is still evident. More attention is given to achieving consistency in decision making across the company (v21) with the score still falling within the moderate range. Significantly more atention is given to the analysis of strategic decisions (v22) with decision-making taking account of multiplex issues (v23) and becoming more forward looking (v24). The organisation is still seen as adopting a reactive mode (v25) although the modest shift in score to a low-moderate position is consistent with the similar shift in score for the degree of risk-taking (v26) in the organisation. Although the score is still at a low level, there is more awareness of corporate strategy (v28) and more awareness of traditions (v29) influencing decision-making.

The increase in product-market innovation (v19) and adaptiveness of decisions (v20) are consistent with the company's further diversification into tufted carpets and yarn spinning and the increased level of environmental uncertainty. The score for integration of decision-making processes (v21), analysis of decisions (v22), multiplexity of decisions (v23) and futurity of decisions (v24) have all increased, reflecting the increasing level of delegation and use of formal controls and concern with forecasting. The decrease in the industry expertise of top management (v26) is consistent with the increasing level of diversification, particularly into tufted and spinning, which were outside the experience of the founding family members.

As the historical overview has shown, the decision to diversify into tufted carpet manufacturing, the single greatest innovation in the industry since the mechanisation of the axminster weaving process in the late 19th century, thus represents a bold move for an organisation which, in 1959, appeared conservative and firmly committed to the woven sector of the industry. Clearly there will have been no tradition of expertise in tufting within the company, and hence the need to bring in the expertise to service the new product. Similarly, the investment in spinning and printing in this period represent bold departures from the traditional woven carpet manufacturing activities. As the overview shows, the company invested heavily in technology and working practices to improve efficiency and innovation in both woven and new operations. Such responses demonstrate the company's 'Prospector' strategy in terms of its new tufted and printing ventures and a 'Defender' strategy in terms of its backward integration into spinning and its ongoing commitment to and strengthening of its woven activities. Such a dual response characterises an 'Analyser' strategy.

Miles & Snow[55] identify an Analyser strategy as one in which the organisation typically operates in two types of product-market domains, one relatively stable and the other changing. In their stable domains Analysers operate routinely and efficiently through the use of formalised structures and procedures. In their more turbulent areas, competitors are watched closely for new ideas and those ideas which appear to be the most promising are rapidly adopted. Analysers thus combine the strength of both the Prospector and Defender strategies with an adaptive approach which seeks to provide a balance in both operations.

The historical overview has shown that in 1969 Tomkinsons had emerged as a manufacturer of both woven (stable domain) and tufted (changing domain) carpets.

Lawrence & Dyer[56] associate the Area 4 environment with a Prospector strategy. The information in this case study confirms the emergence of a Prospector strategy in Area 4 but notes the organisation's commitment to its traditional stable product port folio which characterises the dual response of an Analyser strategy. The findings here then provide qualified support for Lawrence & Dyer's[57] expected Area 4 and Prospector strategy relationship.

(iv) efficiency and innovation - 1969

Lawrence & Dyer claims that strategy and structure in Area 4 is likely to exhibit a strong concern for innovation but efficiency is expected to be low.

The profile at 1969 and the historical overview confirm the expected higher commitment to product-market innovation (v19) reflecting the company's diversification into tufted carpet manufacture and yarn spinning, both innovations representing radical departures for the company. Both these innovations also represent investments to achieve higher efficiencies arising out of the inherently more efficient manufacturing process in the case of tufted and, in the case of yarn spinning, backward integration into raw material supplies. The historical overview and structural profile (v13) similarly confirm a concern with improving efficiency as financial resources were under pressure following the heavy investment programme and were relieved by the sale of the New Zealand interests.

The findings here then confirm Lawrence & Dyer's expected relationship between higher levels of IC and high levels of innovation. It is, however, important to note that in both tufted and yarn spinning these radical innovations are associated with increasing levels of IC and involve extending the portfolio by two additional productive units. As noted in the discussion of the 1959 profile, incremental product innovation, as reflected in the new contract range and the Bernat Klein axminster designs, continued to be a feature of competitive behaviour in the woven units, so that both incremental and radical innovation are evident at this level of IC.

As noted, the investments in tufting and spinning also constitute investments in improving the overall efficiency of operations. The creation of additional productive units to achieve such efficiencies confirms Abernathy's model which demonstrates[50] that the capacity for efficiency and innovation are unlikely to be pursued effectively within the same productive unit. Thus, as the productive unit profiles and historical overview show, despite investment to improve efficiency in the wilton and axminster units, the profiles retain a high degree of flexibility indicating that the overalll efficiencies to be gained by tighter integration within the production systems has been offset against retaining this degree of flexibility in line with the competitive behaviour of these products.

The structural profile reveals a low integration score (v13) indicating that control systems were insufficiently developed and it is, therefore, reasonable to conclude that the potential benefits of these efficiency programmes were not fully exploited. The findings here then support Lawrence & Dyers[51] claim that Area 4 is associated with low efficiency outcomes.

7.4.4 Environment, structure and strategy profiles for 1975

(i) Environment and expected structure and strategy

As Fig 9 shows, the co-ordinates in Table 5 locate the organisation in Area 5 of the nine-cell framework. Fig 8 demonstrates that although there was some change in the level of dynamism, and more significantly in the level of heterogeneity, the overall level of IC remained at the intermediate level. Increasing heterogeneity is expected to increase the level of decentralisation. Hostility, however, increased significantly shifting RS to the intermediate level. The significant increase in the level of RS is expected to increase the emphasis given to achieving efficiency and integration. These co-ordinates reflect the conditions in the industry which, as the historical overview shows, included raw material shortages and price increases, sterling policies which created difficulties in export markets, government price controls and rising levels of cheap imported carpets, bankruptcies and price competition, all resulting in some of the worst trading conditions ever experienced by the industry.

Lawrence & Dyer[illegible] focus special attention on Area 5 as the intermediate levels of IC and RS are claimed to provide the conditions most likely to foster readaptation. Lawrence & Dyer argue that no generally accepted term has evolved for the organisation form expected here and only a limited effort has been made to describe them in the literature. The label Readaptive form is given to the expected structure and organisations are expected[33] to adopt a Readaptive strategy which emphasises both efficiency and innovation. Member involvement is expected to be high.

(ii) structure

Table 9 lists the scores for each of the twelve variables characterising organisation structure at four points in time. Fig 13 presents a graphic display of the scores for these variables at 1969 and 1975. As Fig 13 shows, the structural profile in 1975 indicates conspicuous changes in the overall configuration of the variables between 1969 and 1975 with nine of the twelve variables showing significant levels of change. The nine variables showing significant levels of change (ie one degree or more) are:

Centralisation (v9)

Resource availability (v10)

Management tenure (v11)

Conflict (v12)

Controls (v13)

Team Spirit (v14)

Communication (v15)

Technocratisation (v17)

Success (v18).

As the historical overview shows, in 1975 Mr KRG Tomkinson replaced Mr NG Lancaster as Chairman and only three of the eight founding directors remained on the executive board. The changes in the executive board resulted in management changes in the divisions, particularly in the tufted division in which Mr KRG Tomkinson had been closely involved. Adjustments had also been made in the selling organisation of the company, particularly in the wilton subsidiary wich now included both axminster and tufted products in its contract range of carpets, some of these carpets being manufactured outside the group.

These changes are reflected in the lower score for management tenure (v11) as the new regime took control and in the expected further decrease in the level of centralisation (v9) which, with a score of 5 on a 7-point scale, represents a moderate level, and is consistent with the expected increase in the level of technocratisation (v17). As expected there has been a significant increase in the level of integration as evidenced by the moderate score for controls (v13) and the higher level of communication (v15). As the historical overview shows, the company was particulary conscious of the need to achieve more effective integration and higher communication within the group and a new company was formed to undertake this role under the directorship of one of the first non-family graduates to join the company and the executive board. Team spirit (v14) although still at a high-moderate level declined and conflict (v12) increased, both outcomes manifesting the inherent difficulties identified by Lawrence & Dyer[34] in reconciling efficiency and innovation and here reflecting the highly sensitive situation evolving as axminster declined and tufted gained turnover but at considerably lower profit margins. Resource availability (v10) is at a moderate level (v10) and is consistent with the company's history of never having traded at a loss and producing some record trading successes despite the adverse trading conditions at this time.

Lawrence & Dyer[95] associate a Readaptive organisation form with Area 5 conditions. A Readaptive form is characterised by high differentiation and integration, balanced power distribution, and high member involvement arising out of HRPs which emphasise bureaucratic, clan and market mechanisms, and high efficiency and innovation.

All six Readaptive characteristics are identified in Tomkinsons' profile at 1975 when the structural changes shift the scores significantly into the high-moderate/moderate area of the profile but fall short of the absolute high scores expected in the Readaptive organisation form. Differentiation (v16) is at a high-moderate level and integration (v13) is at a moderate level. The high- moderate score for centralisation (v9) and the moderate score for delegation (v8) and technocratisation (v17) indicate some movement towards an even distribution of power in both the vertical and horizontal dimensions although the balance remained relatively skewed in favour of top management. Similarly the decline in the team spirit score (v14) although still at a high-moderate level indicates some decline in the favourable impact of HRPs and is reflected in the increased score for the level of conflict (v12). The historical overview and productive unit profiles confirm that both efficiency and innovation were emphasised throughout the period.

As the historical overview shows, the high emphasis given to achieving integration and the operating objectives and style of this integrating mechanism, together with the product strategy and configuration of the three main productive units, indicate that Tomkinsons was operating a matrix organisation form, particularly with regard to is contract activities which had become particularly important at a time when price competition threatened the domestic carpets sector.

The structural profile is consistent with Mintzberg's Administrative Adhocracy. Such a structure is essentially organic and relies on mutual adjustment and liaison devices to achieve co-ordination. Planning and formal controls have a low profile. Power is selectively decentalised to the technocrats. Differentiation is low and conflict and aggression are endemic to the structure. Typically the organisation functions with its operating core separated from the rest of the organisation. The wilton division with its extensive factoring facility typifies this form of operation although, as the hostile trading conditions continued, both the axminster and tufted divisions were also involved in servicing both contract and domestic sectors. This pattern of trading required high levels of flexibility and co-operation throughout the group and particularly sensitive attention to production scheduling.

The findings here support Lawrence & Dyer's claim that a matrix structure is consistent with Area 5 conditions. The structural profile is insufficiently developed in terms of Differentiation and Integration and the equalisation of power to justify compatibility with the expected Readaptive organisation form. It is noted, however, that team spirit (v14) and Communication (v15) are within the boundaries of the Readaptive organisation form characteristics.

(iii) Strategy process and strategy -1975

Table 10 lists the scores obtained for the eleven variables characterising the strategy-making process at four points in time. Fig 14 presents a graphic display of the information in Table 10 for 1975 and 1969.

As Fig 14 shows, nine of the eleven variables characterising the strategy-making process changed between 1969 and 1975, with only four of these nine changes showing any significant level (ie one degre or more) of change.

The four variables showing significant levels of change are:

Innovation (v19)

Analysis of decision-making (v22)

Multiplexity of decision-making (v23)

Industry expertise of top management (v26)

As the profile reveals, product-market innovation (v19) declined to a low-moderate level in 1975 when, as the historical overview shows, more emphasis was given to process innovations geared to improving the efficiency of operations throughout the company. Although the attention given to addressing decision-making across a wide range of issues increased (v23) reflecting the emphasis given to achieving integration and a wider participation in improving company performance, the degree of analysis to which decision-making was exposed (v22) decreased as the company was forced to switch production and sales at short notice in the particularly hostile conditions in both its domestic and contract sectors. The increase in the level of industry expertise of top management (v26) reflects the wider mix of experience as a new executive regime replaced the 1959 founding board where all but three of the original nine members had retired.

The profiles at 1969 and 1975 are highly similar and these four changes suggest a change in emphasis rather than a change in style and it is reasonable to conclude that decision-making remained in the adaptive mode described for 1969 above and which Mintzberg[98] finds is consistent with the Administrative Adhocracy form.The historical overview shows that the company continued to pursue its 1969 Analyser strategy and operated in both woven and non-woven sectors with tufted products assuming a higher profile in the product mix. The productive unit profiles in Section 7.3. show that by 1975 tufted operations were geared to a higher level of efficiency than the two woven port folios indicating that it was the most recent of the three productive units that had assumed the stable - efficient profile of the dual Defender - Prospector roles characterising the Analyser strategy.

Lawrence & Dyer[99] associate Area 5 conditions wih a distinctive Readaptive strategy which, they conclude[100], has many of the characteristics of an Analyser strategy. Following Miles & Snow[101] it is noted that the dual core technology of an Analyser strategy limits the organisation's ability to move fully in either direction so that the organisation risks both inefficiency and ineffectiveness if the necessary strategy-structure balances are not maintained. Since product-market innovation (v19) and the efficiency index of the productive unit profiles are operating at the mid-point levels, it is concluded that neither efficiency nor innovation were sufficiently achieved to qualify the 1975 profiles as the expected Readaptive strategy which requires these two outcomes at a high level. The findings in this case study then support Lawrence & Dyer's[102] claim that an Analyser strategy is consistent with the Area 5 environment and that such a strategy although similar to a Readaptive strategy falls short of the expected high outcomes in terms of efficiency and innovation.

(iv) efficiency and innovation - 1975

Lawrence & Dyer claim[102] that the intermediate levels of IC and RS in Area 5 offer the highest potential for both efficiency and innovation.

The company profiles reveal that the product-market innovation (v19) declined to a low-moderate level and that efficiency (v13) increased to a moderate level. Both these scores mask the efficiency-related process innovations revealed in the three productive unit profiles where, as the historical overview confirms, product lines were rationalised and new equipment and labour practices were introduced to improve the efficiency of maintaining a flexible response to the fast changing market conditions. The productive unit profiles indicate that it was the most recent carpet-making process, tufting, that was operating at the higher efficiency levels with an overall product-process score of 5:3.5 compared with axminster at 5:3.1 and wilton at 5:2.0. The evidence here indicates that while product-market innovation (v19) declined to a low-moderate level, product-process innovation (see Productive Unit Profiles) increased to the highest levels achieved in the period under review. Similarly, structrual efficiency (v13) increased to a moderate level while the productive unit profiles indicate an increase to the highest efficiency levels achieved in the period under review. That is to say it is the technical system or engineering solution that reflects the innovation - efficiency outcomes at this time.

The findings here then support Lawrence & Dyer's claims[104] that both efficiency and innovation are emphasised in Area 5. This study demonstrates that both these outcomes were relatively more emphasised in the context of the engineering solution than in the structure-strategy profiles.

Following Abernathy[105], the findings here confirm that in all three productive units the highly standardised products are associated with incremental product and process changes aimed at improving product performance and/or efficiency of operations. The level of efficiency reflected in the tufted unit profile is higher than in the two older axminster and wilton units and thus supports Abernathy's claim[106] that product maturity is defined not by the passage of time but by product standardisation and the parallel advancement of the production process. It is this relationship between the product and its production process that defines the potential for achieving efficiency gains.

7.4.5 Environment, Structure and Strategy profiles for 1986

(i) Environment and expected structure and strategy

The co-ordinates in Table 5 locate the organisation on the boundaries of Areas 5 and 6 of the nine-cell framework, characterised by intermediate IC and intermediate/high RS conditions. As Fig 8 shows the increase in the level of IC is attributed to environmental dynamism rather than in the level of heterogeneity, and both dynamism and RS are at the highest levels of uncertainty in the period under review. High dynamism is expected to increase the need for an organic response and resource scarcity is expected to increase the emphasis given to efficiency. These co-ordinates reflect an environment in which, as the historical overview shows, the industry continued to face particularly hostile conditions as the UK recession in the early 1980s contributed to the already harsh trading conditions the industry had experienced throughout the 1970s. Price competition in the industry increased as tufted gained market share from the woven sector, and axminster, in particular, found it difficult to compete in the domestic sector.

Lawrence & Dyer[67] and as noted in Section 7.4.4(i) above, associate a Readaptive organisation form and strategy with Area 5 conditions. Area 6 is associated[68] with a Machine Bureaucracy form and a Defender strategy.

(ii) Structure

Table 9 lists the scores for each of the twelve variables characterising organisation structure at four points in time. Fig 13 presents a graphic display of the scores for these variables at 1975 and 1986.

As Fig 13 identifies, the profile at 1986 shows significant changes between the 1975 and 1986 in seven of the twelve variables characterising structure, the remaining five variables either holding constant or showing minor movement only. The seven variables showing significant change (ie one degree or more) are:

Scanning (v7)

Delegation (v8)

Management tenure (v11)

Conflict (v12)

Controls (v13)

Technocratisation (v17)

Success (v18)

As the historical overview shows, by 1986 the two remaining members of the 1959 founding board retired and for the first time in its history the Tomkinson name disappeared from the executive board. The family continued to own a 55% share of the business and their interests were represented by Mr Richard Pugh-Cook, a grandson of Gerald Tomkinson. Mr Lowry Maclean, who had joined the company in 1979 as Chief Executive was appointed Chairman and Chief Executive in February 1986. These changes are reflected in the score for management tenure (v11) indicating a new management regime.

The historical overview shows that considerable organisational changes were effected in this period, including the restructuring of divisions to reflect markets instead of products and the merger of the axminster and tufted divisions under a single management structure. Marketing and the posititioning of carefully researched products assumed a high profile as more attention was given to operating in areas affording reasonable profit margins.

These changes are reflected in the higher scores for delegation (v8), now on a par with the centralistion score (v9) and which, together with the increase in the level of technocratisation (v17) indicates a significant shift in the equalising of power in both vertical and horizontal dimensions. Environmental scanning (v7) has increased to a high-moderate level and control systems (v13) are operating at a high level indicating, as expected, a high level of integration, although differentiation (v16) is lower reflecting the merger of the axminster and tufting divisions.

Conflict (v12) has increased to a high-moderate level and is consistent with the pressure on resources and the changes implemented to improve efficiency. Team spirit (v14) remains at a high-moderate level indicating that HRPs are functioning at levels satisfactory to secure member involvement.

The 1986 profile with its greater emphasis on scanning, delegation, technocratisation and controls, indicate a stronger emphasis on efficiency as expected by the level of RS expeienced at this time. The profile here is consistent with Mintzberg's[108] Divisionalised Adhocracy which is characterised by both divisional and adhocracy traits and is consistent with an organisation operating in both stable and dynamic markets.

The historical overview confirms that Tomkinsons operated in both the woven and tufted sectors in which by 1975 the competitive behaviours had been reversed to emphasise flexibility in wovens (dynamic) and efficiency in tufted (stable) respectively. The degree of emphasis given to improving efficiency is consistent with the higher profile assumed by tufted carpets in the product mix as tufted replaced axminster, particularly in the domestic market sector.

As Fig 9 shows, Tomkinsons in 1986 is positioned on the boundary between Areas 5 & 6. Lawrence & Dyer[110] associate a Readaptive organisation form with Area 5 (see Section 7.4.4(ii)) above for details), and Mintzberg's classic Machine Bureaucracy structure with Area 6 with low differentiation, high integration, power at the top of the organisation, moderate to high efficiency, low innovation and HRPs which concentrate on bureaucratic and market mechanisms resulting in low to moderate employee involvement[(iii)].

The findings here support three of the six Machine Bureaucracy characterisics. As expected differentiation (v16) is low-moderate, integration (v13) is high and moderate efficiency is emphasised in the production unit profiles. Contrary to expectations, power is vertically and horizontally diffused, innovation remains at a moderate level and HRPs continue to stress clan mechanisms in addition to the expected bureaucraic and market mechanisms with member involvement (v14) remaining at a high-moderate level so that despite the increasing level of conflict (v12) the company maintained its record of achieving change with the co-operation of its workforce and without ever having experienced strike action.

These characteristics are more representative of the organic element of the Readaptive form and the profile here meets five of the six variables characterising the Readaptive form, though not at the absolute high scores expected of this form. As expected, integration (v13) is high, power (vs 8,9 and 11) is vertically and horizontally diffused. Team spirit (v14) is at a high-moderate level and both efficiency and innovation have been emphasised. Contrary to expectations, however, differentiation (v16) is at a moderate level.

As Mintzberg notes[112], the Divisionalised Adhocracy form reflects this hybrid sructure and it is thus consistent with the borderline Areas 5 and 6 environment, the dual operating focus of the company, and the environmental increase in the level of dynamism requiring the need for an organic capability.

As peviously noted, the emphasis given to efficiency in the structural changes is consistent with the higher profile of tufted and its inherently more efficient manufacturing process. The degree of looseness required to meet the needs of the more dynamic woven market, particularly in the contracts sector, has been achieved by factoring which enables the company to exploit a wider and more flexible resource base - a particular characteristic of the Administrative Adhocracy which Mintzberg[113] demonstrates often operates with a truncated operating facility.

The findings here then support Lawrence & Dyer's[114] expected Area 5 and matrix organisation form relationship. The Divisionalised Adhocracy form in 1986 exhibits many similarities to the expected Readaptive form but falls below the expected high definition of the distinguishing characteristics. At 1986 the low-moderate differentiation score is well below the expected level and it is concluded that the Divisional Adhocracy form is not a substitute for the Readaptive form.

(iii) strategy process and strategy - 1986

Table 10 lists the scores for the eleven variables characterising the strategy process at four points in time. Fig 14 presents a graphic display of the information in Table 10 for 1986 and 1975.

As Fig 14 shows, six of the eleven variables show significant levels of change between 1975 and 1986, the remaining five variables either remaining constant or showing minor movement only. The six variables showing sigificant levels of change (ie one degre or more) are:

Innovation (v19)

Multiplexity of decision-making (v23)

Futurity (v24)

Reactiveness (v25)

Industry expertise (v26)

Explication of strategy (v28).

The profile for 1986 shows a higher commitment to product-market innovation (v19) with a score at the top moderate range and is consistent with the pioneering of fine scale designs in tufted poducts.. The general approach to responding to environmental conditions (v20) is firmly anchored at the 1969 low-moderate level. Scores for the integration and analysis of decision-making (vs 21 and 22) are both now at the top moderate level. There is a significant shift to a high score for the degree to which decision-making takes account of a multiple issues (v23) and is concerned with future orientations (v24) and achieving a proactive response (v25). Risk taking (v27) remains at a moderate level and there is a significantly greater awareness of corporate strategy(v28) with a score at the top moderate range while the perception of precedents and traditions informing strategy (v29) remains at a moderate level.

Although the profile at 1986 reflects a strong ongoing commitment to caution in terms of the adaptiveness of decisions (v20) and risk-taking (v27), the profile is substantially different from previous profiles with the company showing more proactiveness (v25), a decision-making process that is more informed, integrated and concerned with future issues (vs 22-25), and a higher commitment to explicating strategy (v26). The lower level of industry expertise of top management (v26) reflects the deliberate injection of management expertise rather than carpet industry expertise into the decision-making structure.

These changes are consistent with a shift towards Mintzberg's[115] planning strategy mode which is characterised by proactive, analytical decision-making and a concern with longer-term horizons, thus giving more scope for creating an awarness of corporate strategy and enabling a higher level of operationalised objectives.

The historical overview confirms this shift towards a planning and proactive strategy mode with more attention given to market research and the development of carefully positioned products offering more reasonable profit margins, supported by administrative and structural changes and investment in new processes to secure the achievement of these goals.

As noted above, Tomkinsons continued to operate in both woven and non-woven sectors although the distinction by the domestic market between these two processes had largely disappeared as tufted gained credibility. This is reflected in the restructuring of the divisions in Tomkinsons to reflect contract and domestic markets and the promotion of the Mr Tomkinson brand which focused qualiy carpets rather than woven and non-woven products.

Tomkinsons' entrepreneurial solution then continues to reflect an Analyser strategy and the 1986 profile and historical overview both confirm its dual Prospector (contracts) and Defender (domestic) operations. The changes in the strategy-making process at 1986 indicate a significant strengthening of its Defender operation and is consistent with the emphasis given to tufted output.

As noted in Section 7.4.5.(i) Tomkinsons in 1986 is operating at the borderline between Areas 5 and 6. Lawrence & Dyer[116] associate a Readaptive/Analyser strategy with Area 5 and a Defender strategy with Area 6. The Readaptive/Analyser strategy was described in para 5.4.4. dealing with the 1975 profile. A Defender strategy is characterised[117] in terms of moderate to high efficiency and low innovation.

The evidence in this case study shows that Tomkinsons is operating an Analyser strategy characterised by a dual Prospector - Defender entrepreneurial response. The changes in the profile at 1986 show a strengthening of its Defender characteristics to be serviced largely within the group by its tufted and spinning operations, and a strengthening of its Prospector response by extending its resource base to include outside design and manufacturing facilities to service the contract sector. The expected outcomes in terms of innovation (v19) and efficiency (v13) are at high-moderate and high levels respectively indicating that the expected Readaptive outcomes have been achieved.

The findings in this case study then support Lawrence & Dyer's[118] expected Area 5 Readaptive/Analyser strategy relationship and in particular demonstrates the tension in balancing efficiency and innovation as RS increases.

(iv) efficiency and innovation

As noted in Section 7.4.5(i) the company is located on the boundaries of Areas 5 and 6 characterised by intermediate IC and intermediate to high RS. Lawrence and Dyer claim[119] that Area 5 offers the highest potential for both efficiency and innovation. In area 6, Lawrence & Dyer expect[120] efficiency to be moderate to high and innovation low.

The company profiles show that both product-market innovation (v19) and efficiency (v13) were at their highest levels with scores at the high-moderate and high levels respectively. In addition, factoring was used to extend the range of responses in the contracts division. There were no significant changes in the productive unit profiles at 1986 which continued to show that the tufted unit operated at higher efficiencies than the two woven units.

The findings here then support Lawrence & Dyer's claim[2] that both efficiency and innovation are likey to be emphasised by the intermediate IC and RS levels of Area 5 and these outcomes are reflected in the structure, strategy and productive unit profiles.

Following Lawrence & Dyer[22] it is interesting to note the additional innovative capacity afforded by the factoring or loosely-coupled arrangements in the non-price competitive contracts sector.

Following Abernathy[23], it is confirmed that the pattern of innovation in all three productive units is incremental reflecting minor changes to product and/or efficiency related process changes which are consistent with the highly standardised product line.

7.5 Tomkinsons Case Study: Summary

Chapters 5 and 6 provided an historical overview and Chapter 7 a structured analysis of the evolution of Tomkinsons from its inception as a public limited company in 1959 to 1986.

The analytical framework combined the Lawrence & Dyer and Abernathy models to describe the perceived environment and organisation strategy, structure and product-process system at four points in time with a view to identifying the evolving environment-organisation relationship and the impact of this relationship on organisational efficiency and innovation.

The data demonstrates the evolution of the organisation from a Professional Bureaucracy structure using a Reactor strategy in Area 7 in 1959, to an Entrepreneurial Group structure and an Analyser strategy in Area 4 in 1969, to an Administrative Adhocracy and Analyser Strategy in Area 5 in 1975, and to a Divisionalised Adhocracy and Analyser/Readaptive strategy in Area5/6 in 1986.

The study tracked the evolution of three productive units and identiied the product-process relationship in each of these three productive units at the same four points in time. In two of these three productive units the profiles indicate that products were highly standardised and that the level of standardisation increased within the period under review. The level of standardisation in the related process systems also increased although the level of product standardisation exceeded the level of process standardisation throughout the period. The third productive unit profile shows that both the product and process system were highly flexible at the start of the period. The product evolved to a high level of standardisation by the end of the period and although the process system also became more standardised, the level of standardisation here was significantly lower than the level of product standardisation.

With regard to the environment-organisation structure relationship, the data confirms Lawrence & Dyer's expected relationships in two of the four cases and provides qualified support in two cases. The two confirmed cases are Area 7 and Professional Bureaucracy structure in 1959, Area 4 and Entrepreneurial Group structure in 1969. Qualified support is given for the relationship between the environment and organisation structure in 1975 and 1986 when the findings confirm Lawrence & Dyer's expected Area 5 and matrix organisation form but where the characteristics of this matrix structure, identified as an Adhocracy structure, are insufficiently pronounced to qualify as a Readaptive organisation form.

With regard to strategy and its relationship with the environment, the study confirms Lawrence & Dyer's expected relationship in two of the four cases examined and provides qualified support for the remaining two cases. The two confirmed cases are in Area 7 in 1959 and Area 5 in 1986 where the expected Reactor and Analyser/Readaptive strategies are confirmed. The two cases providing qualified support are in Area 4 in 1969 and in Area 5 in 1975. In the first of these two cases the findings give qualified support for a Prospector strategy in Area 4 in 1969 when it was noted that such a strategy had emerged but was being operated in tandem with a Defender strategy thus indicating the dual response of an Analyser strategy. In the second of these two cases the findings confirm an Analyser strategy in Area 5 in 1975 when the efficiency and innovation outcomes were below the levels expected of a Readaptive strategy thus supporting Lawrence & Dyer's claim that while a Analyser strategy has much in common with a Readaptive strategy it is unlikely to achieve the high innovation and efficiency outcomes of the Readaptive mode.

With regard to efficiency, the findings support Lawrence & Dyer's expected relationship between efficiency and RS. The data confirms that efficiency gains were manifested in the structure profiles as RS increased. It was noted that efficiency gains were also manifested in the productive unit profiles where the findings support Abernathy's claim that efficiency is associated with the level of product-process standardisation. The data demonstrates that as the level of product standardisation increased the level of efficiency in the related process systems also increased although the latter remained below the level of product standardisation throughout the period.

With regard to innovation, the data provides qualified support for Lawrence & Dyer's expected outcomes. As expected, innovation is found to increase in line with the increasing level of IC but, as the data reveals, this relationship is with radical innovation only. Incremental product innovation is evident at both low and intermediate levels of IC.

The findings support Abernathy's claim that patterns of innovation are associated wih product-process characteristics. Following Abernathy the data demonstrates that radical innovation, as typified by the diversification into tufting, is associated with product-market uncertainty. In all three productive units the data demonstrates Abernathy's claim that with product standardisation innovation is incremental and process innovation is relatively more emphasised.

The findings support Abernathy's claim that incremental product innovation may be retained as a competitive feature provided the product is sufficiently standardised and the processing system offsets potential efficiency gains against the capacity to incorporate incremental innovation. The data demonstrates that in all three productive units the product has been advanced to a highly standardised level and is serviced by a flexible processing system which permits frequent incremental product innovation.

Fig 15 summarises the information contained in Chapter 7. The information is presented here in terms of Miles & Snow's Adaptive Cycle and identifies the solutions to the three major organisational problems informing the adaptive process - the definition of domain, the determination of the supporting administrative system and the determination of the technology and processes for producing the selected goods and services. The resulting patterns of solutions to the first two problems portray the organisation's adaptive behaviour in terms of Lawrence & Dyer's model. The solution to the third problem is ignored in the Lawrence & Dyer model and in this study is portrayed in terms of Abernathy's model of product-process behaviour.

The entrepreneurial solution a 1959 demonstrates Defender characteristics. The administrative solution is shown as a Professional Bureaucracy which behaves in the facilitative Prospector mode. The engineering solution at 1959 is represented by two woven carpet manufacturing units operating in a flexible Prospector mode. The overall solution is inconsistent and therefore a Reactor strategy.

By 1969 the entrepreneurial solution demonstrates both Defender and Prospector characteristics which although qualifying as an Analyser solution is supported by an Entrepreneurial Group administrative solution which operates the Defender and Prospector aspects as distinct solutions rather than as an integrated system. The engineering solution in 1969 is represented by three carpet manufacturing units all operating in a flexible Prospector mode. The Defender aspect of the

TOMKINSONS: SUMMARY OF FINDINGS 1959 1986

Figure 15

	Period 1959	1969	1975	1986
ADAPTIVE CYCLE				
Entrepreneurial Solution - in terms of				
1. domain	7	4	5	5/6
2. Product/ Market Strategy	Reactor (Defender)	Analyser* (Prospector)	Analyser*	Analyser /Readaptive
Administrative Solution - Divisionl structure	Professl Bureaucy	Entreprl Group	Admin Adhocy*	Adhocy*
Engineering Solution - product:process relationship				
1. Axminster	4:3.0	4:3.0	5:3.1	5:3.1
2. Wilton	1:1.5	1:1.5	5:2.0	5:2.0
3. Tufted	N/A	4:3.0	5:3.5	5:3.5
Aggregate	2.5:2.25	3:2.50	5:2.86	5:2.86
Profit Margin**	8.32%	8.20%	3.71%	9.30%

* discrepancy with Lawrence & Dyer model
** Source Appendix V

engineering solution is represented by backward integration into yarn spinning. The overall configuration indicates two distinct responses ie Defender and Prospector rather than an integrated single system.

At 1975 the dual Defender and Prospector entrepreneurial solutions are still evident and supported by an Administrative Adhocracy administrative solution which continues to operate the Defender and Prospector solutions as separate entities although integrative mechanisms were provided to act as a co-ordinating rather than as an integrating system. The engineering solution demonstrates a significant strengthening of the Defender characteristics in all three carpet manufacturing units when all three exhibit the balanced efficiency-innovation profile characteristic of an Analyser approach. The Defender engineering solution is also strengthened by the extension of the backward integration into yarn spinning. The overall configuration continues to indicate the two distinct Defender and Prospector responses in the entrepreneurial and administrative solutions and an Analyser response in the engineering solution.

At 1986 the dual Defender and Prospetor entrepreneurial solutions are maintained and supported by a Divisionalised Adhocracy administrative solution which operates these responses as a single system. The engineering solution operates as an Analyser system in all three carpet manufacturing units and is supported by a Defender solution in the backward integration into yarn spinning. The overall configuration indicates that the solutions to all three problems are in the Analyser mode.

CHAPTER 8: BRINTONS CASE STUDY: 1819 -1986

8.1. Foundation:

Brintons Limited, a sixth generation family-owned private carpet manufacturing and spinning company in Kidderminster, traces its origins to 1819 when Henry Brinton established a carpet business, based on the domestic system, which he ran in conjuncion with his spinning business which had its origins in the spinning industry established at the nearby village of Hill Pool by his father, William Brinton, in 1783.

In 1823, in addition to his existing activities, Henry Brinton began making brussels carpeting at the Vicar Street site of the present firm, and by 1828 he operated this aspect of his business in partnership with his father and two brothers. The partnership owned two brussels handlooms together with ancillary equipment which enabled the firm to carry out all the processes of carpet manufacture from raw material preparation, weaving, through to selling the finished carpets and rugs. By 1835 Henry Brinton had taken over all his father's and brothers' weaving interests and in 1836 was operating 93 looms at various locations in the town and employed some 133 people in making brussels, wilton and venetian carpets and 'town-made' rugs. The firm exported carpets, had an agent in London and by 1840 employed its own team of carpet designers.

As the brussels trade grew, Henry Brinton expanded both his weaving and spinning activities and, trading in partnership with two of his four sons, from the late 1840s onwards began concentrating his activities at the Vicar Street site. This concentration proved of considerable advantage when the firm introduced powerloom tapestry weaving in 1850 and brussels powerloom weaving in 1853, both on licence from John Crossley & Sons, carpet manufacturers of Halifax.

By 1853, in addition to the main factories in Vicar Street and a new twenty-loom factory on the same site, the firm also occupied three other carpet factories holding 17 brussels looms. Extensions and purchases continued unil 1856 when the firm was able to purchase land which linked and consolidated the premises and provided a site for a modern centralised factory. During the slump conditions in the period 1854 - 1857 the firm continued its consolidating programme and in 1855 became the first firm in the industry to appoint a full-time traveller to the USA.

Both Henry and his eldest son died in 1857 leaving John, then aged thirty, to run the family business. A younger son, Alfred, was fully employed in running the spinning activity at Hill Pool, near Kidderminster.

8.2 Transitions-ownership & legal form, products & loom developments

John Brinton remained in charge of the firm for the next fifty-seven years until his death in 1914. During this period the company achieved high international recognition for its products and for the efficiency of its production operation. By 1862, with 600 employees, Brintons was the largest carpet manufacturer in Kidderminster and was recognised for the highest economy of production covering brussels and velvets by steam power, chenille carpets and rugs, wide sofa carpets, figured and other rugs manufactured both by power and hand looms. In 1879, at an exhibition in Sydney, the firm was described as being at the head of the carpet industry throughout the world.

Brintons closed down its chenille axminster plant in 1869 and sold its hand-operated looms to Tomkinsons & Adams who had just set up in business and who undertook to manufacture chenille rugs to match Brintons' range of wilton and brussels carpets. The firm had been involved in loom research for many years when, in 1878, it declined an invitation from Michael Tomkinson to operate the new axminster spool looms on licence from Tomkinson & Adams. The immediate success of the spool axminster process, however, put Brintons under considerable pressure to perfect its own axminster weaving process. Brintons Jacquard Gripper Loom, based on the work of two employees, Albert Dangerfield and Thomas Greenwood, was patented in 1890, and the success of the gripper axminster product consolidated Brintons' achievements in all major types of woven carpets.

For the first fourteen years of his tenure, John Brinton traded in partnership with John Lewis, a nephew of his brother-in-law, Sir Francis Crossley of John Crossley & Son. In 1871, the partnership with John Lewis having been dissolved, the title of the firm was changed to John Brinton & Company, and this event was celebrated with a dinner for the company's team of some sixty managers, clerks, designers, foremen and overlookers. In 1881 the firm was registered as a private limited company and in 1891 as a public limited company - an arrangement which in 1923 came very close to the family losing control of the firm.

The opening years of the twentieth century witnessed a slump in the carpet industry as both export and home markets declined. Despite the stringent trading conditions, Brintons, now employing some 1200 people, invested in expanding its spinning capacity to provide woollen yarns in addition to worsted yarns, and in building a new dyehouse equipped with the most modern machinery. By 1906, however, the slump conditions caught up with the company and production was 50% below the output in 1900. The company traded at a loss and, tempted by grants and tax incentives offered by Canada which was developing its own carpet industry, established a carpet manufacturing subsidiary in Ontario. By 1909 cash flow in Kidderminster was at a critical level and the Canadian company was sold, the proceeds arriving just in time to save Brintons from possible closure early in 1910. The company recorded a meagre half-year's profit - just £660 - but had gained strength by the end of that year's trading.

John Brinton died in 1914 at the age of eighty-seven and was succeeded by his third son, Reginald Brinton who had joined the company in 1893 and was appointed to the board in 1898. His two elder sons pursued careers outside the carpet industry and a fourth son, Cecil, a Cambridge graduate engineer, was persuaded to join the company in 1904 - initially on a three year contract - and by 1905 had established a Machine Shop and the high standards of loom maintenance which in later years was developed into a highly acclaimed loom development and loom construction capacity.

World War I threatened ruin for carpet manufacturers and spinners. By November 1914 20% of the firm's male employees were in the forces. Production facilities were committed to war-time production of blankets and webbing and the company's highly efficient Machine Shop was involved in important war production of shells and aeroplane parts.

In 1917 certain financial institutions actively promoted the amalgamation of firms in the carpet industry and the four directors of Brintons resolved to safeguard the company's independence by purchasing all available shares and dividing them between themselves. In 1921, Percy Preen, one of the four directos declared a 62% shareholding and sought control of the company. Following a major court case in 1923 which decided against Percy Preen the remaining three directors acquired all the shares and the company continues to trade as a privately owned limited company.

In 1924 production totalled over 1m square yards and continued at around this level for the remainder of the decade. John Brinton, Reginald Brinton's only son, joined the company in 1923 after serving a traineeship with the Bigelow-Sanford Carpet Company at Thompsonville, Connecticut. He was a member of a research group of companies in the Midlands who shared an interest in scientific management when he joined the board in 1927. John Brinton was appoined Managing Director in 1935 when, recognising the need to reorganise for greater efficiency and plan for management succession, he persuaded the company to appoint a firm of management consultants to review company operations and identify management potential within the firm. Urwick Orr's preliminary report indicated that their very substantial fees could be met by the savings generated by improving waste management alone.

The consultants' proposals met with considerable hostility from both staff and works' personnel. Weavers, in particular, were in dispute over the inadequate provision for creeler (ie trainee) assistance - although other issues such as the formation of a Works Council, the appointment of efficiency-men and incentive schemes were also points of animated contention, as was the proposal to establish an axminster manufacturing subsidiary elsewhere in the country with different working conditions and rates of pay. All opposition was firmly handled by Cecil Brinton who pointed out that while the firm had enjoyed reasonable prosperity, competition in the industry in the future was likely to be so great that only the most efficiently organised firms would surive. While staff were offered the option of complying with the proposed reorganisation or resigning, works' personnel were eventually reconciled on being offered a pension scheme and other welfare benefits as protection against the effects of the consultants' proposals.

The consultants' investigations proceeded and the company duly established a very modern axminster factory at Bridgwater in Somerset. Female labour was recruited and trained but labour turnover was high and the subsidiary never achieved satisfactory levels of efficiency. The project was still barely self-supporting when at the start of World War II the factory was leased to Bristol Aeroplane Company and although the Bridgwater factory was re-opened after the War it was not an economic proposition and was sold in 1952.

The investigations and resulting reorganisation were completed by 1939 and gave the company a new streamlined operation which included personnel and facilities covering many branches of engineering unique to the textile industry. The latest management measures and control techniques had been introduced to ensure high levels of efficiency and Mr John Lemon, a management consultant with wide experience in scientific management, joined the company. The programme, which included the indentification of managerial talent within the company and a system of promotion from within, identified the managerial potential of Mr Terry Tolley who had joined the company as an office junior in 1932 and later became the Managing Director and was recognised as one of the best managers in the carpet industry.

World War II again proved the value of the Engineering Department which achieved the highest levels of performance in executing the various military projects assigned to the company.

Limited carpet production was undertaken in 1941 when the company was designated a 'nucleus firm' under the Board of Trade's Concentration of Industry programme and as such it was required to manufacture carpets for those firms which had been closed down but had stocks of raw materials available. By 1942, however, all carpet production had been suspended and the company's looms were devoted to producing webbing and blankets.

The Floor Coverings (Control of Manufacture & Supply) Order 1944 licensed limited carpet production which was restricted to a small percentage of the output level at 1939 and to qualities specified by the Order. By the end of 1945, however, production was governed by an open licence and depended on the quantity of raw materials available.

Reginald Brinton died in 1942 and was succeeded as Chairman by his brother, Cecil Brinton. Tatton Brinton, Cecil's son, became a director of the firm in 1941 when Derek Woodward, (son of George Woodward - one of the directors at the time of the court case over share ownership) was also appointed to the board. Both Tatton Brinton and Derek Woodward were appointed Assistant Managing Directors in 1948.

8.3 Key Events 1946 - 1986

8.3.1 1946 - 1959

In 1946 Brintons was the first firm in the industry to achieve 100% of its pre-war annual production of 1.75m square yards and exported almost twice the level of its pre-war yardage at more than four times the pre-war value. This performance, achieved with only 70% of its looms and plant in operation, represented a 40% increase in output per man-hour and demonstrated the competitive advantage of its engineering expertise at a time when the carpet industry had to rely on the textile equipment industry which was itself under pressure to meet orders at both home and overseas. In commenting on this remarkable achievement the company acknowledged 'the spirit of genuine friendship between the company and its workforce' where open communication was actively encouraged through the Works Council and its various satellite committees and management and unions worked together to create the conditions necessary for achieving the company's declared policy of having the highest paid weavers in the industry.

The continuing shortage of raw materials in the post-war period, however, inhibited progress and by 1948 although the company was exporting some 65% of its output, mainly to the USA, many looms were idle and only 1200 of its 1500 employees were at work. Many carpet manufacturers began producing cheaper quality carpets to meet the demand from lower-income groups in the UK where it was estimated that some 50%

of homes had no carpets at all. Brintons decided at this very early stage not to pursue this market and focused attention on producing quality carpets at the lowest possible prices through pursuing volume sales and achieving improvements in the actual method of production which, it was noted, had not changed for over forty years. With the most advanced laboratory and engineering facilities in the industry, the R&D Department concentrated on developing new weaving methods and investigated alternative fibres, including synthetic yarns, as surface and backing materials. In line with this strategy of improving efficiency, a new spinning mill, built to the company's own specification and equipped with the latest machinery, was established at Slingfield in Kidderminster, giving wool washing capacity for the first time which in turn provided considerable advantages in quality and efficiencies in the subsequent dyeing process.

The import restrictions imposed by Australia in the 1950-51 recession seriously damaged Brintons' exports to that country, then accounting for some 20% of output, and also threatened the company's long-established high market profile dating back to 1879 when it appointed its first Australian agent. Stocks were diverted to the UK market where although Purchase Tax remained at 25% licensed production and pricing restrictions had been removed. Trading in the UK, however, came to a virtual standstill when government agencies promoted hostile publicity to persuade the public to defer purchases until carpet prices fell. Following negotiations between the government and the Federation of British Carpet Manufacturers industry prices were eventually reduced by between 5% and 15% at a time when many manufacturers were operating on large overdrafts. Brintons' axminster lines, particularly broadloom squares, were popular and by the end of the year sales had gained momentum. Wilton lines, usually made to order and commanding higher prices, were causing concern and short-time working had been introduced. To keep employees informed, the Works Council received a regular briefings on the company's affairs and the general state of the industry. The Beacon, the company's quarterly magazine was first launched in September 1951 and provided an additional and popular channel of commumnication.

Slump conditions suddenly hit the industry in 1952 as a result of the dock strike in Australia and the subsequent embargoes on imports. Faced with wool price increases and declining markets, the company introduced mixed blends for the first time to give a more price-sensitive product. By the end of the year, however, demand had resumed and axminster production was committed for many months ahead to the extent that in addition to double-shift and overtime working wilton weavers were operating axminster looms. Particular attention was, however, directed to securing wilton orders and the company was able to re-start its Basra looms, although the wilton position remained precarious and required particularly flexible operation to respond to erratic market conditions.

By 1953-1954 raw material prices had stabilised and import restrictions in Australia had eased, although competition in the UK market increased substantially. Demand for Brintons' two specialities - seamless axminster squares and textured wilton broadloom - was unprecedented and more than 50% of the total UK exports of gripper axminster carpets in 1954 had been made by the company. To meet this demand a large section of the wilton narrow loom plant was dismantled and replaced with axminster wide looms and weavers were still working a double-shift system to cope with the required level of production.

In 1954, two senior executives on a market survey of Canada, reported on a new tufted method of making carpets which appeared to have solved the problem of cheap soft floorcoverings. The new process, developed in the USA and adopted by firms with no experience in the American woven carpet industry, already accounted for 30m square yards or 50% of woven sales in the USA. Woven manufacturers in the UK saw the new process as an alternative source of supply which gave access to new markets outside the price range of the woven sector.

Brintons responded to looming increased competition by emphasising the quality and comparative price advantage of its axminster and wilton products. Quality control was vigorously enforced at all stages of operation from raw material purchase through to delivery and customer service. To this end, the company's new capital-intensive stock-dyeing process provided considerable advantages over hank (skeins) dyeing in terms of both quality of dye and efficiencies in the batch sizes processed. Specific attention was directed at containing costs by drawing attention to the high cost of materials in woven carpets - at that time, 2/3rds of the total cost of the product - so that effective use of materials had significant advantages in maintaining profitable trading. Although the company had always been cost conscious, it was emphasised that even higher efficiencies had to be achieved if the company was to compete effectively.

In 1955, in line with the company's policy of promoting from within, four senior managers were appointed to the board - Mr JH Lemon, General Manager; Mr TA Tolley, Works Manager; Mr GS Anderson, Accountant and Company Secretary; and Mr I Mills, Sales Manager. By now too Cecil Brinton was ageing and his considerable engineering talent was in decline. The task of updating loom performance to meet the challenge of the new non-woven carpet process fell to Mr H Lowe who had joined the company in 1948 and took over responsibility for R&D in 1953. Harry Lowe, having persuaded the board that the quantum leap needed to develop a new generation of looms was outside the capacity of the existing production team, was allocated a budget of £12,000 in 1956 and given full authority to proceed. It took his team just eighteen months to design and build the revolutionary Mark VI and VII axminster looms which were then and still are recognised as being the best in the industry. Sixty-three new looms were duly installed and by 1961/2 the resulting efficiencies enabled the company to reduce product prices. In 1986, 53 of these looms remained in production and the loom design was still regarded as being the best in the industry[64].

Trading conditions showed no sign of improvement in 1956, the worst year for the industry since the war, although Brintons' order books compared reasonably well with the previous year and it was the only major company to survive the year without resorting to short-time working. Continued attention was directed to achieving higher levels of productivity and the operational flexibiliy necessary to exploit the unique versatility of the gripper axminster process. At the same time Brintons collaborated with four other leading woven manufacturers to establish a joint company to manufacture tufted carpets. John Lemon, Brintons Director and General Manager, was seconded to the new company, Tufted Carpets Limited, at Brighouse in Yorkshire, and in March 1957, less than twelve months from start-up, the company had sold 1/2m square yards of carpet marketed under the name of Kosset and Shaggy Dog Rugs. Members of Brintons' Work Council visited the Kosset site and were duly impressed with the speed of tufting machines and the simplified work processes.

There was severe pressure on profitability in the woven industry in 1957 as manufacturers resorted to producing cheaper and cheaper carpets at a time when they were already bearing the financial burden of cut-length services to the retailer. Brintons continued to pursue its policy of containing selling prices by reducing costs through greater efficiencies rather than by reducing the quality of their products. In the industry generally all types of synthetic materials were being used to effect savings but Brintons, at the forefront of synthetic fibre research, maintained a cautious policy of adoption only after thorough evaluation of these materials. In carpet design, however, the company was forced to follow the trendy colour schemes and patterns, however aesthetically displeasing this was to designers. Both axminster and wilton sales improved. the latter particularly as a result of a large order for hotels, as volume markets were located in the Near, Middle and Far East. A reasonable profit was made and the company resumed its position as the largest supplier of carpets from the UK to Australia.

The New Zealand's government's controls restricting imports to 50% of the 1956 level were imposed without warning on the 1st January 1958 and Brintons, the UK's single largest carpet exporter to New Zealand, was hit hard. Production schedules had to be adjusted rapidly and sales switched to alternative markets, but the search for a solution to the New Zealand situation absorbed much time and energy as the company was anxious to protect its longstanding market profile there. In 1958 the company entered into negotiations with Tattersfield Limited, carpet manufacturers in New Zealand, to establish a new joint company, Tattersfield-Brintons Limited, the largest carpet manufacturing company in New Zealand in which Brintons' had a 40% share. Brintons contributed new looms, textile machinery and some cash while Tattersfield contributed plant, building, stock, work-in-progress and cash. Brintons also provided a Works Manager and weavers from the Kidderminster company and arranged for their share of production to be sold through Landers, their long-established Australian agents.

Despite increasing competition from both UK manufactuers and imports Brintons' turnover at £4.974m in 1959 was at a record level when the company became the first in the industry to latex axminster carpets and the second to adopt mothproofing treatments. Despite overtime working production only barely managed to meet demand and plans were made to increase output to cope with this and new markets in Germany and other countries in the proposed Free Trade Group.

The pattern of sales had, however, changed significantly with the growth of cut-length services in the UK and a higher level of small orders. The financial burden of carrying stocks to meet these orders proved particulary onerous at a time when rising costs had to be contained at selling prices which, because of continued media hostiliy, were still below justifiable levels.

With a view to increasing the efficiency of cut length services finished goods stocks were centralised at Green Street which was equipped with modern storage and conveyor systems, including a specially modified forklift system developed in the Machine Shop. A programme of planned re-equipment over the next five - ten years was initiated to replace narrow looms with wide looms although some narrow looms were retained to execute special orders. A particular highlight of the year had been the ceremonial opening of the new Kidderminster showrooms which had been specially designed and equipped to service the retail trade. The complex included facilities for retailers to bring their own customers to view the company's products and also acted as the venue for the company's three-day intensive training courses to give retailers a thorough understanding of the carpets they were selling.

8.3.2 1960 - 1969.

Faced with continuing restrictions on imports in Australia and encouraged by the competition between the six Australian states to attract overseas investment, the company established a manufacturing unit in Geelong, Victoria, where textile skills and pile yarn supplies were already well established. Within five months of laying the foundations in February 1960, Brintons Pty Limited produced its first carpets. In December 1960 the Australian government lifted the import restrictions and British imports flooded the market forcing Brintons Pty Limited into retrenchment within only three months of its official opening in January 1961. The project, under the leadership of Mr J Lemon, was the largest industrial immigration undertaking at that time and involved transferring twenty-five narrow axminster looms, dye-vats, winding and stamping machines and personnel from Kidderminster to Geelong, in addition to overcoming the problems caused by the effect of intense heat on the jacquard cards, staining caused by gum-contaminated water and securing adequate supplies of pile yarns when local manufacturers proved to be less co-operative than expected.

Aimed at helping the retailer, a new marketing approach supported the UK launch of Candia, a new wool/nylon/viscose blend and latex backed axminster carpet which achieved market leadership within just three months of its launch in February 1960. The successful Candia formula was translated and extended to a new luxury range, Cadogan, which also achieved instant market recognition. A new all wool luxury wilton range, Intrigue, incorporating hard-twist yarn to give a novel carved-leaf effect, was also launched with similar success. The new ranges demonstrated Brintons' commitment to quality products at reasonable prices so as to attract a bigger share of the market and exploit the advantages of volume production.

In pursuit of this strategy every opportunity was taken to promote the company's market profile and, through its Press Relations Service in London, Brintons courted editorial staff with professionally prepared promotional materials which duly resulted in these products being featured in relevant magazines and journals. The planned programme of investment in equipment and systems continued and demonstrated early benefits when as a result of improvements in flood prevention and damage limitation techniques only a half-day's weaving was lost and damage to the dyehouse and preparatory departments minimised in the Kidderminster floods of that year.

The axminster loom building programme made excellent progress and two weaving sheds equipped with these looms were already operational by 1961. The Machine Shop extension and redevelopment programme had been completed and provided greater loom building capacity and a new project was initiated to bring wilton looms to higher efficiencies. Winding operations were centralised and preparations well advanced for the installation of new hank dryers and scouring machines. Plans were also announced to increase the capacity of the Spinning Mill and to install new carding engines, spinning, twisting and reeling frames and additional facilities for storing and blending wool. The Broadloom

Finishing Department was also nearing completion and had been equipped with new picking tables and conveyor systems to increase picking efficiencies.

It was obvious by 1961 that the era of full advance order books had passed and the company had to adjust to a very different selling and production routine to meet the highly uncertain cut-length service and generally volatile trading conditions where Canada and the USA proved particularly difficult. Competition from the tufted sector was increasingly threatening as manufacturers improved both the quality and styling of tufted products which threatened direct competition with Brintons' two key products, Candia and Regina 82. Brintons calculated that sixteen tufting machines were capable of producing more than the entire loom capacity available in the company - a very sobering thought which focused very clearly the need to be even more vigilant about quality, efficiency and customer service - the hallmarks of Brintons' operation - if the company was to survive the difficult competititive conditions.

In February 1962 John Lemon was appointed Managing Director of Tufted Carpets Limited and although he remained a Director of Brintons with special responsibility for Australia and New Zealand, he relinquished his responsibilities with regard to the Kidderminster operations.

Despite particularly hostile conditions in 1962 when credit restrictions and high interest charges depressed consumer spending, Brintons achieved record sales at £6.09m at product prices that were 5-7½% below competitors' prices and with product qualities that were second to none and which often set the standard for other manufacturers to follow. For example, Regina 82 launched in July 1961, had taken eighteen months to develop and was already a standard cloth with eleven manufacturers known to be planning a similar product. High machine efficiencies and flexible shift and overtime working arrangements enabled the company to respond to demand and the newly installed computer absorbed the additional load imposed on despatch and invoicing. Higher levels of exports were actively sought to compensate for the loss of markets in Australia and New Zealand although alternative markets were usually smaller with obvious implications for economic batch sizes. The Common Market, however, offered good prospects and with this in view the European selling organisation was strengthened and included the appointment of an European Sales Manager.

By 1963 sales were double the pre-war figure and the company's policy over the last ten years of investing seventy-five per cent of post-tax profits in the modernisation programme had proved highly succesessful. Inevitably, however, selling prices would have to be increased to absorb wool price increases, although production was to be pushed to even higher levels to reduce unit costs and keep price increases as low as possible. Efficiencies were, however, being threatened by the proposed new ringroad system which interfered with the factory complex.

At the request of the Federation of British Carpet Manufacturers Brintons provided data and initiated proposals for a carpet grading scheme when the industry was pressesd by the Molony Report in 1962 to introduce measures to enable consumers to make informed purchases. As part of this programme Brintons staged an exhibition in 1963 to demonstrate dyeing techniques and this was so well received that it was later shown on BBC television.

A Staff Association for male staff only was formed in 1963 with Sir Tatton Brinton as its first President. Some 50% of eligible employees joined the Association whose main purpose was to provide a forum for informing and educating staff and promoting social events. A year later a separate Ladies' Staff Association was formed with Lady Brinton as its first President.

In 1964 rising wool prices finally forced Brintons into increasing selling prices which nevertheless remained 5% below that of its competitors. Sales of tufted carpets in the UK now accounted for some 41% of volume and 25% of value and continued to threaten the cheaper end of the woven sector. The woven sector, however, still had considerable advantage in styling although advances in tufting technology indicated that even this advantage was under threat.

While Brintons' Mark VI and Mark VII looms enabled it to be highly competitive in the woven sector, clearly further cost-reducing developments were required if woven products were to compete directly with tufted products. Automation offered obvious advantages in achieving such efficiencies and the June 1964 edition of The Beacon featured a French carpet manufacturing company where fully automated looms operated without weavers and were centrally monitored and controlled. In the meantime, multi-loom weaving, already growing fast in the industry, offered real possibilities for improving efficiency.

The wide-loom axminster modernisation programme which had increased production by 50% over the last four years neared completion and attention was directed to developing a new generation of wilton looms and axminster narrow looms. At the same time, all departments were required to make a contribution to improving efficiency and a programme of intensive investigations was initiated.

In 1964 Sir Tatton Brinton was appointed Vice-Chairman of the company and in October of that year he was elected to Parliament as the Conservative Member for Kidderminster.

Although even higher levels of turnover and production were achieved in the 1964-65 financial year, operations were significantly less profitable and considerable momentum was lost when all attention was focused on overcoming the production problems caused by static electricity and the increased costs incurred through repairing faults in production and the loss of market credibility.

The continuing dismal trading conditions in the UK made exports more attractive and Canada in particular offered the prospect of the lucrative large orders and long production runs which Brintons favoured. The distribution of Brintons' products in Candada was undertaken by Brinton Carpets Limited at Peterborough, Ontario - the company Brintons had sold to save the Kidderminster company in 1910. The new latex plant at Caldwell Mill was in the course of construction and a new factory on the Stourport Road was planned to house the new wilton looms which had been designed and built in the Machine Shop. The operating speeds and efficiency of these new looms was far in excess of any wilton looms in the industry, and the new cloth made on these looms, Bell Twist 82, was launched at a price considerably below that of any equivalent qualiy. Uncertainty over the routing of the proposed ringroad continued to cause uncertainty and hindered the progress of various building projects, particularly the siting of the now urgent additional stockroom capacity.

Following the death of two directors, new board appointments were made in 1966 which had the effect of lowering the average age of the board and strengthening continuity. Although a number of managment changes were made , two appointmnts in particular were significant in demonstrating the success of the company's promotion from within policy: Mr TA Tolley was appointed Managing Director and Mr HF Lowe was appointed to the board and retained special responsibility for Production Engineering.

By 1966 the woven carpet industry was experiencing the worst trading conditions since the war. Tufted had gained 43.2% volume share of the UK market and rising costs and bleak economic conditions constrained consumer spending.

Brintons' production had increased by 50% over the previous five years and 80% of this production was derived from the looms built and installed since 1960. Almost all axminster production was described as routine, although there were always a number of special orders being woven which created special production problems. Even so, severe absenteeism in the early part of the year retarded production and a high level of capital was committed to unfinished goods. By the time the production bottleneck had been resolved the British market was in the slack pre-budget period and sales were diverted to exports only to be threatened by a seamen's strike. By the mid-year the order position had improved to give sales at £8.5m at the same level as the previous year and Brintons was almost alone in the industry in maintaining full employment and its post-war record of no short-time working.

The difficult trading conditions continued into 1967 when devaluation of the pound added to the problems faced by the industry. Although Brintons succeeded in increasing its share of the market, profit margins were considerably reduced. The changed pattern of consumer spending away from carpet squares to broadloom and the practice of cut-length services to retailers, not only absorbed increasing levels of finance but also demanded higher levels of operational flexibility to meet the fluctuating patttern of trading at a time when higher levels of efficiency were required to compete with tufted products. Quality, a significant competitive advantage of Brintons' products, remained a key issue and a Quality & Reliability Campaign proved highly successful in identifying areas of improvements and achieved the target results well before the half-way mark of the exercise. The company was reasonably hopeful that the jobs of its 2400 employees were safe provided sectional interests were never put before the overall needs of the firm.

Sales in the woven industry revived in 1968, particularly in the first part of the year when sales were running at some 22% above the same period for the previous year.

By September Brintons' sales were up by 32.5% on the January figure. The demand for broadloom continued to grow at the expense of squares and the company embarked on a programme to convert some of their modern 9' axminster looms to 12' looms. The overall loom building programme continued at a hectic pace and modern looms now accounted for some 92% of production. Much emphasis was given to the need for flexible operating systems and flexible shift-working in meeting competition and in coping with the increasing levels of contract sales and, most importantly, in satisfying delivery dates where it was evident that there was increasing customer concern. The company continued to absorb the rising cost of production in order to maintain low selling prices so as to attract volume sales.

In the late autumn of 1968 two of the companies collaborating in establishing Tufted Carpets Limited merged and Brintons disposed of its interests in the tufted company in order to concentrate on achieving further technical improvements in woven technology. After protracted negotiations with the Board of Trade, permission was finally granted to proceed with the building of a new pile yarn spinning factory at Telford in Shropshire. While the new factory on the Stourport Road made good progress, developments at the nucleus site remained uncertain pending a decision on the ringroad. The Australian factory recorded its best ever trading results in 1968.

Cecil Brinton relinquished his appointment as Chairman and Joint Managing Director in September 1968 and was appointed Honorary President of the company. Sir Tatton Brinton, his son, was appointed Chairman and Mr Derek Woodward was appointed Vice-Chairman.

The stringent credit restrictions in 1969 put severe pressure on the industry and many manufacturers intoduced short-time working. Brintons with 2636 employees increased sales to £12.2m and did particularly well in exports which were running at three times the 1966 level. A major breakthrough was in the USA where the company was successful in securing Macy & Co, the largest store in the world, as an outlet for the Candia range.

Demand for Brintons' products was at times overwhelming and required particularly high levels of co-operation to achieve the high standards of product quality and customer service which distinguished the company. Bell Twist was now the biggest selling hard-twist carpet in the world and demonstrated the effectiveness of Brintons' high quality-low price strategy in securing volume sales.

The company had fought hard to enter the contract sector at a time when over capacity in the industry made competition increasingly difficult. The Contracts Division, now just two years old, had done particularly well in securing orders for 10,000 square yards and some at even 20,000 square yards, to make Brintons the biggest name in the contracts sector.

A specially designed range of products for this sector was introduced in consultation with furniture, fabrics and paint manufacturers, and a new showroom committed to contract sales was opened in London.

While sales turnover was encouraging, the company was conscious that more could be done to increase output of 12' carpets and more 9' axminster looms were converted accordingly. The new No 6 Factory to house the Mk VIII Bell Twist looms was completed and provided for a substantial increase in production and warehousing capacity.

The new spinning factory with a targeted workforce of 200 employees was officially opened in August 1969 and provided Brintons with the capacity to meet its yarn requirements in terms of both quantity and quality.

The programme of development and expansion demonstrated the company's commitment to maintaining its leading position as a volume manufacturer of quality woven carpets and high standards of customer service.

Although the standard products continued to sell well, it was recognised that the development of new products had been neglected and this now requied priority attention.

8.3 1970 - 1979s.

The difficult trading conditions continued into 1970 and, although coping better than other woven manufacturers, Brintons failed to meet its target performance even though turnover had improved on the year before.

Brintons was now almost the only major woven carpet manufacturer without any involvement in tufting. Tufted carpets in the 1950s had serviced the cheap floorcoverings sector but had now significantly improved its product and market image to challenge the woven sector, particularly hard twist wiltons, one of Brinton's special qualities. Developments in tufting technology had also advanced the pattern capability of the process so that axminster products were also directly threatened.

With the loss of domestic markets to the tufted sector, woven manufacturers were forced into the contracts market where the durability of the woven cloth gave distinct advantages over tufted products. However, as more woven manufacturers competed for contract orders, sale became increasingly more difficult.

Brintons continued its programme of modernisation and development at improving efficiency at all stages of manufacture with a view to equalling, if not excelling, the efficiencies of tufted operations.

Cecil Brinton died in May 1970 after sixty-five years service to the company, forty-seven of these yars as Chairman. When he joined the company in 1904 the 6/4 looms were the widest and he had developed and built the 15' looms and the 12-frame narrow and 8-frame broadlooms which remained the current loom specifications. With the death of Cecil Brinton and the retirement of two long-serving directors, three new appointments were made to the board, all three with special responsibilities in the Sales and Marketing function and included two who were members of the Brinton family.

The Telford spinning operation was accorded subsidiary status in 1970 on completing phase one of the development programme and achieving an output of 100,000 lbs of yarn per week. Phase two of the programme which aimed to double the existing output had already commenced and, on completion, would be capable of meeting most the of the company's yarn requirements.

The company received the Jubilee Award of the Textile Institute in 1971 in recognition of its outstanding engineering achievements in connection with research and devlopment of the gripper axminster loom. The award was significant for two reasons - one, because it was the first time that the award was won by a carpet company and two, because it was usually made for recognition of services to the industry whereas Brintons' loom research and development was strictly for its own use.

While there were hopeful signs of recovery in the home market in 1971, exports were below the 1970 level due mainly to further deterioration in the Australian market. Sales to America, however, had increased and Brintons Carpets (USA) limited, a selling organisation, was established to act as sole agents and distributors for Brintons in the USA. Brintons' specially developed products for the American markets had been well received and the contract sector, in particular, proved successful with Brintons being able to offer shorter delivery dates than even local manufacturers. Axminster imports were still subject to a 10.5% surcharge but the company's efficiencies were such that even at this level, it was able to compete effectively. The wilton surcharge at 40%, however, made it impossible to sell these goods in the American markets. In Europe, where tufted accounted for most of the local production, Brintons was confident of achieving high levels of sales for its woven products and attention was focused accordingly.

The year of the Industrial Relations Act, 1971, witnessed much emphasis on IR in the company. An Industrial Relations Manager was appointed and with the approval of 85% of employees, the company embarked on a six-month trial period of updating IR policies and procedures. A Senior Joint Negotiating Council was established with full negotiating rights and responsibility for evolving policies and procedures with a view to establishing mechanisms for the parties to resolve their differences in a constructive manner.

Notwithstanding these provisions for differences to be resolved in a constructive manner there was a strike in the company in 1972 which together with shortages of scoured wool and jute, resulted in short-time working and a loss of production and a reduction in stock levels which jeopardised delivery dates and the company's customer service reputation.

Rising raw material prices and wage costs forced the company into increasing selling prices by 5% - in line with CBI policy but at a level which prejudiced profit margins. Wool was virtually double the 1971 price and focused attention on the possibility of extending the use of man-made fibres, although wool not only gave better performance but was generally more acceptable to the market. With the need to keep costs down, however, the company had launched a 100% man-made fibre product developed specially for the German market, and trials were also in hand to use polypropylene as a substitute for jute as a weft yarn. The new Mark XI wilton products - Bell Velvet, Bell Celeste and Bell Loop - had been so well received that production could barely meet demand. The new Lux Axminster quality had also been in strong demand and demonstrated that high quality axminster still attracted volume sales. Plans were announced to increase spinning capacity and additional factory space was purchased in Kidderminster to provide better stockroom facilities.

Although the Australian company had increased turnover, profit margins were substantially below target. The USA now qualified as Brintons' largest market and the American company achieved good results - despite the high delivery costs incurred by the need to charter an aircraft to meet deliveries that were threatened by the seamen's strike in the USA.

The company was awarded the Design Council Award for 1973 and Bell Celeste won the Carpet Review Design Prize and demand for the company's products was high. Sales in the USA had trebled over the previous year and the Australian company also increased turnover at reasonable profit margins, and exports to Australia were more competitive since tariffs had been reduced. The Mark IX project developing a special cloth for the American market offerd good prospects.

Yarn production at Telford suffered as a result of manpower shortages and the company was still relying on outside suppliers to fully meet its requirements. Although wool prices had stabilised and even signalled a fall, there were signs of a nylon shortage as the oil crisis threatened the supply of synthetics and dyestuffs just when good progress had been made with substituting polypropylene for jute weft.

Statistically 1974 was a good year with sales at £23.5m despite the loss of production arising out of short-time working earlier in the year because of energy shortages. Sales in the home market were at a lower level and wilton, in particular, was well below production capacity. Axminster, however, sold well and order books were full and even required overtime working to meet delivery dates. Exports, double the value at 1973, were particularly successful and one in every four employees in the company was now working on export production. As oil prices quadrupled the cost of raw materials increased substantially and even though the company increased selling prices it was unable, under government legislation, to recover its full costs. As a result the pipeline costs supporting work-in-progress, finished goods and debtors, were running at 50% above the 1973 level and insufficient profits were generated to support the planned £4½m development programme.

It was clear that stock volumes could not be financed at the present level of performance and at prevailing interest rates. While liquidity was thus seriously jeopardised the position was aggravated by the increase in corporation tax from 42% to 50%. The financial position was eased by the good performance of the Australian subsidiary but even then the post-tax profits were sufficient to finance only half the increase in the value of pipeline costs. A good housekeeping campaign helped to contain the effect of these costs, but heavy additional expenditure was incurred in resolving effluent problems in Kidderminster and at Telford.

By January 1975 it was clear that the woven carpet industry was suffering as a result of the drastic cut-throat practices in the tufted sector. Australian markets were flooded with cheap tufted products as a result of which the Australian government imposed a quota restricting imports of axminster and tufted to 25% of the 1974 level. Brintons with its large volume of exports to Australia was particularly vulnerable to these restrictions. Although sales in the home market responded favourably to the cut in hire purchase deposits from 33 1/3% to 20% bringing carpets into line with furniture, rising raw material prices made carpets increasingly expensive in comparison with other consumer goods and the proportion of consumer spending on floorcoverings declined.

Many companies in the industry found it difficult to survive in these conditions and some had already failed. Brintons' order books were lower than planned levels and strict inventory controls were imposed to conserve cash. The quick delivery service suffered and once again jeopardised customer relations. The planned improvements at Telford had been achieved with a resulting benefit in the quality of yarn, and three new carding machines were installed at Slingfield Mill. Two new qualities - Elizabethan and Bell Velour - were launched towards the end of the year and both indicated good results. The IR climate had improved and the new procedure agreement and joint consultation programme were judged to be effective.

A hardworking and vigilant sales team and the flexibility achieved in production and despach all contributed to the company's success in achieving a sales turnover of £35.1m in 1976, even though there were many changes in ranges and qualities to meet customer requirements and as the proportion of special orders increased. These conditions required considerable co-operation and goodwill when some sections of the company worked overtime and others were on short-time working.

The Australian company had established a high reputation and did reasonably well in a depressed market. In New Zealand, however, the signs were threatening when the government there encouraged the establishment of a Militron carpet printing machine which was capable of absorbing all that country's carpet requirements; the implications for the Australian market were also serious as New Zealand enjoyed privileged trading arrangements with Australia. Brintons withdrew from its New Zealand commitment shortly afterwards when Tattersfield sold its share of the company to a rival organisation.

By 1977 some observers were pronouncing the last rites over the woven carpet industry. Raw material prices continued to increase as the £ lost value making carpets increasingly more expensive and uncompetitive at a time when the market was flooded with tufted products at prices which must have been uneconomic. Over-production in the woven sector added to the problem as manufacturers resorted to heavy discounting to shift their stocks at a time when consumers had switched from spending to saving.

Although profit margins were considerably reduced in 1977, Brintons' UK operations increased turnover by 7.8% in value and 4.4% in volume and exports accounted for 30% of output. Both Kidderminster and Telford factories were on short-time working which mainly affected axminster and in total some 72 of the company's 2,400 employees.

The uncertainty of orders, coupled with the necessity to meet the sometimes impossibly short delivery dates that customers now took for granted, strained production schedules and continued to require high levels of co-operation between all departments, particularly when some areas worked almost non-stop and others had no work at all. The Australian company, faced with similar trading conditions to the UK, also held its position in comparison with other manufacturers.

Given the bleak home markets, attention was directed to increasing exports, particularly to Europe, which offered the potential for the volume orders necessary to exploit the advantages of Brintons' production system. With this in mind, a director assumed special responsibility for Europe and was stationed there. Mr D Woodward retired from the board and Mr H Lowe was appointed Joint Managing Diretor and Mr J Clist and Mr Topham Brinton were appointed Assistant Managing Directors.

Inflation was still high in 1978 and the cost of maintaining current assets was prohibitive. Attention was given to minimising these costs by reducing stock levels, even at the expense of achieving smooth production programmes, and by increasing labour flexibility. Strike action by weavers in response to this measure jeopardised already difficult production schedules. Predictably, delivery dates increased and the sales force worked hard to restore the resulting damage to customer goodwill.

While taking advantage of every order opportunity to increase volume sales, the company pursued its objective of achieving quality production at lowest prices through improving efficiency. A major investment in the Mark XII axminster loom provided increased capacity for high volume-low cost output and investment in other complementary processes included new semi-automatic winding machinery using larger hanks; computerised design scanning facilitating economic re-colouration of designs, and a new computer.

Selling prices were held at the 1977 prices and this, together with a workforce at 2343 and a strong product profile, enabled the company to achieve sales of £43m as home sales increased by 21%, contracts by 41% and exports by 12% over the previous year, with wilton showing stronger demand that axminster. The Australian company experienced an exceptionally bad year and traded at a loss and exports to Australia also suffered when tariffs of 30% on axminster and 22½% on wilton were imposed in November 1978. The selling company in the USA increased turnover by 33% over the previous year but profit margins were eroded due to decline in $ values and increased transport costs.

Against a background of widespread distress in the industry in 1979 as many companies went into receivership and short-time working was widespread, Brintons was unique in holding selling prices stable and increased its share of the UK market with sales at £48.8m and created 160 new jobs.

The company was once again frustrated in its attempts to meet delivery dates by the series of national strikes affecting the UK in 1979. Raw material prices continued to increase as oil prices rocketed and nylon supplies were threatened by srikes at British Nylon Spinners. The increasing level of imports from the USA damaged UK manufacturers who, unable to compete with the artificially low oil-subsidised prices enjoyed by American manufacturers, sought import controls which Brintons feared would result in retaliatory measures by the USA which would injure the company's export trade. Given this possibility, attention was directed to increasing sales in Europe which showed signs of becoming Brintons' largest market.

All product lines sold reasonably well, including the longstanding Candia and Bell Twist qualities. Bell Trinity, a new Mark XII quality won a Gold Award from the International Business Designers Association of America, and plans were made to introduce Palace Velvet, already a success in the export market, to the home market. Substantial improvements in the output of yarn were made at Telford and development work on electronic colour measurement and prediction made good progress and offered enormous possibilities for efficiencies in colour matching and yarn utilisation.

The first issue of the Brintons Financial Report to Employees pointed out that while the company had survived and remained profitable, the level of profits was insufficient to finance the modernisation programme and future expansion without resorting to increased borrowing.

8.3.4 1980 - 1986.

The recession worsened in 1980 as oil prices escalated and company closures, redundancies and short-time working were at high levels when between January and June industry sales in the home market were 25% down and exports 40% down on the previous year and consumer spending on carpets had declined to one halfpenny in the £. The very high tariffs in Australia destroyed any prospect of trade and the Middle East became a dumping ground for all countries with excess production.

Four new products were introduced to stimulate demand but despite efforts to promote sales and reduce costs Brintons' sales at £44.8m had declined in both value and volume terms and short-time working was introduced when it was no longer viable to manufacture goods for stock. The Australian subsidiary had performed well but the American company had poor results due to losses arising from exchange rates.

Sir Tatton Brinton, in his sixty-fifth year and with over forty years' service with the company and Chairman since 1968, retired and was elected Pesident in January 1981. Sir Tatton was succeeded by his son, Topham Brinton, who had been appointed to the board in 1966 after working in various departments, and Vice-Chairman in 1978, and who was also Vice-Chairman of the BCMA and Chairman of the industry's National Joint Committee for Wages and Terms & Conditions of Employment. Brintons played an active role through the BCMA in encouraging the industry to fight back and participated in the founding of a London-based industry showroom and the Buy a British Carpet Campaign.

In 1981 the company was operating below production capacity and turnover was below the previous year's results. Redundancy and normal wastage reduced staffing levels and strict controls were enforced to conserve cash and reduce borrowings to ensure survival. At the same time the company was anxious to ensure that it was able to respond to any upturn in the market and with this in mind sought to improve efficiencies in three critical areas of dyeing, winding and axminster weaving. In the dyehouse a spectrophotometer was introduced to give unparalled accuracy in colour-matching which enabled breaks in dyelots and reduced the level of waste. In winding, new Gilbos machines were introduced to give a higher output per hour and better and more efficient packages for looms. The Mark XII axminster 4m loom was improved to achieve higher efficiencies and quality of output. A Profit Participation Scheme was introduced to encourage employees to become more involved in the performance of the company.

Mr TA Tolley, who had been involved in the decision in the 1950s to keep Brintons in the woven sector, retired with forty-eight years service and as Joint Managing Director since 1966. Mr HF Lowe who had joined the board in 1966 with special responsibility for Production Engineering, was asppointed Joint Managing Director.

Although interest rates and inflation declined the economy was still depressed in 1982 and over-capcaity in the industry still caused problems. Brintons' order position remained below capacity levels but its tight cash controls gave it a strong financial position and the Profit Participation Scheme made a payment to eligible employees. Quality Circles were extended and waste control continued to attract attention in the company's drive to improve efficiency.

Brintons celebrated its 200th anniversary in 1983 with a Gala Celebration at the Sports and Social Club, a Ball at the Town Hall and a donation to the local hospital's clinical diagnostic unit where Brintons' memorabilia was included in a time capsule built into the structure of the unit. There were signs of a gradual improvement in the economy although the level of carpet imports caused concern. Brintons' sales recovered to £43.8m but still below full-capacity level. Heather Berber Wilton, a 60% wool pile product requiring special yarn preparation and carfeul weaving, won the Carpet & Floorcovering Review Award for plain carpets. A new product 'Powerturf' was launched for the new sports market. Brintons Pty Limited also won two top awards at a Carpet and Floors Exhibition with a sculptured wilton and a pin-dot design axminster.

There was a significant improvement in sales in 1984 at £50.5m although profitability remained below 1976 levels and imports had a 29% share of the UK market and, it was esimated, had cost 8,000 jobs in the industry. Brintons expanded production in all areas and recruited additional employees. Customer service, quality and waste controls failed to cope with the rapid upturn in business, particularly in cut-length sales, and office systems were also strained. A major investigation was initiated to identify the reasons for these failures and Campaign '84 was launched as part of the company's effort to improve customer service and quality levels. A competition to reduce defective production was launched with a prize to the value of 30% of the savings made. A new Sales Hotline Service was installed to improve the services to retailers. A new Hacoba beaming machine was installed and despite modifications had yet to prove its full potential in improving quality.

Despite being a late entrant to the sports market, Powerturf - now called Actionweave - had secured considerable market share since the company had withdrawn the exclusive distribution agreement and arranged to market and sell the product itself. Some prestigious orders had been received including Lords and Manchester City Football Club, and plans were made to market the product in Australia.

Two new directors were appointed, Mr A Brookes and Mr R Powell, who had joined the company as trainees in 1951 and 1956 respectively. Mr Tolley who had remained as a non-executive director and Chairman of Brintons (Telford) Limited retired after a total of fifty-one years serivce.

Selling prices were increased in 1985 to cover rising material and wage costs. By Spring orders were 9% up on 1984 and annual sales reached £58.5m. Axminster accounted for 65% of output and exports for 20% and contract sales were strong. Retail sales in the UK market remained flat and new Mark VIII products were being designed to stimulate demand. Defective carpet costs had been reduced by 13.55% on the previous year and 137 new jobs had been created since 1983 bringing the total employee figure to 1,961. The Australian company returned to profit after two years heavy losses and had managed to reduce their heavy bank borrowing. The American company recorded magnificent profits largely as a result of favourable currency exchange rates. As Brintons was unable to buy the quality and quantity of yarn needed from outside suppliers a £9m investment programme was initiated to provide new buildings and machinery, mainly at Telford, to replace some machinery which had been in service for over thirty years.

Depressed trading in the UK continued into 1986 and put competitive pressure on exports, particularly in the USA, where prices were forced down so that orders were not only difficult to get but were not particularly profitable. Brintons' turnover was marginally below the 1985 level as both UK and export sales declined, although exports still accounted for 29% of turnover and Bell Twist remained the world's largest selling twist cloth. Despite delays in completing the building work at Telford, the new plant was operational at 30% of planned output and producing excellent quality singles yarns which would considerably improve loom efficiency and product quality. The project was now nearing completion and was equipped to provide the most advanced woollen spinning mill in Europe.

Brintons was registered under the British Standards Institute's Quality Assurance scheme - a considerable achievement as only six of the 1000 firms had been successful in achieving this recognition of product reliability and quality. Mr J Clist who had been appointed to the board in 1970 was appointed Joint Managing Director.

CHAPTER 9: BRINTONS: PRODUCTS, CORE TECHNOLOGY AND OUTLINE PRODUCTION PROCESS

9.1 Introduction,

As Chapter 8 shows, Henry Brinton bought two brussels handlooms in 1823 and started manufacturing carpets in addition to his activities in the family's long-established spinning business which by 1819 also included carpet manufacture based on the domestic system. By 1828 his firm carried out all aspects of the business from raw material preparation through to selling the finished carpets and rugs. By 1840 the firm was exporting carpets, had an agent in London and employed its own team of carpet designers and manufactured brussels, wilton and venetian carpets and town-made rugs. Brintons adopted powerloom tapestry weaving in 1850 and was among the early adopters of powerloom brussels weaving in 1853 and centralised manufacturing operations at its present headquarters site by 1855. By 1862, with 600 employees, Brintons was the largest carpet manufacturer in Kidderminster and produced brussels and velvets by steam power, chenille axminster carpets and rugs, wide sofa carpets, figured and other rugs manufactured both by power and handlooms. By 1879 the firm had establishd a reputation for quality carpets and efficient production systems and was recognised as being at the head of the carpet industry throughout the world. In 1869 Brintons sold its hand-operated chenille axminster looms to Tomkinsons & Adams and it was already engaged in developing an axminster powerloom when in 1878 it declined to operate the spool axminster process on licence from Tomkinsons & Adams. In 1890 Brintons patented the gripper axminster loom and by 1895 axminster squares formed a substantial proportion of Brintons ouput.

By 1906 the company had established a comprehensive Machine Shop and the high levels of loom maintenance which, under the leadership of Cecil Brinton, were exploited to establish a worldwide reputation for textile engineering in general, and loom development and loom construction expertise in particular. By the 1920s Cecil Brinton had developed the axminster and wilton loom specifications which continued in operation at 1986 and had developed and built the looms which were progressively replaced from the late 1950s onwards by the new generation of highly acclaimed axminster and wilton looms developed and built by Harry Lowe. John Brinton introduced scientific management techniques in the 1920s and the management consultants, Urwick Orr, were retained in the 1930s to re-organise the company with a view to improving efficiency and introducing the necessary control systems.

In 1946 Brintons was the first company in the industry to achieve 100% of its pre-war output of 1.75m square yards with only 70% of its looms and plant in operation. In the post-war period production was concentrated on high volume, high quality-low cost axminster and wilton carpets only, in full rolls and broadloom squares. All manufacturing activities, including spinning and dyeing, were carried out at the same site in Kidderminster where plant and equipment installed in the 1920s and 1800 people were deployed in a functionally structured, privately owned limited company which was controlled by a small team of director-managers under the chairmanship of a member of the founding family.

In 1986 the company employed 1,960 people and was still manufacturing high quality-low cost axminster and wilton carpets at Kidderminster where production equipment and systems had been developed to manufacture mainly broadloom carpets to service the cut-length retailer trade in the domestic sector and the smaller production runs in the contracts sector. Kidderminster operations are functionally organised and controlled by a small team of director-managers under the chairmanship of a member of he founding family. Both axminster and wilton operations report to a single main-board director. These operations include all preparatory, weaving and finishing stages of production and are serviced by a new spinning and dyeing facility located at Telford in Shropshire and operated as a wholly owned subsidiary of Brintons Limited. A wholly owned manufacturing subsidiary had been established in Geelong, Australia, and Brintons Carpets (USA) Limited and Brintons GmbH had been established as selling only organisations. In the period 1955 - 1968 the company had in collaboration with other leading woven manufacturers been involved in establishing and running Tufted Carpets Limited at Brighouse in Yorkshire, and in the period 1958 - 1976 had a 40% interest in Tattersfield-Brintons Limited in New Zealand.

The remainder of this section describes the Kidderminster-based axminster and wilton units in terms of their own distinctive products, core technologies and manufacturing processes. Major changes in these areas in the period under review are noted with a view to assesing in a subsequent section their contribution to organisational efficiency and innovation.

9.2 Axminster: Products, Core Technology & Outline Production Process

9.2.1 Products and Core Technology

The Gripper or Jacquard axminster loom was developed in 1890 by Brintons who adapted their wilton looms to take the gripper mechanism[2]. The distinctive nature of the gripper weave and the development and adoption of the process are recorded elsewhere - see for example Bartlett[3] Robinson[4]. For the purposes of this study[5] it is necessary to note that the finished product resembles a spool axminster carpet. A distinguishing feature of the two processes is in their use of colour. Whereas the spool axminster process permits an unlimited use of colour, the gripper process uses the jacquard principle for colour selection which restricts the number of colours to eight to twelve although this number can be extended by planting. The gripper process eliminates the spool setting operation and thus has the advantage of being a more economic process generating less pile yarn waste since unused yarns remain on the creel and can be re-used.

Gripper axminster looms are constructed to weave at a given pitch (ie tufts in the horizontal row). Early looms were constructed to weave 9' seamless axminster squares in a coarse pitch. Loom development was confined largely to Brintons who built looms for their own use only until the 1930s when David Crabtree & Sons Limited manufactured looms for the industry generally and, as the process became more widely adopted, 6 - 7 pitch was standardised and looms up to 12' were constructed[6].

Since World War II the main focus of development has been aimed at increasing the running speed of the looms[7]. Brintons is recognised as having achieved the highest loom speeds which by 1969 were 60% faster than the 1959 speeds, and also with having developed the automatic gripper axminster looms[8]. Other innovations in the post-war period include the development of a 9-pitch high quality loom, 15' wide looms, the elimination of warp-beaming changing, and the development by David Crabtree & Sons Limited of a 16-frame loom to meet the demand for an increased colour capacity[9].

Product differentiation is achieved by varying the density of fibres per square inch by adjusting the number of vertical rows and pile height, the quality of these fibres and styling. Competition is on the basis of quality and styling, although price is a feature of competition in the lower quality ranges. Conventionally in the industry, quality and / or styling changes are introduced annually, although more frequent changes may be introduced to reflect market requirements[10].

As already noted, Brintons sold its hand-operated chenille axminster looms in 1869 to Tomkinson & Adams (see Case Study 1) who agreed to supply chenille axminster match rugs for Brintons' brussels and wilton carpets. Brintons was already involved in developing its own axminster process in 1878 when it declined Tomkinson & Adams' offer to operate the spool axminster process under licence. The immediate success of the spool axminster process, however, put Brintons under severe pressure to develop an alternative and more efficient method for axminster weaving[11].

Brintons pioneered the gripper axminster process incorporating the jacquard mechanism and duly patented their invention (developed by two employees, Albert Dangerfiel and Thomas Greenwood) in 1890. By 1895 an Axminster Department had been established with 8-frame looms producing 34,312yds of carpet. Developments continued to increase the colour capacity of the looms and although up to twenty-two colours could be accommodated the results were not entirely satisfactory and a maximum of sixteen colours was found to be the most design-effective and efficient system. The design constraints nevertheless proved problematic when the designers failed to produce designs to suit the unique requirements of the gripper system and resigned en masse when the company insisted on maintaining the design standards imposed by the gripper process. A new designer, already experienced in designing for the American version of the gripper process, was headhunted and remained with the company until his retirement in 1939. His distinctive design approach exploited the economic advantages of the gripper process and the 'Brintons Touch' soon became widely recognised in the industry. By 1896 the company had developed its highly succesful seamless axminster squares which led to the doubling of axminster capacity and tweny-four hour operation of the looms to meet demand[12].

The opening years of the twentieth century witnessed a slump in the carpet industry when both home and overseas markets declined. Brintons production increased rapidly with the launch of the famous 'Majestic' seamless carpet in 1904. Brintons, now with 1200 employees, continued to invest in expanding and modernising its factory. A new axminster weaving shed housed fifty 6/4 4 pitch looms and an additional power plant, a new dye house equipped with the latest machinery and additional wool spinning capacity was committed to axminster production. Under the supervision of Cecil Brinton, a Cambridge graduate engineer who had been persuaded to join the company on a three-year contract in 1904, a Machine Shop was established and an extensive loom development programme initiated which resulted in a 7-pitch 12-frame narrow loom and an 8-frame wide loom designed to weave at optimum efficiencies in terms of both speed and reliable quality[13]. These looms remained in production until the late 1950s when they were replaced by the revolutionary MkVI and MkVII looms designed by Harry Lowe who had taken over Cecil Brinton's production engineering responsibilities[14].

By 1906 the general slump conditions caught up with the company and output was 50% below the 1900 level. About this time some axminster hand looms were reinstated to execute special orders and a round carpet 33' in diameter in an elaborate Louis XIV design was made for a London firm and other 'specials' for the Japanese Embassy. In 1909 the new 'Cecil' range was launched and a chenille axminster department was opened in a specially designed facility to benefit from the latest equipment and economic plant layout and workflow systems[15].

The company was trading at a loss and was only saved from closure in 1910 when the proceeds from the sale of the Canadian susbsidiary (established in 1906) paid off the interest charges and other debts. The outlook continued bleak and the industry faced ruin when World War I was declared and Brintons was commissioned to manufacture blankets and webbing for military purposes[16].

In the post-war period the company again achieved record sales for axminster products and by 1924 overall production had reached 1m square yards. This level of activity, together with a number of deaths and retirements of key personnel, made re-organisation and management succession priority management considerations leading to the appointment of Urwick Orr in 1935. The consultants recommendations for work measurement, creeler-assistance, incentive schemes and a Works Council, created much conflict with staff and works personnel. Works employees were eventually reconciled by the introduction of a pension scheme and welfare benefits as some protection against the consulants' proposals, while staff employees were given the option of complying or leaving. The proposal to establish an axminster unit at Bridgewater in Somerset, however, proved particulary contentious and acted as a reminder of a similar incident in the nineteenth century when the company transferred tapestry weaving to Yorkshire rather than meet weavers' claims for more pay. The Bridgewater project proceeded but was barely self-supporting when World War II started and the company was once again committed to war production. Although the Bridgewater unit was re-started after the war it was never an economic proposition and was sold in 1952[17].

The company was designated a 'nucleus firm' under the government's World War II arrangements and as such was required to manufacture carpets for those firms which had been closed down but still had stocks of raw materials. Even this activity had ceased by 1942 until 1945 when a limited production of carpets was permitted under license[18].

When carpet manufacturing resumed after World War II Brintons concentrated on manufacturing gripper axminster and wilton carpets only in full rolls and squares and in 1946, with only 70% of its plant and equipment in operation, it was the first company in the industry to achieve 100% of its pre-war yardage of 1.75m square yards when it exported more than twice its pre-war volume at more than four times the pre-war value[19].

Many carpet manufacturers at this time began producing cheap quality carpets for the lower-income market in the UK where it was estimated that some 50% of homes had no carpets at all. Brintons decided instead to pursue a high quality-low cost product policy by pursuing high volume orders and by improving the efficiency of its operations[20].

In pursuit of this policy greater efficiencies were sought in all operations, including the search for alternative fibres to overcome the shortages and rising prices of traditional materials. In 1952 the company introduced a wool-blend carpet for the first time and introduced various surface treatments, including moth proofing. Stock-dyeing techniques were introduced and Finished Goods stocks were centralised at Green Street which was equipped with the latest labour-saving machinery.

The Broadloom Finishing Department was similarly updated to increase efficiency and in 1959 the company was the first to apply a latex backing to axminster products. The R & D Department, under Mr H Lowe, began an intensive loom development programme in 1956 resulting eighteen months later in the highly acclaimed Mark VI and Mark VII axminster looms. By 1962 sixty-three of these looms were installed and operating at efficiencies sufficient to enable the company to reduce prices. In 1986 fifty-three of these looms continued in production and were still recognised as being the best in the industry.

Although demand for axminster continued at unprecedented levels throughout the 1950s the performance of the tufted carpet sector in the USA and the changed pattern of trading in the UK demanded attention. Brintons collaborated with four other leading UK woven carpet manufacturers to establish a tufted carpet company in Yorkshire in 1956 to manufacture and sell tufted carpts under the Kosset brand label. In the UK the pattern of trading had changed in the retail domestic sector away from full rolls and carpet squares to cut-lengths and a quick delivery service. The new pattern of trading not only created uncertainties which undermined Brintons' high-volume operations but also transferred the financial and physical burden of stock-holding to carpet manufacturers. Although volume markets were pursued, efficiencies were also sought in increasing operational flexibility to service the smaller orders in the UK domestic sectors.

Candia, a new latex-backed wool/nylon/viscose blend axminster product, was launched in February 1960 and supported by careful marketing and promotion aimed at helping the retailer. Within three months the product was a market leader and the winning formula was extended to a luxury version of the product. The Regina 82 range launched in July 1961 was quickly established as a standard cloth and eleven manufacturers were known to be planning a similar product. These ranges, selling at prices 5 - 7½% below competitors' prices, attracted record demand and demonstrated the effectiveness of Brintons' high quality-low price formula. Two weaving sheds were already equipped with the new axminster looms and a new Broadloom Finishing Deparment was equipped with modern picking tables and conveyor systems to increase picking efficiencies[23].

By 1963 sales were double the pre-war figure but the pattern of cut-length trading had become entrenched and required more flexible operating systems to cope with the smaller production batches and more volatile markets[24].

In 1964 tufted had gained a 41% volume and 25% value share of the UK market. Although axminster still enjoyed a competitive advantage in styling, developments in tufting technology posed a direct threat to patterned products and to Brintons' Candia and Regina ranges. Rising wool prices forced Brintons to increase selling prices although even at the new level prices were still 5% below competitors products. Demand for Brintons' carpets still remained high but production problems with static electricity resulted in delays and higher mending costs and a serious loss of market credibility[25].

The axminster loom building programme was completed by 1966 and the Mark VI and Mark VII wide looms were well able to compete in the woven sector but it was clear that even further efficiencies were necessary if axminster was to compete against tufted products. Clearly automation was a possibility but in the shorter term multi-loom weaving, already gaining ground in the industry, offered further scope for efficiencies. Attention was directed to gaining efficiencies by developing and modernising all stages of axminster production. The new latexing plant at Caldwell Mill was in the course of construction and plans were announced to bring narrow axminster loom efficiences to a higher level[26].

By 1966 and through to 1967 conditions in the woven industry were bleak as tufted gained a 43.2% volume share of the UK market and Brintons was almost alone in maintaining its post-war record of no short-time working. Despite the depressed conditions, Brintons increased its share of the market although profitability declined and high absenteeism caused production bottlenecks which had no sooner been resolved than exports were constrained by a seamen's strike[27].

Axminster sales recovered in 1968 when the shift towards broadloom was even more pronounced and Brintons converted some 9' looms committed to production of axminser squares to 12' looms. Following the merger of two of the four companies collaborating in the Kosset company, Brintons withdrew from this enterprise to concentrate attention on achieving higher efficiencies in its woven operations[28].

Despite stringent credit restrictions in 1969, Brintons turnover reached record levels at a time when many manufacturrs were on short-time working. The company's exports were three time greater than the 1966 level and in the USA, Macy's, the largest store in the world, had been secured as an outlet for Candia. By now, although some special axminster products were manufactured, Brintons axminster production, now more than 50% above the 1960 level, consisted almost entirely of four standard products and one special quality serviced by looms built since 1960. The development of new products had, however, declined and this aspect was now accorded priority consideration. The company was by now the largest operator in the contracts sector where competition was also increasing from both woven and tufted manufacturers[29].

Brintons failed to meet its target performance in 1970 when trading conditions continued difficult for the industry. Tufted had by now gained sufficient product and market credibility to directly challenge the quality woven sector and developments in the patterning capability of the tufted process threatened axminster so that Brintons had to achieve efficiencies that were equal to or better than tufting in order to maintain its position. As woven carpets lost their share of the domestic market more woven manufacturers were forced into the contracts sector and competition for orders increased[30].

The company's achievements in gripper axminster loom development were recognised in 1971 by the Jubilee Award of the Textile Institute. The efficiency of this process were so effective that the company was able to compete successfully in the American markets despite a 10.5% surcharge on axminster imports.

A strike in the company and raw material shortages in 1972 resulted in short-time working when stocks levels declined and customer service was jeopardised although the company's new Lux Axminster carpet sold well.

Experiments to extend the use of man-made fibres, including polypropylene as a weft yarn, continued and a 100% synthetic carpet was launched for the German market and the Mark IX narrow axminster loom development of a special cloth for the American market received special attention. All of these developments in the use of synthetic materials and the price advantages over traditional materials were, however, jeopardised when oil prices flared and raw materials became scarce and subject to escalating prices by 1974. Although selling prices were increased, the company was unable to recover its full costs under government legislation and profit margins were narrow. Overall sales declined although demand for axminster was strong and Brintons' order books were full, particularly export orders, and required overtime working.

By 1975 the woven industry was suffering from the cut-throat practices of the tufted sector and carpets were being sold at prices well below economic levels as many manufacturers discounted to reduce stocks. Overall demand declined despite the reduction in hire purchase deposits and carpets lost their share of consumer spending. Demand for Brintons' products also declined and strict inventory controls were introduce to conserve cash. By 1976 and through to 1977, operations were subjected to many fluctuations as production schedules responded to the increasing level of special orders and smaller batch sizes as the competition for sales increased and some axminster operations were on short-time working while other areas worked overtime. Competition in export markets increased accordingly and Brintons new Mark XII broadloom axminster project combined loom and complementary processes developments to manufacture a specialised high volume-low cost product which won the Gold Award of the International Business Designers Association of America in 1979[84].

By 1980 through to 1983 although further new products were introduced, including Powerturf for the new sports and leisure markets, to stimulate demand, performance declined as the UK recession deepened. Brintons was operating below capacity levels and staffing levels were cut. During this period a £9m investment programme in new equipment and operating systems continued with a view to achieving overall efficiencies that were on a par with or better than the tufting process. Particular attention was directed to spinning and dyeing processes to ensure operating efficiencies and quality standards to complement the existing loom capabilities[21].

Production and recruitment were expanded rapidly to meet the sudden return to demand in 1984 when faulty production and waste levels increased and customer service standards declined. A major investigation was initiated to remedy the failed control systems and by

1985 had achieved a 13.5% reduction in defective carpet costs over the the previous year[36].

Although the market improved from 1984 onwards demand at 1986, when axminster accounted for some 65% of the company's output, remained below the 1976 level despite the introduction of new products to stimulate sales. Home markets in particular remained slack and competition in export markets, accounting from some 20% of output, forced prices down. Contract markets, however, were strong and Brintons faced increasing competition in this area from both the woven and tufted sectors[37].

In 1986 Brintons was one of the six companies to qualify as a Registered Firm under the British Standards Institute's Quality Assurance Scheme. Such regisration acknowledged Brinton's international reputation for meticulous quality standards and control systems[38].

9.2.2 Outline production process[39]

Fig 16 presents a diagramatic representation of the stages involved in making a gripper axminster carpet. The number of stages and the sequence of these stages has remained unchanged throughout the period under review.

Table 11 lists the technological and process changes that have been implemented during this period and describe the basic purpose of these changes. As this information demonstrates, there have been a number of improvements at all main stages of the manufacturing sequence which have

Figure 16

BRINTONS: AXMINSTER OUTLINE PRODUCTION PROCESS 1969 -1986

> > Dyed yarn received from Spinning

Stage 1 W I N D I N G

↓

Stage 2 A L T E R A T I O N S - Prepare & Alter creels

↓ - Prepare jacquard cards from design papers

Stage 3 W E A V I N G

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Stage 4 F I N I S H I N G

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↓

Stage 5 S H E A R I N G

↓

Stage 6 B A C K I N G

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Stage 7 F I N A L I N S P E C T I O N

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W A R E H O U S E

Source: Interview 39

Table 11

BRINTONS: AXMINSTER PRODUCTION PROCESS CHANGES 1969 - 1986

1. Overall process	No change in sequence of operations All stages considerably faster and more effective. Ongoing machine design to reduce faulty production. Direct labour costs reduced by some 30% Considerable improvements in waste control at all stages, including computer controlled colour matching system developed by Brintons in collaboration with ICS Southampton
2. Winding	Size of hanks increased in late 1970s from 1lb to 8lbs giving greater productivity. All development done by Brintons in collaboration with Gilbos Complementary changes in yarn & dye processing
3. Alterations	Changed from parallel to conical packaging in 1970s to give side delivery to Mk VII loom to achieve savings in waste. Further changes in 1988 to give over-end top to tail delivery with even greater waste control. System devised by Brintons
4. Finishing	Mechanical tables to increase picking efficiencies. Although gripper finishing is more labour intensive than spool, labour reduced as a result of loom efficiencies.
5. Shearing	Horizon shearing machine installed 1984/5 - faster & more reliable running
6. Backing	New equipment installed 1984/5 to improve tension control/product quality. Specified by Brintons but built by Sellers of Huddersfield. Changed from sizing to frothed latex
7. Weaving	Several new loom designs including MkVI & VII, Mk IX, MkXII (see main text) mainly to achieve higher running speeds and reliable performance. Developed and built in Brintons.

Source: Interview 39

been aimed at improving the overall efficiency of the manufacturing operation and/or achieving improvements in product appearance / performance.

As Fig 16 shows, the production process consists of seven main stages. Stages 1 to 4 uses plant and equipment which is dedicated to the axminster process. Stage 5 facilities are shared with the wilton process. The processing system is organised on a progressive flow basis and utilises plant and equipment which has been developed specifically for that stage. In some cases Brintons in collaboration with specialist suppliers, has developed the equipment which is later made available to the indusry generally. In other cases, Brintons has itself developed and built the equipment and specifications are then restricted to the company's own use.

Production facilities are dedicated to particular standard product lines wherever possible and may be reallocated according to demand.

Following the sequence of production in Fig 16, at Stage 1 pre-dyed yarn is received from the yarn stores in hank form and is wound from hanks to cheeses. As Table 11 shows, innovations at this stage include the development, in collaboration with Gilbos, of high-speed winding equipment whih is capable of processing larger hanks to provide larger and more uniformly packaged cheeses which reduce handling and achieve savings in labour costs at this and subsequent stages, as well as improving weaving performances. The overall speed at which yarn is processed through Stage 1 has been increased with savings in both labour and downtime.

At Stage 2(a) jacquard cards are stamped in accordance with design papers received from the Design Studio and at Stage 2(b) the jacquard cards, cheeses from Stage 1 and backing materials are assembled on the loom in preparation for weaving. As Table 11 shows, changes at this stage include a new conical packaging which facilitates a side delivery to the MkVII loom and achieves considerable savings in waste yarn. The delivery system is currently under further review to achieve even greater yarn savings through implementing a computerised system developed by Brintons for its own use.

At Stage 3 surface and backing yarns are woven together to form the carpet in a 7-pich construction which was adopted in the early twentieth century when the looms were modified by Cecil Brinton. As Table 11 shows innovations at this stage are a significant feature of Brintons competitive strategy in achieving high quality-low cost woven carpets. Brintons developed and patented the gripper axminster process in 1890 and since then has established a world-wide reputation in loom development and construction and is recognised as having the highest loom efficiencies throughout the world. Developments in this area have been aimed at achieving efficiencies through increasing the width and running speeds and overall reliability of looms, including automatic fault detection and stop motions. Improvements in machine efficiencies contributed to labour efficiencies in weaving through multi-loom operation and to labour efficiencies in subsequent stages through the reduction of weaving faults.

At Stage 4, finishing, the carpet is inspected and faults are corrected manually. As Table 11 shows, Brintons' own design mechanical tables and conveyor sysems were inroduced to facilitate fault detection and the speed at which work is progressed. These innovations, together with more reliable loom performance, has resulted in a significant reduction of employees at this stage of the manufacturing process.

At Stages 5 to 7 the facilities are shared with wilton products. At Stage 5 the surface pile of the carpet is sheared to a uniform pile height. As Table 11 shows, improvements at this stage include investment in new equipment to increase the running speed and accurancy of shearing performance. After shearing the carpet is backed at Stage 6 and the most significant change here has been in the change in backing agent from sizing to latex, Brintons being the first woven manufacturer to apply a latex backing. Investment in latexing and ancillary equipment has enabled the processing of larger quantities of carpets at greater speeds and in the performance and handling of the product itself. The backing operation is automated and includes an automatic fault detection and stop mechanism. At Stage 7 the carpet is subjected to a final inspection, measurement and grading and is transferred to the warehouse. The warehouse itself is outside the remit of the axminster productive unit and innovations in this area are not included in this review, although as Section 1 has shown, the warehouse itself was subject to complementary development.

9.3 Wilton: Products, Core Technology & Outline Production Process

9.3.1 Products and Core Technology

For a summary of the distinctive nature of wilton products and the development of weaving technology see Case Sudy 1, Chapter 6.3.

As already noted, Brintons began its carpet manufacturing activity in 1823 with hand-operated brussels looms and in 1853 was among the early adopters of the brussels power-loom on licence from John Crossley and Sons who had acquired the patent rights from Bigelow in the USA. In 1855 at the Paris Exhibition, Brintons' won recognition for the quality of is products and for the efficiency of its manufacturing system covering a wide range of woven carpets. By 1868 the company was specialising in brussels and wilton manufacture and sold its hand-operated chenille axminster looms to Tomkinson & Adams. In 1879 at an exhibition in Sydney the firm was described as being at the head of the carpet industry in the world[40].

With the invention of the spool axminster process in 1876, wilton trade declined[41] and Brintons patented its own gripper axminster process in 1890 and by 1895 its axminster products gained significant market recognition and became the major focus of development. Wilton trade declined still further in the slump conditions in the opening years of the twentieth century when Brintons had more than 160 brusslels and wilton looms. By 1906 the company was trading at a loss and was saved from closure in 1910 by the sale of a subsidiary company in Canada[42].

Attention was directed to improving axminster loom efficiencies with the appointment of Cecil Brinton to the company in 1904. Carpet manufacturing was suspended during World War I and issues of management succession and re-structuring the company to achieve higher levels of efficiency led to the appointment of Urwick Orr in the early 1930s. Carpet production was suspended again during World War II although Brintons as nucleus firm was required to undertake some limited carpet manufacture on behalf of other manufacturers who still had raw materials available. Wilton looms were devoted to producing webbing for military purposes[43].

When Brintons resumed carpet production in 1946 production was concentrated on gripper axminster and wilton products only. Wilton was manufactured in some four different pitches up to 10-pitch to give four standard qualities and one special quality, with textured wilton broadloom as a major selling line. By the early 1950s wilton output was mainly devoted to made-to-order production which required flexible manufacturing arrangements to process smaller batch sizes and fluctuating levels of demand. While demand for axminster increased, wilton production was often subject to short-time working and narrow wilton, in particular, experienced substantial decline and this plant was dismantled to make room for additional wide axminster looms[44].

By the 1960s the contracts sector emerged as a significant market for Brintons' wilton products. Competition in this sector, however, increased as other wilton manufacurers entered this market and as axminster, faced with competition in the domestic sector from tufted, also diverted sales to the contracts sector[45].

In 1960 Brintons launched a new all wool luxury wilton, Intrigue, featuring a hard-twist yarn to give a novel carved-leaf effect. The new product was successful in attracting market share and attention was directed to developing wilton looms to higher efficiencies and re-designing wilton operations accordingly[46].

The R & D Department developed and built a new generation of looms, the Mark VIII face-to-face 8-pitch series, which were recognised as achieving the highest running speeds in the industry. Despite strong labour opposition to the introduction of these automatic looms by 1965 a new factory complex, complete with warehousing facilities, had been built to house these new looms and a new wilton cloth, incorporating a new cost-efficient yarn setting technique, Bell Twist 82, was launched at a price significantly below competitors' products. These looms remain in production in 1986 and still produce some 30,000 square yards of carpeting[47].

By 1967 Brintons had established a Contracts Division and manufactured new ranges in consultation with manufacturers in the furniture and furnishings industries. A new Mark XI loom was developed in 1969 to accommodate a small-motif design, and in 1972 a new series of products was launched - Bell Velvet, Bell Celeste, Bell Loop - with Bell Celeste winning the Carpet Review Design Prize. The products won immediate market recognition and production was barely able to meet demand[45].

By the early 1970s the woven carpet industry was experiencing severe trading difficulties with purchasing controls, raw material price increases and shortages. Wilton exports faced a 40% surcharge in America and quota restrictions in Australia. Developments in tufted technology had significantly improved product performance and product credibility and these products now competed directly with wilton velvets and textured wiltons. By 1973 through to 1976 Brintons was operating below production capacity and the number of small orders had increased significantly and long-run efficiencies were sacrificed to maintain production. Production scheduling demanded high levels of flexibility as some areas worked overtime to meet the sometimes impossibly short delivery dates and other areas were on short-time working[46].

The recession in the carpet industry worsened in the early 1980s. By 1981 Brintons had introduced redundancy and short-time working and although demand improved in 1984 output had not reached even the 1976 levels. Total sales improved again in 1985 to 9% over the 1984 levels when wilton accounted for some 30% of output and the contracts sector accounted for 50% of the company's business[47].

9.3.2 Outline production process:

Fig 17 presents a diagramtic represenation of the sequence and stages of the wilton production process. As Fig 17 shows, there are seven main stages in the production process for plain wiltons - the patterned wilton process follows the same sequence and stages as the gripper axminster process described in para.9.2 above.

Stages 1 to 4 utilises plant and equipment dedicated to wilton products and stage 5 facilities are shared with axminster products. As in the gripper axminster process, equipment used has been developed specifically for a given stage and such equipment has either been developed in collaboration with specialist suppliers to a required specificaion and may then be available to the industry generally, or equipment may be developed and built by Brintons for its own use only.

There has been no change in either the sequence of or number of stages involved in the production process in the period under review. As noted above, all stages of production were subjected to review and development to improve overall performance and Table 12 lists the main changes made at these stages.

At Stage 1 stock-dyed yarn is received into the wilton store from spinning and is wound from skeins to cheeses. Changes here include the increased size of cheeses to carry more yarn and reduce the amount of handling required and although outside the productive unit domain, the various changes in yarn blends and processing contributed to

Figure 17

BRINTONS: WILTON (PLAINS*) OUTLINE PRODUCTION PROCESS 1969 -1986

> > Stock Dyed yarn received from Spinning

Stage 1 W I N D I N G

↓

Stage 2 P I L E B E A M I N G

↓

Stage 3 W E A V I N G

↓

Stage 4 F I N I S H I N G

↓

↓

Stage 5 S H E A R I N G

↓

Stage 6 B A C K I N G

↓

Stage 7 F I N A L I N S P E C T I O N

↓

↓

W A R E H O U S E

Source: Interviews[1]

* Patterned wilton as for axminster

Table 12

BRINTONS: WILTON PRODUCTION PROCESS CHANGES 1969 - 1986

1. Overall	No change in number of or sequence of operations. Generally improving machine efficiencies and waste control. Considerably lower direct labour costs arising out of face to face looms.
2. Winding	Increased size of cheeses to carry more yarn and reduce handling costs. Also yarn and dye processing innovations contribute to improved efficiencies and product quality
3. Beaming	Developing CAD sysem to compute yarn requirements to improve waste control
4. Weaving	Standardised at 8 pitch in 1960s. Several loom innovations including MkVIII face to face high speed & automated looms facilitating multi-loom weaving. MkXI single cloth loom to faciltate small motif designs. Developed & built within the company
5. Inspection	Conveyor systems and lighted tables introduced to increase picking efficiencies. Significant labour savings arising out of yarn and loom innovations.

Source: Interviews[51]

efficiencies gained here, the contribution of stock dyeing techniques introduced in the mid-1950s being of significant importance in improving the efficiency and quality of plain wilton processes.

At Stage 2 surface and backing yarns are assembled at the rear of the loom in preparation for weaving. CAD systems are currently being developed to facilitate the computation of yarn required which together with a computerised colour-matching system generates significant material utilisation efficiencies.

At Stage 3 the surface and backing yarns are woven together to form the carpet. As noted above, the number of pitch variations was reduced from four to a single 8 pitch format in the early 1960s and the Mark VIII face to face loom introduced high-speed automatic looms and multi-loom weaving. The Mark XI single-cloth loom facilitated small-motif designs.

A Stage 4 the carpet is inspected for faults and mended manually before shearing and steaming. Conveyor systems and lighted tables, together with yarn and weaving improvements, generated significant labour efficiencies in finishing.

Subsequent stages are shared with axminster production and have been reviewed in para 9.2.2 above.

CHAPTER 10: BRINTONS - PERCEIVED ENVIRONMENT, ORGANISATION FORM AND STRATEGY PROFILES 1969 - 1986

10.1 Introduction

Chapter 8 traced the development of the organisation from its genesis in 1783 to World War II and identified the key events in the post war period up to 1986.

Chapter 9 presented a descriptive account of the company's two main products, related core technologies and production processes, and identified the main changes in the period under review.

Chapter 10 uses the theoretical models informing this study to identify the evolving organisation environment and strategy/structure relationship in the period 1969 - 1986. The basic environment - strategy-structure model is extened to identify the evolving product-process strategy in the same period.

The variables characterising the environment and strategy and structure are those selected by Miller and Friesen, and have been identified in Chapter 3. The relationship between the product and its related production system is described in terms of Abernathy's model of a productive unit, the variables characterising the model have also been identified in Chapter 3.

The variables are used here to construct a profile of the perceived environment, organisation structure and strategy, including product-process strategy, at three points in time - namely, 1969, 1977 and 1986.

The resulting configurations are used to classify the organisation form and strategy that evolved in the period under review. The findings are then discussed in the context of Lawrence & Dyer's expected environment and organisation form and strategy relationships and the implications of this relationship for organisation efficiency and innovation.

10.2 Brintons: Perceived environment 1969 - 1986

The external environment is described in terms of dynamism, heterogeneity and hostility (See Chapter 2 for a discussion of these characteristics.)

Table 13 lists the scores obtained for the characteristics of dynamism, heterogeneity and hostility at the selected points in time.

Fig 18 provides a graphic representation of the data in Table 13.

Table 13

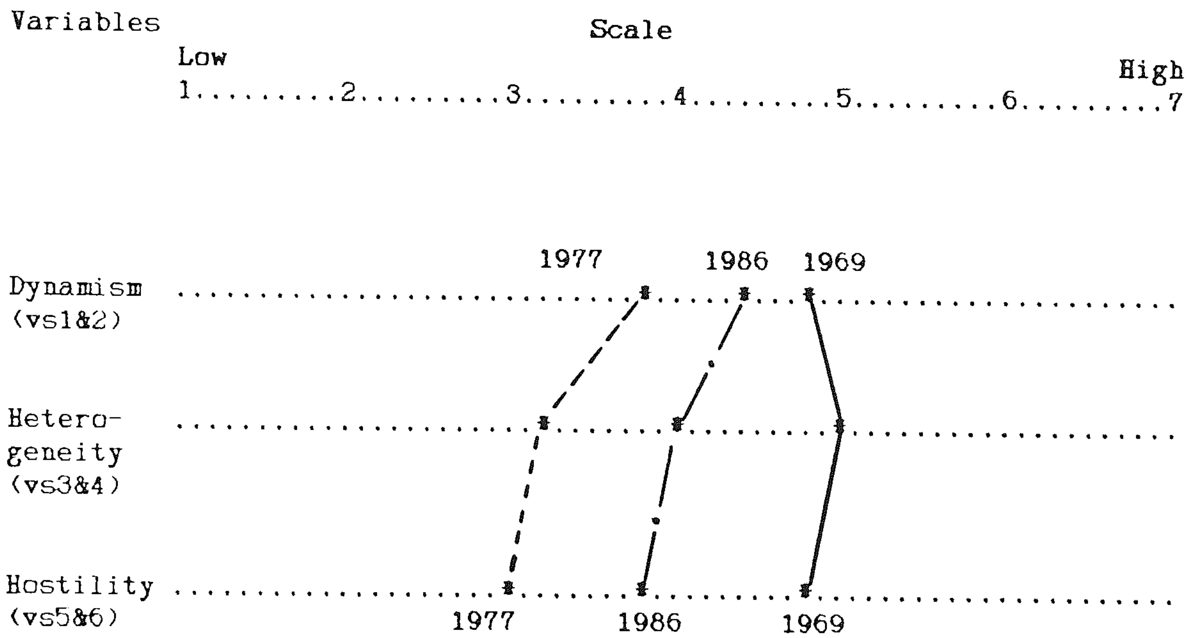
BRINTONS: PERCEIVED ENVIRONMENTAL CHARACTERISTICS SCORES 1969 - 1986

Variables	Period		
	1969	1977	1986
Dynamism (vs1&2)	4.80	3.80	4.40
Heterogeneity (vs3&4)	5.00	3.25	4.00
Hostility (vs5&6)	4.80	3.00	3.83

Source: Interview$_4$

Figure 18

BRINTONS: PERCEIVED ENVIRONMENT CHARACTERISTICS 1969 - 1986



Source: Table 13

The data shows that all three variables characterising the environment changed within the period under review.

Dynamism is concerned with the unpredictability of competitor behaviour, cutomer tastes and technologies. As Table 13 shows, the scores for dynamism changed from its highest score of 4.8 in 1969 to 3.80 in 1977 and to 4.40 in 1986. The historical overview shows that the industry was under severe pressure in 1969 as credit restrictions in the UK inhibited consumer spending and retailers, unable to carry the financial burden of stockholding, relied on manufacturers to hold the necessary stocks to provide a cut-length and fast delivery service. Brintons, geared to trading in full rolls and carpet squares, was forced into new patterns of trading in order to compete. As it became increasingly difficult to obtain the large volume orders which exploited the efficiencies of the company's technical system, contract and special orders became increasingly important and required rapid and frequent production scheduling changes to accommodate the non-standard product lines. The technical and process systems were subject to modernisation as the strongly expanding tufted carpet sector threatened the woven sector which was then forced into price competition with the new product.

Heterogeneity is concerned with the difference in competitive tactics, customer tastes, product lines, etc., across the organisation's respective markets. As Table 13 shows, the scores for this variable changed from a score of 5.0 in 1969 to 3.25 in 1977 and rose again to 4.0 in 1986. This score pattern is reflected in the historical overview which shows the high degree of industry ferment in the 1969 period as high levels of product and production flexibility were required to secure new markets. By 1977, the carpet industry was fighting for survival, many companies closed down and short-time working was widespread. With the advantage of low product prices and a strong worldwide reputation for quality and customer service, Brintons was able to survive better than most of its competitors by continuing to attract, wherever, possible, the advantages of volume orders and the resulting stability of product lines. By 1986, however with the stronger emergence of tufted products, the company was competing not only within the woven sector but also with the tufted sector as even contract markets became susceptible to the improved performance and sytling capability of tufted products.

Hostility is concerned with increasing price competition, severe regulatory restrictions, shortages of labour, raw materials, etc. Table 13 shows that the scores for this variable changed from a high point of 4.8 in 1969 to 3.0 in 1977 and rose again to 3.83 in 1986. These scores are confirmed by the historical overview which shows that hostility was a feature of the industry from 1964 onwards as government measures inhibited consumer spending and pricing restrictions eroded profit margins at a time when over capacity in the woven industry increased price competition. The evidence indicates that hositility was a feature too of export markets, particularly in the volume of markets of the USA, Australia and New Zealand, where duties on imports and currency exchange controls deterred trading for all but the most robust companies. The fact that such duties were not applied to carpet imports into the UK served to undermine the UK industry even further. Increases in raw material prices and periodic shortages of wool and jute encouraged the adoption of synthetic materials which itself became subject to the same price/shortage characterisics as a result of oil price escalation.

In summary, the environment is perceived to be at a high-moderate levels in 1969, falling to low-moderate levels in 1977 and increasing sligbly above the 1977 scores to a moderate level in 1986. For Brintons, the environment as characterised by all three variables is shown to be less dynamic, less heterogeneous and less hostile in 1977 than it was in 1969, and slightly more uncertain in all three characteristics in 1986 than it was in 1977. Throughout the period, the scores for these three variables fall within the boundaries of a moderate score.

Table 14 converts the scores for these three environmental characteristics to correspond with the environmental variables of information complexity and resource scarcity to construct the nine -cell environmental framework presribed by Lawrence & Dyer.

Fig 19 presents the Lawrence & Dyer environmental framework showing the two variables of information complexity and resource scarcity. Each of these two variables is provided with a seven point scale and the scale has been divided to construct a nine-cell environmental framework.

Table 14

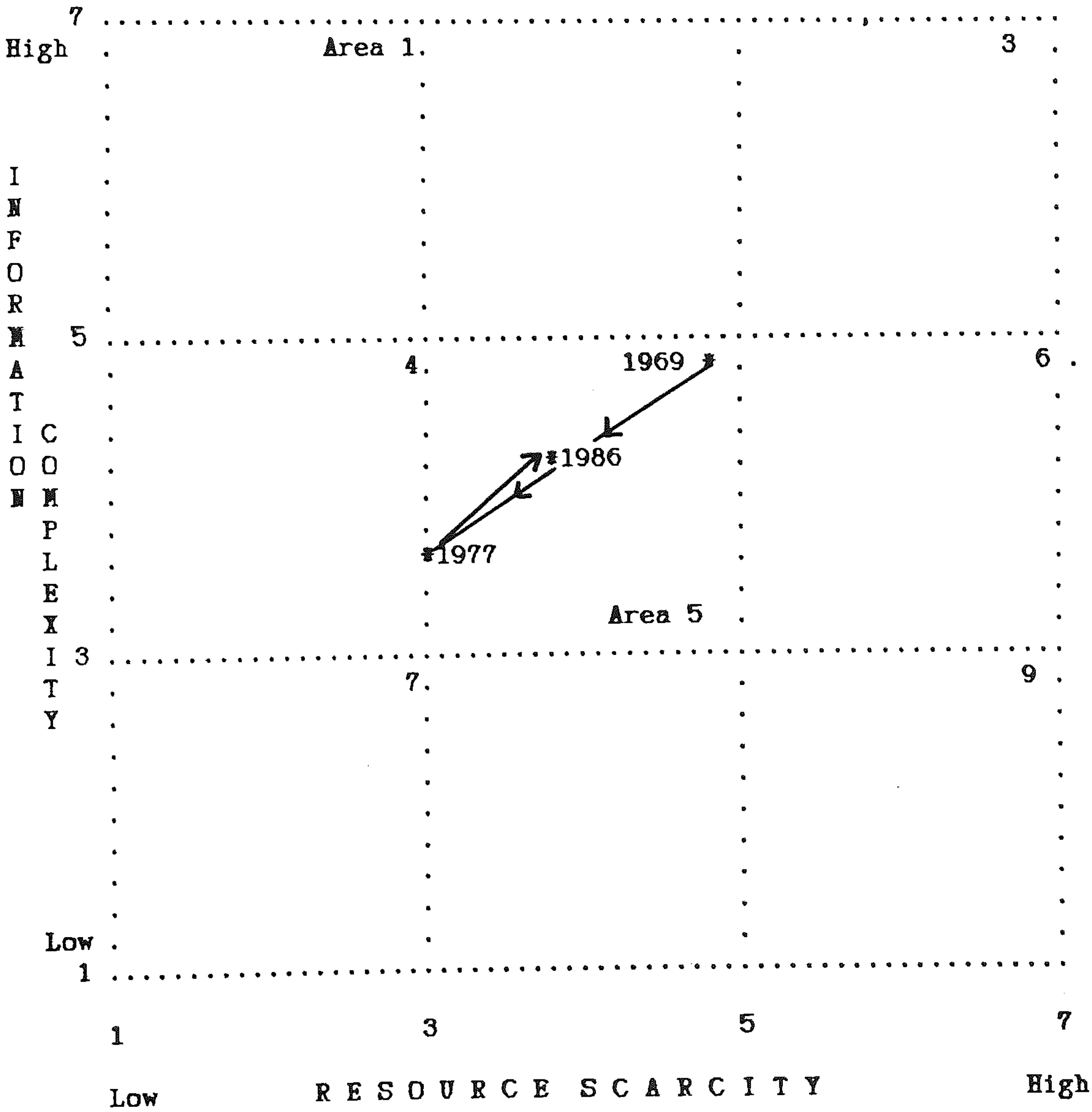
BRINTONS: PERCEIVED ENVIRONMENT SCORES 1969 - 1986: CONVERSION

Variables	Period		
	1969	1977	1986
INFORMATION COMPLEXITY			
=			
Dynamism	4.80	3.80	4.40
+			
Heterogeneity	5.00	3.25	4.00
Total	9.80	7.05	8.40
÷ 2			
Information Complexity =	4.90	3.53	4.20
RESOURCE SCARCITY			
=			
Hostility	4.80	3.00	3.83

Source: Table 13

Figure 19

BRINTONS: PERCEIVED ENVIRONMENT 1969 - 1986



Source: Table 14

The sliding scale from low to high on the vertical axis of the information domain measures the complexity of its variable aspects - dynamism and heterogeneity. As the degree of complexity in these aspects increases, so does the amount of information an organisaion needs to make informed choices in regard to the product and services it provides. Increasing levels of complexity are expected to result in higher levels of organisational differentiation and are also expected to increase the scope for innovation..

The sliding scale from low to high on the horizontal axis of the resource domain measures the degree of difficulty an organisation has in securing the resources it needs to assure successful operations. The resources here are concerned with raw materials, capital, labour, etc., all of which are normally secured in exchange for the goods and services the organisation provides. As resource scarcity increases it is expected that the organisation must increase the mechanisms available for co-ordinating activity if it is to be efficient. This is the process of organisational integration, and integrative mechanisms may take the form of control systems, centralised planning, decentralised liaison staff and task forces.

The Scores in Table 14 provide the co-ordinates which locate the organisation within this nine-cell framework and thus identify the perceived environmental niche occupied by the company at the three points in time.

As Fig 19 shows, the company is perceived to be operating within the intermediate information complexity and the intermediate resource scarcity conditions of Area 5 throughout the period, although its location within this environmental niche changes at all three points in time.

In 1969 the company is shown to be operating in the extreme North-East of the area at the boundaries between Areas 2, 3 and 6. By 1977, there is a shift to the Western mid-point of Area 5 to the boundary with Area 4, and by 1986 the company is occupying an almost central position within Area 5.

The next section identifies the characteristics of the organisation's two main productive units at the same three points in time, and the remaining sections deal with structure and strategy to identify the expected and actual relationship with the environments identified here.

10.3 Printons: Productive Unit Profiles 1969 - 1986

The two main products and their related production systems are described in terms of the seven variables characterising Abernathy's model of a producive unit. (See Chapter 3 for a discussion of these variables).

Profiles are constructed for each of the two main productive units at three points in time - 1969, 1977 and 1986 - to identify the evolving relationship between the product and its related production system with a view to assessing whether this relationship promotes or inhibits efficieny and innovation.

10.3.1 Axminster Productive Unit

Table 15 lists the scores obtained for the seven variables characterising the productive unit at three points in time.

Fig 20 presents a graphic display of the information in Table 15.

The profiles show that in the period under review three variables changed beween 1969 and 1976 and there were no changes between 1976 and 1986. Two of

Table 15

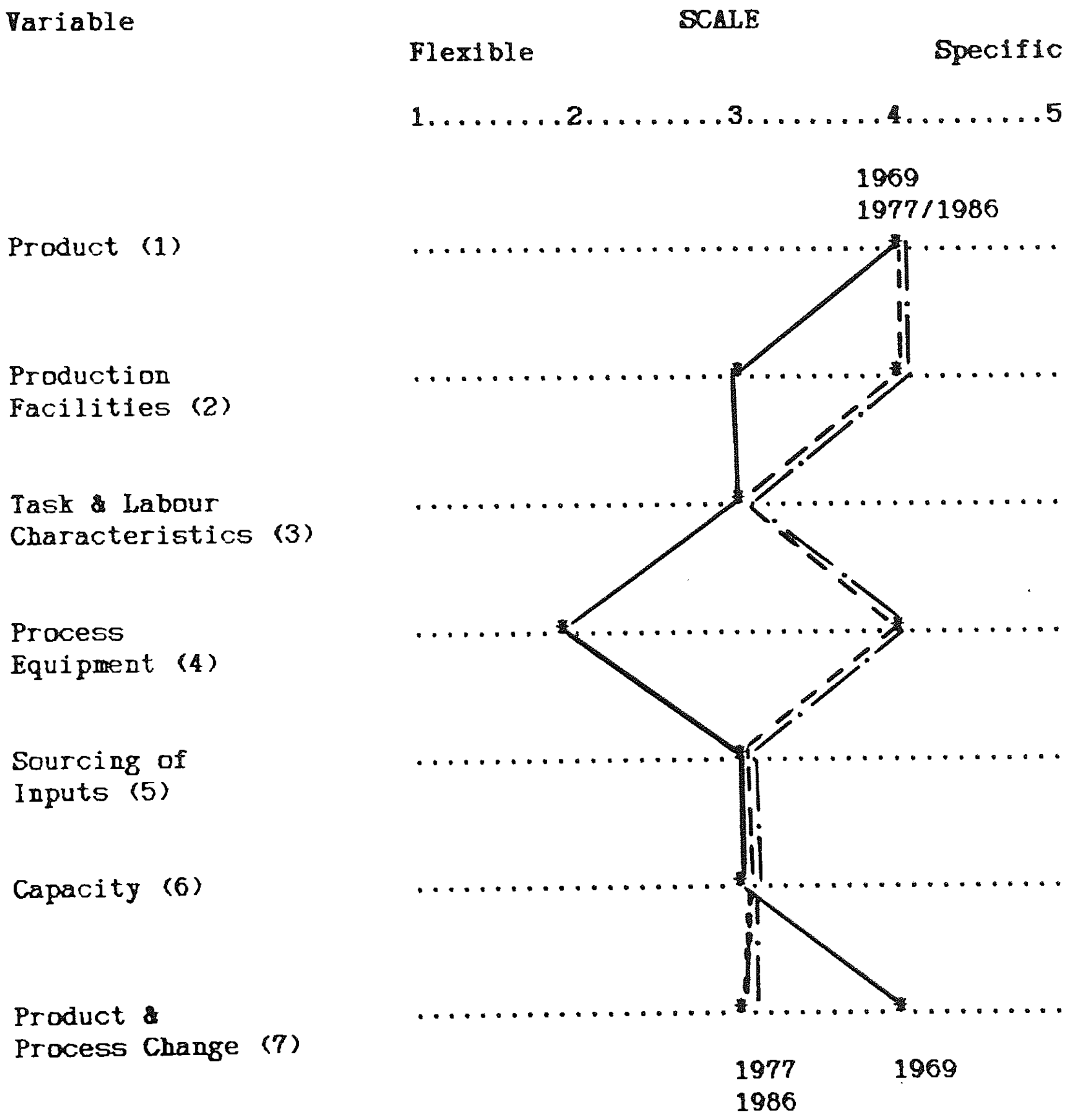
BRINTONS: AXMINSTER PRODUCTIVE UNIT SCORES 1969 - 1986

Variables	Period 1969	1977	1986
Product (1)	4.0	4.0	4.0
Production Facilities (2)	3.0	4.0	4.0
Task & Labour Characteristics (3)	3.0	3.0	3.0
Process Equipment (4)	2.0	4.0	4.0
Sourcing of Inputs (5)	3.0	3.0	3.0
Capacity (6)	3.0	3.0	3.0
Product & Process Change (7)	4.0	3.0	3.0

Source: Interviews

Figure 20

BRINTONS: AXMINSTER PRODUCTIVE UNIT 1969 - 1986



Product:Process Ratio	1969 4:2.80	1977 4:3.00	1986 4:3.00

Source: Table 15

these three changes (ie production facility and process equipment) were in the direction of increasing efficiency. The third characteristic to change (ie type and frequeny of product/process change) reverses the direction of change towards achieving greater flexibility.

The characteristics and behaviour of all seven variables are examined below.

(a) Product

As Fig 20 shows, the product (variable 1) is described as being at Level 4 throughout the period 1969 - 1986. Following Abernathy[10] such a product is highly standardised with options for different markets constituting minor variations.

Chapters 8 and 9 above show that the product specification in terms of the construction of the fabric has remained unchanged since the early 1900s when the 7-pitch specification developed by Cecil Brinton was adopted. The company manufactures on average some five ranges, four of which are standards and one a special, and all are in the upper quality axminster range and are subject to styling changes annually, or more frequently to meet market demand. Although 'new' products were introduced within the period under review the innovations represented by these new products are essentially in terms of raw materials used and finishes. For example, Printons was the first company in the industry to use latex as a backing for axminster carpets; wool and synthetic fibre blends were introduced as pile yarns; polypropylene replaced jute as a weft yarn; and broadloom carpets replaced carpet squares.

Taken together these product innovations may be described as improving the performance of the product (as for example in pile blends and latex backing which provided a more durable product) and/or reducing the cost of the product, (as for example with the use of synthetic fibres as wool prices increased), although in some cases, as with wool and jute, the reliability of the sourcing and quality of these materials have been equally important considerations in their adoption.

In summary, while the product construction has remained constant throughout the period under review indicating a high degree of stability and certainty in this domain, product innovations in the period have been in the form of raw materials which have the effect of improving product performance and/or reducing product cost.

(b) Production Facilities

Fig 20 shows that production facilities (v2) were at Level 3 in 1969 and at Level 4 at 1977 through to 1986. Following Abernathy, at 1969 production facilities represented line-flow arrangements with separate facilities for each standard product and at 1977 changed to closely balanced and commonly paced facilities that are mechanically controlled, and remained in this mode through to 1986.

As Chapter 9.2.2 shows, the production process at 1969 encompasses a number of subordinate and sequential processes served by diverse technologies which operate independently but are subject to scheduling controls to ensure output at each stage is at the predetermined level and standard to optimise efficiency. Although the sequence of production and the number of subordiate processes remained unchanged at 1977 through to 1986, the operating systems and technologies serving these sub-processes were updated to achieve higher efficiencies and higher levels of integration in the throughput of work throughout the processing system. While each stage of the system is mechanically controlled the stages remain independent and such control does not represent a wholly integrated mechanically controlled system. Facilities are commonly paced in terms of scheduling to achieve a balanced flow at all stages and much attention was given to achieving this balance.

(c)Task and Labour Characterisics

Fig 20 shows that task and labour characteristics (v3) remained at Level 3 throughout the period. Following Abernathy[illegible] tasks are typically of short duration requiring minimum skills and training.

The de-skilling of the once highly skilled job of weaver has been documented elsewhere (see, for example, Barlett[illegible], Smith[illegible]. The developments in loom technology which reduced the status of weaver to machine operator had been achieved prior to the period covred in this study. Loom automation multi-loom weaving was introduced in the study period and, as noted, with some opposition from the workforce. The new arrangements mainly affected the numbers employed rather than any change in the skills involved.

While there have been no significant changes to the nature of tasks carried out at the various production stages shown in Fig 16 there has been a significant reduction in the numbers employed at each of the stages to complement the investment in modern equipment, particularly as a result of loom automation and the introduction of multi-loom weaving.

Many employees have a long family association with the company, some spanning several generations. The workforce is recruited generally from the local labour market and labour turnover is low. Shopfloor personnel in this unit are usually members of the Kidderminster-based Power Loom Weavers & Textile Workers Union. Joint Committees at plant level implement and monitor terms and conditions of employment which are negotiated at national level for the industry and supplemented at local level through Joint Committees at plant and district levels.

(d) Process Equipment

Fig 20 shows that process equipment (v4) changed from Level 2 in 1969 to Level 4 in 1977 and remained at this level through to 1980. Following Abernathy[12] this represents a change from process equipment which includes some specially designed equipment for key tasks in 1969 to the integration of special machines at some stations to form islands of automation. As Fig 20 shows, this characteristic registers the highest level of change in the period under review.

The historical overview shows that considerable investment in time and money was made throughout the period in developing and modernising equipment and processes. Although much attention was given between 1959 and 1969 to improving the key area of loom performance in terms of reliability and speed , attention was also directed at achieving improvements at all production stages to complement and exploit the full potential of the advantages in loom performance. For example, changes in the dyeing stages facilitated greater quantities to be processed and computerised colour-matching equipment reduced the potential for error in dye recipes while increasing the flexibility of batch sizes; the amount of yarn on cones was increased to reduce handling; picking tables were modified and conveyor systems introduced to improve efficiency in terms of quality and output.

As the historical overview shows, a significant feature of this company's competitive repertoire is its high engineering capacity which includes the development and construction of all textile equipment. As para (b) above shows the procesing system encompasses a number of sequential sub-processes served by diverse technologies which were updated between 1969 and 1977 to provide independent automated or semi-automated facilities at all but Stages 2, 4 and 7 of the outline production system in Fig 16. At stages 3 and 6 in particular, representing weaving and backing operations, the equipment is highly automated. Stage 2 which is concerned with preparing the loom to translate quality and styling, and Stages 4 and 7 which are concerned with correcting weaving faults, retain a high level of flexibility.

(e) Sourcing of Inputs

As Fig 20 shows, the types of material used and the sources of these materials (v5) are described as being at Level 3 throughout the period and, following Abernathy[16], indicates that the product incorporates materials that are specially designed.

As the historical overview shows, the company has operated a fully integrated spinning capacity since it began making carpets in 1819 when it also supplied yarn to other manufacturers. In the post-war period woollen and worsted yarns were produced only for its own use, although yarns continued to be purchased from external suppliers. From the late 1960s onwards the company invested heavily in modernising the spinning subsidiary at Telford to satisfy all its yarn requirements, including the development of specialised yarns to complement both product development and the production process, particularly to facilitate high-speed weaving. As para (a) above notes, yarn innovation is a major source of product innovation.

Other materials, for example dyestuffs and backing materials, are either supplied to specification, or suppliers working in conjunction with company's own R & D unit develop required materials. For example, the extensive work undertaken in connection with developing the spectrophotometer involved also dye and fibre suppliers.

(f) Production Capacity

Fig 20 shows that production capacity (v6) remained constant at Level 3 throughout the period. Following Abernathy[7] such capacity represents plant which is organised and controlled by product-market considerations and includes the production of most components of the product.

The historical overview shows that plant and equipment is grouped on a product basis and dedicated to particular product lines. Thus in its broadest sense the axminster production capacity is organised to reflect narrow and broadloom weaving and within these two groups subsidiary groups reflect the major product lines.

(g) Patterns of Product and Process Change

Fig 20 demonstrates that this characteristic, contrary to the predicted direction of change, has reverted to a more flexible mode in the period under review. The pattern of product and process change in 1969 is described as being at Level 4 which, following Abernathy[8], indicates that major changes are infrequent athough there may be a higher frequency of minor changes. This pattern changes to Level 3 from 1977 onwards when change becomes more frequent but in essence refines existing products and has the effect of reducing or containing costs.

The historical overview confirms this pattern of change even when, for example, a product innovation representing an industry first (eg latex backing) did not involve changing the basic construction of the cloth. Similarly the thrust of both technological and process innovation has been aimed at achieving higher levels of efficiency and / or enhancing the quality and reliability of the basic product. The company's high volume processing system geared to the production of full rolls and carpet squares was re-equipped and re-designed to achieve more efficient flexibility in producing broadloom carpets to provide cut-length services and cope with the uncertain batch sizes in this form of trading, including the smaller orders in the contracts sector. Having achieved this level of flexibility, the historical overview confirms that new products were developed more frequently in the post-1969 period as the company sought to stimulate demand.

In summary, the axminster productive unit profiles reveal a highly standardised product at Level 4 throughout the period, with options for different markets constituting only minor variations. The product at 1969 was serviced by a production system which operated at Levels 2 and 3 giving a product:system ratio of 4:2.8 indicating an overall balance between efficiency and innovative capabilities.

At 1977 through to 1986 production facilities and process equipment progressed to the same level of development as the product at Level 4, indicating that the technological efficiencies to be gained from this level of product standardisation were exploited, as revealed in the revised product:system ratio of 4:3.40. The characteristics describing the deployment of the product and its technological system (ie Vs 3,5 & 6) remain at the Level 3 mid-point of the scale, indicating that efficiency gains arising from the progression of these characteristics have been off-set against the capacity of these characteristics to sustain innovative activity.

This efficiency-flexibility relationship is confirmed in the characteristic describing the pattern of product and process changes which indicates that the modernisation and re-equipment programme achieved high machine and system efficiencies while enhancing the capability to incorporate those incremental innovations that achieve competitive recognition.

10.3.2 Wilton Productive Unit

Table 16 lists the scores obtained for the seven variables characterising the productive unit at three points in time.

Fig 21 presents a graphic display of the information in Table 16.

As the profiles show, of the seven variables characterising the productive unit, two remained constant throughout the period; five variables changed between 1969 and 1976, and all variables remained constant between 1976 and 1986.

The characterisics and behaviour of all seven variables are examined below.

(a) Product

As Fig 21 shows, the product (v1) in 1969 is described as being at Level 4 which, following Abernathy, describes a product that is highly standardised with options for different market segments constituting minor variations. From 1976 through to 1986 the product is described as being at Level 5 which, following Abernathy, is a standardised product with only incremental changes from year to year.

Table 16

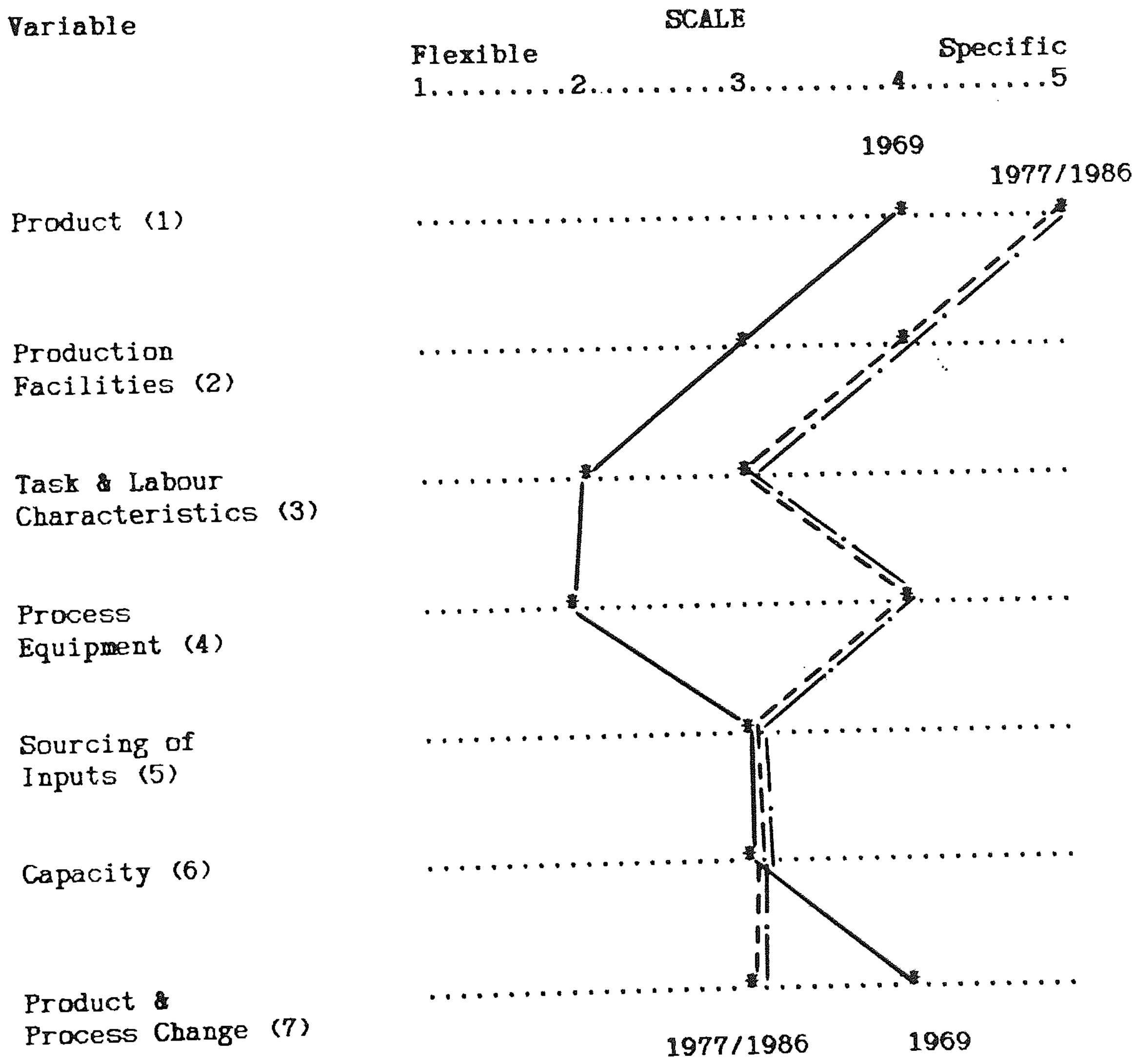
BRINTONS: WILTON PRODUCTIVE UNIT SCORES 1969 - 1986

	Period		
Variables	1969	1977	1986
Product (1)	4.0	5.0	5.0
Production Facilities (2)	3.0	4.0	4.0
Task & Labour Characteristics (3)	2.0	3.0	3.0
Process Equipment (4)	2.0	4.0	4.0
Sourcing of Inputs (5)	3.0	3.0	3.0
Capacity (6)	3.0	3.0	3.0
Product & Process Change (7)	4.0	3.0	3.0

Source: Interviews

Figure 21

BRINTONS: WILTON PRODUCTIVE UNIT 1969 - 1986



	1969	1977	1986
Product:Process Ratio	4:2.60	5:3.40	5:3.40

Source: Table 16

As Chapters 8 and 9.2.3 have shown, the wilton productive unit is the older of the two productive units and by the 19th century Brintons had established a world-wide reputation for the excellence of its wilton products and the efficiency of its manufacturing system.

In the post-World War II period the company manufactured four standard ranges of wilton carpets and one special range in some four different pitches up to 10-pitch. By the early 1950s the product was being manufactured mainly to special order and by the early 1960s the large specialised orders for hotels etc., in the contracts sector became the main outlet for wilton products. The product was standardised at an 8-pitch wilton in the late 1960s in which some four standard lines are manufactured. Styling changes are made annually or at whatever frequency the market requires.

Product innovations have been mainly in the form of yarn and dye innovations which enhance product performance, and in process changes which produce pile-length variations to give a sculptured surface effect. These innovations have not, however, altered the basic construction of the carpet weave.

The transition from Level 4 to Level 5 then reflects the reduction in the range of pitches to give a standardised 8-pitch product.

(b) Production Facilities

Fig 21 shows that production facilities (v2) are described as being at Level 3 in 1969 which, following Abernathy[illegible], describes typically line-flow arrangements with separate production facilities for each standard product. From 1976 through to 1986 the facilities are described as being a Level 4 which, following Abernathy[illegible]. refers to closely balanced, commonly paced facilities that are mechanically controlled.

As Chapter 9.2.3 has shown, the wilton production process at 1969 encompasses a number of subordinate and sequential processes served by diverse technologies which operate independently but are subject to scheduling controls to ensure output at each stage is at predetermined levels and standards.

Alhough this sequence of production and the number of sub-processes involved remained unchanged throughout the period, the operating systems and technologies servicing these sub-processes were updated to achieve higher efficiencies and higher levels of integration in the throughput of work throughout the processing system. While each stage of the system is mechanically controlled the stages remain independent and such control does not represent a wholly integrated mechanically controlled system. Facilities are commonly paced in terms of scheduling to achieve a balanced flow at all stages and much attention was given to achieving this balance.

(c) Task and Labour Characteristics

Fig 21 shows that task and labour characteristics (v3) in 1969 are described as being at Level 2 which, following Abernathy[24], represents long task durations requiring semi-skilled workers and some training on the job. From 1976 through to 1986 task and labour characteristics are described as being at Level 3 which, following Abernathy[25], describes short task durations requiring minimum operating skills and minimum training on the job.

The de-skilling of the once highly skilled job of wilton weaver has been documented elsewhere - see for example Bartlett[26], Smith[27]. Although classified as a machine operative well before the period covered by this study, in practice wilton weaving retains its status position in the job hierarchy and continues to be a source of friction in achieving labour mobility.

As Chapter 9.2.3 has shown, investment in new technology and new processes improved efficiencies at all stages of manufacture and significant labour savings were achieved throughout, but most significantly through loom innovations where, for example, automated looms and multi-loom weaving reduced not only both the number of weavers and the level of skills required, but also reduced the number of workers employed in carpet mending as more reliable loom peformances were achieved. As the historical overview shows, technological and process changes, and loom innovations in particular, faced considerable opposition, including strike action.

Many employees have a long family association with the company, some spanning several generations, and labour turnover is low. Shop-floor personnel are generally recruited from the local labour market and are usually members of the Kidderminster-based Power Loom Weavers and Textile Workers Union which negotiates terms and conditions of employment at industry level. Joint Committees at District and Plant level implement and monitor national agreements, and Plant committees also negotiate supplementary agreements.

(d) Process Equipment

Fig 21 shows that process eqipment (v4) is described as being at Level 2 in 1969 and progressed to Level 4 in 1976 and in 1986. Following Abernathy[28]. in 1969 such equipment constitutes some specially designed equipment for key tasks, and by 1976 special machines at some stations are integrated to form islands of automation.

As noted in Chapters 8 and 9, the company has a long-established reputation dating back to he 19th century for the quality and efficiency of its wilton operations arising out of its equally long-standing reputation for loom development and loom-building expertise. The historical overview shows that from 1966 onwards a development programme was aimed at gaining efficiencies at all stages of production although most significantly in the weaving process itself with the Mark VIII and Mark XI looms. These looms innovations were designed to achieve significantly higher running speeds and incorporated various automatic controls and monitors to give higher levels of reliability and thereby improve product quality and material and labour efficiencies. As part of the drive to improve performance looms were standardised to 8-pitch and ancillary operations were re-equipped and more keenly balanced throughout the production sequence.

(e) Sourcing of Inputs

Fig 21 shows that sourcing of inputs (v5) is described as being at Level 3 throughout the period 1969 - 1986. Following Abernathy[29], at this level input materials are specially designed and include components and product development services by suppliers.

The historical overview shows that the company operated an integrated yarn supply facility from its founding in 1819. Although the family business initially supplied yarn to both the cloth and carpet weaving industries of Kidderminster, in the period under review the company's wholly owned subsidiary company at Telford in Shropshire spins woollen and worsted yarns for the company's own use only, although some yarns were purchased from outside suppliers throughout this period.

In addition to playing a leading role in the development of synthetic fibres and blends for the carpet industry, the company has, in collaboration with its major raw material suppliers, developed various raw materials (eg dyes and backing compounds) many of which are supplied to the company's own specification.

A £9m investment programme commenced in the late 1970s to modernise and extend the spinning subsidiary with a view to generating sufficient output to satisfy all the company's yarn requirements, including the development of specialised yarns to complement both product development and the production process, particularly to facilitate high-speed weaving.

(f) Production Capacity

Fig 21 shows that production capacity (v6) is described as being at Level 3 throughout the period under review. Following Abernathy... production capacity at this level represents plant that is organised and controlled by product/market considerations and includes the production of most components of the product.

Chapters 8 and 9 have shown that the company has from its founding period undertaken production of all components of the product. The plant is organised to reflect the typically smaller batch sizes constituting the market for wilton products. The Level 3 score, representing the mid-point of the range between high flexibility and high specificity thus reflects the need for flexibility in responding to these uncertain markets while at the same time ensuring appropriate levels of efficiency are achieved.

(g) Patterns of Product and Process Change

Fig 21 shows that in 1969 product and process changes (v7) were described as being at Level 4 in 1969 and at Level 3 at 1976 through to 1986. Following Abernathy[31], the pattern of change at 1969 is characterised by long periods between major product changes although there may be more frequent minor changes. At 1976 the pattern of change reverts to a more flexible mode in which there are frequent changes which in essence refine existing products and have the effect of reducing/containing costs.

Chapter 9.2.3 shows that a new all wool product was launched in 1960 which incorporated hard twist yarn to achieve a novel carved leaf effect and that there was little product development in wilton until the early 1970s when with the new generation of wilton looms the very succesful 'Bell' product series was launched, with Bell Celeste winning the Carpet Review Design Prize in 1972.

The main thrust of changes between 1969 and 1976 were process and equipment changes aimed at increasing the level of efficiency in achieving operational flexibility.

In summary, the wilton profile at 1969 shows a highly standardised product which is marginally differentiated to service a number of different markets. The product is served by a processing system which in terms of raw materials and capacity has been progressed to the same level of product standardisation indicating that the efficiencies to be gained from this level of standardisation have been fully exploited in respect of these two characteristics. Production facilities, task and labour characteristics and process equipment are all operating at lower levels of specificity indicating that these characteristics retain the ability to make a contribution to further innovation.

The product:process ratio at 4:2.60 indicates that the overall relationship between the product and its processing system has not been fully exploited and the system thus retains the capacity to make innovative product and process responses.

At 1976 through to 1986 the profile reveals a product which has been progressed to the highest level of standardisation (Level 5) and is serviced by process equipment and a production facility which are highly specific at Level 4. The 5: 4 relationship between the product and its technological sysem is thus highly specific, although clearly further efficiencies are theoretically possible to achieve a 5:5 relationship.

Task and Labour characteristics together with sourcing of inputs are at an intermediate level (Level 3) indicating that potential efficiencies have not been fully exploited. As para 10.3.2(a) shows, yarn and other raw materials constitute a major source of product innovation and the profile score here indicates that the capacity to accommodate such changes has been offset against possible efficiency gains from achieving a higher level of specificity in this characteristic. Similarly, task and labour characteristics have also not been fully exploited to give the highest levels of efficiency afforded by the level of product standardisation.

The overall production capacity at Level 3 is at an intermediate level indicating that while the highest possible levels of efficiency have not been achieved, the capacity to accommodate product - process innovations has not been jeopardised. The reversal in the score from Level 4 to Level 3 for the pattern of product and process changes indicates that refinements in technology and processes have been aimed at achieving such flexibility at higher levels of efficiency. These efficiency - flexibility adjustments are reflected in the revised product:process ratio at 5:3.40 which shows that although the overall system has been progressed to a more specific state over the 1969 position, the scope for flexibiliy has been retained. The profile demonstrates that high levels of efficiency have been directed at those aspects of the product and its related poduction system that are not directly concerned with securing product differentiation (Vs 1, 2 and 4), while those characteristics that contribute dirrectly to incremental product innovation (vs 3 and 5) are at an intermediate level and reflect a compromise between efficiency and flexibility.

10.4. Brintons: Organisation structure 1969 -1986

10.4.1 Introduction

Organisation structure is described in terms of the twelve variables selected by Miller and Friesen. See Chapter 3 for a discussion of these variables.

Table 17 lists the scores obtained for each of the variables at three points in time - 1969, 1976 and 1986.

Figure 22 presents a graphic display of the information contained in Table 17. As Fig 22 shows, the structural configuration remained highly stable throughout the period with only three variables showing any significant levels of change (ie one degree or more) in the period 1969 - 1986.

10.4.2 Struture profiles 1969 - 1986

10.4.2.(i) Environment and expected structure

As Fig 19 shows, the co-ordinates in Table 14 locate the organisation in Area 5 of the nine-cell framework throughout the period 1969 - 1986,

Table 17

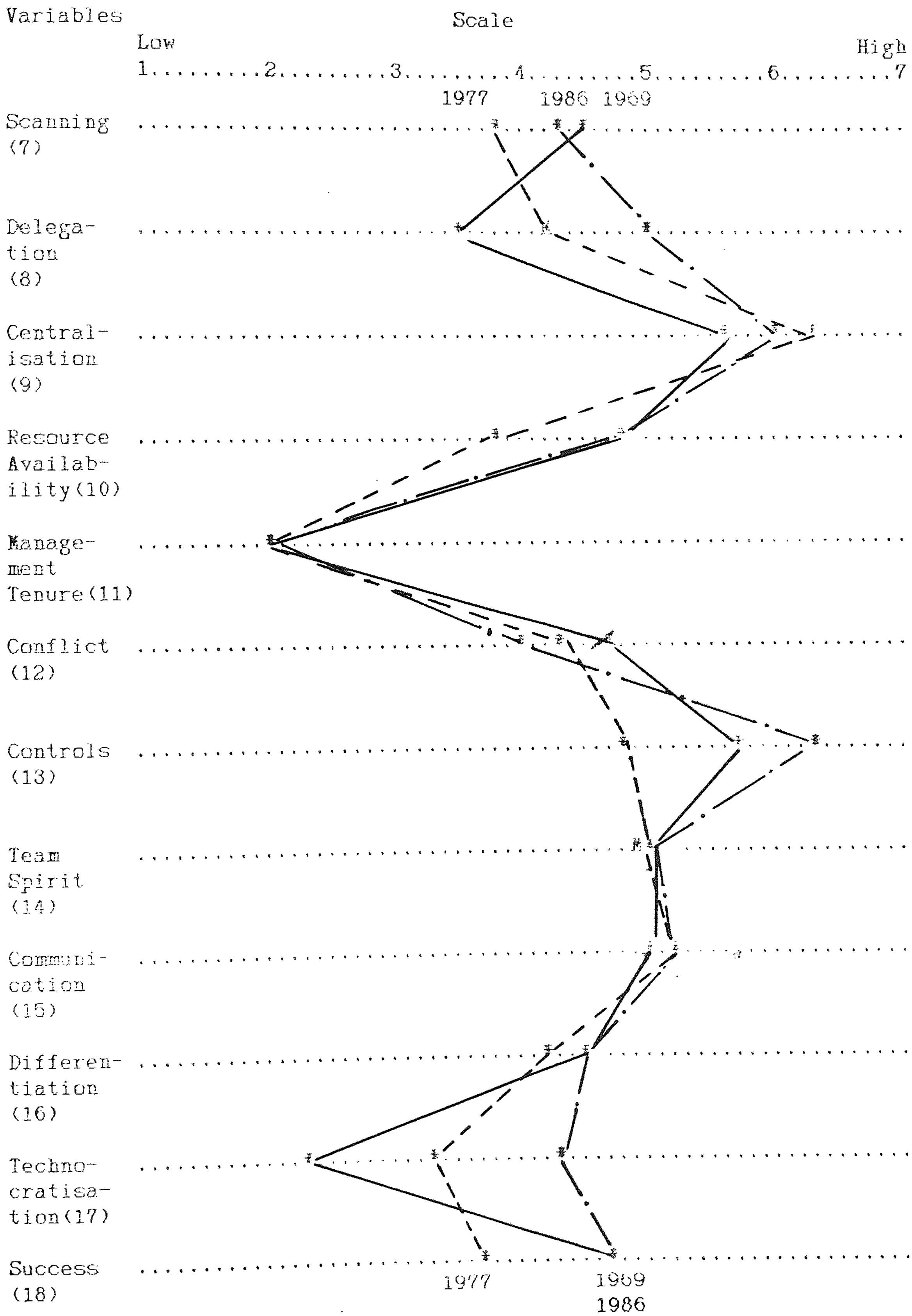
BRINTONS: ORGANISATION STRUCTURE SCORES 1969 - 1986

Variables ( )	Period 1969	1977	1986
Scanning (7)	4.50	3.75	4.25
Delegation (8)	3.50	*	5.00
Centralisation (9)	5.60	6.30	6.00
Resource Availability (10)	4.75	3.75	4.75
Tenure (11)	2.00	2.00	2.00
Conflict (12)	4.70	4.25	4.00
Controls (13)	5.70	4.80	6.33
Team Spirit (14)	5.00	*	5.00
Communication (15)	5.00	5.25	5.25
Differentiation (16)	4.50	4.20	4.50
Technocratisation (17)	2.30	3.30	4.30
Success (18)	4.70	3.70	4.70

* data missing

Source: Interviews

BRINTONS: ORGANISATION STRUCTURE 1969 - 1986 Figure 22



Source: Table 17 M=Score Missing

although the organisation's position within Area 5 itself changed at each of the three points in time.

Lawrence & Dyer[34] focus special attention on Area 5 where the intermediate levels of IC and RS are claimed to provide the conditions most likely to foster readaptation. Lawrence & Dyer claim[35] that a Readaptive organisation form is required in Area 5 and that such a form is expected to show high differentiation and high integration, a power system which is balanced in both vertical and horizontal dimensions and HRPs which through balanced market, bureaucratic and clan mechanisms achieve a high level of employee involvement.

10.4.2.(ii) structure profiles 1969 - 1986

As Fig 22 shows, of the twelve variables characterising structure three variables showed significant levels of change (ie one degree or more) in the period 1969 - 1986, the remaining nine variables remained constant or showed only minor levels of change.

The nine variables remaining constant or showing only minor levels of change are

Scanning (v7)

Success (v8)

Centralisation (v9)

Resource Availability (v10)

Tenure (v11)

Conflict (v12)

Team Spirit (v14)

Communication (v15)

Differentiation (v16)

The score for scanning (v7) varies from 3.75 to 4.50 and at this level of variation (0.75) is taken to be constant at the moderate level throughout the period. The historical overview confirms that the company was aware of developments in the external environment particularly with regard to technology, raw material and markets which were monitored through the active participation of senior executives in the activities of their respective disciplines at national and international levels through, for example, membership of the Federation of British Carpet Manufacturers, the Confederation of British Industry and various professional bodies.

The centralisation score (v9) varies from 5.6 to 6.3 and at this level of variation (.70) is taken to be constant throughout the period. Fig 22 demonstrates that centralisation (and controls v13) represents the highest score in the profile. The historical overview indicates that the company is family-owned and managed by a small team of director-managers, including members of the owning family, who are responsible for the major functions. Strategic and executive decision-making is thus contained largely within the same management group although clearly other managers and supervisors do influence decision-making and in certain defined areas had substantial delegated authority. For example, complete responsibility for the loom development programme in the 1960s was delegated to Mr H Lowe who was at that time manager of R & D.

The variable characterising conflict (v12) has score values varying from 4.0 to 4.70 and at this level of variation (.70) is taken to be constant. The scores all fall within the intermediae level throughout the period. The historical overview has shown that conflict between the various units, particularly in the highly volatile conditions requiring scheduling of both contract and standard products, was often an issue between sales and production areas. Efficiency issues affecting manpower, particularly for example the loom devlopment programme and manning flexibility led to considerable tension between management and the workforce resulting in high levels of absenteeism and strike action.

Communication (v15) and Team Spirit (v14) both record high-moderate scores throughout the period. The historical overview shows that support for developing team spirit and communication was given a high priority throughout the period. For example, much emphasis was given to keeping employees informed of company and industry issues through quarterly reports and discussion with the Works Council and securing individual involvement through a number of satellite committees and special programmes. The Beacon highlighted department and job profiles with a view to demonstrating their role and contribution to the company as a whole, and individual and departmental achievements were given publicity. The team-building programme was strengthened by the promotion from within policy which demonstrated some conspicuous successes, most notably the career of Mr T Tolley who started with the company as an Office Junior in the General Office and was appointed to the board in 1955 and Managing Director in 1966. The team spirit and communication profile is further strengthened by the high incidence of long service employees at all levels in the organisation where, in addition to the high visibility and continuity of the owning family, many employees have long-established family associations with the company spanning several generations and spanning several levels of the hierarchical structure.

Differentiation (v16) with a score of 4.5 throughout the period is at a high-moderate level and is consistent with the historical overview which shows that the company has a long-established functionaly separated structure. Respondents reported that the functions operate as individual units which are co-ordinated at the topmost level and through well defined operating standards.

The score for managment tenure (v11) at 2.0 remained constant throughout the period. The historical overview shows that managment succession and continuity were major considerations in senior managment and board appointments. The characteristic is concerned with the continuity in the topmost position in the organisation which in this company is always reserved for a member of the Brinton family. In the period under review two members of the family, Sir Tatton Brinton and his son, Topham Brinton, held his position from 1968 - 1980 and 1981 to current, respectively. It was reported that the appointment of family members to the company is strictly controlled to give balance between family and non-family members on the board while maintaining the continuity of the family in the position of Chairman.

The profile at 1969 shows centralisation (v9) at a high level, delegation (v8) at a moderate level and Technocratisation (v17) at a low level. Taken together these scores indicate a moderate diffusion of power in the vertical dimension and a low diffusion of power in the horizontal dimension so that the overall distribution is skewed in favour of top management. Differentiation (v16) is at a high-moderate level and integration (v13) is high. Team spirit (v14) is at a high-moderate level indicating that HRPs in terms of clan, market and bureaucratic mechanisms are all at a level sufficient to secure employee involvement.

Lawrence & Dyer[illegible] associate Area 5 with a Readaptive oganisation form in which differentiation and integration are high, power is equally distributed in both vertical and horizontal dimensions, and employee involvement is high. With the exception of power, the structure at 1969 identifies these characteristics at high or high-moderate levels. Lawrence & Dyer[illegible] indicate that in the short term power distribution may be skewed in one or both dimensions to reflect particular contingencies. Following Lawence & Dyer[illegible] it is thus reasonable to conclude that given the small team of director-managers and the particularly hostile conditions in 1969 when although market share improved profitability declined, that the vertical distribution of power was perceived to be fairly skewed in favour of top management. Similarly, the imbalance in the horizontal dimension may be attributed to the high profile and political status accorded to the R&D Department at a time when technical expertise was fundamental to the success of the company.

The findings here then support Lawrence & Dyer's[40] claim that Area 5 is associated with a Readaptive organisation form. The structure at 1969 reflects a skewed distribution of power and following Lawrence & Dyer[40] it is noted that such an imbalance may be supported only in the short term.

As previously noted only three variables show significant changes between 1969 and 1986. These three variables are

Delegation (v8)
Controls (v13)
Technocratisation (v17)

As the profiles for 1977 and 1986 show, delegation (v8) and Technocratisation (v17) scores increased to high-moderate and moderate levels respectively. The adjustment in these two variables has the effect of increasing the level of power distribution in both vertical and horizontal dimensions, so that at 1986 with centralisation (v9) at a high level, power is more evenly distributed although the horizontal diffusion remains below the ideal level. At 1986 the profile shows differentiation (v16) at a high-moderate level, integration (v13) at a high level, team spirit (v14) at a high level and a more evenly balanced power system and the profile is thus consistent with the Readaptive form.

The findings here demonstrate a Readaptive organisation form in 1969 when it was noted that the power distribution was skewed in both vertical and horizontal dimensions. It was noted that only three variables changed significantly in the period under review and that the changes in these three variables had the effect of adjusting the power balance to give a more even distribution of power although at 1986 it remained relatively skewed in the horizontal dimension.

The findings then support Lawrence & Dyer's[41] claim that Area 5 is associated with a Readaptive organisation form. Lawrence & Dyer[41] claim that it is extremely difficult for organisations to remain in Area 5 for any length of time. It is significant then to note that Brintons has remained in this area for a least seventeen years and in this period the only significant structural change has been in the distribution of power.

10.5 Brintons: Organisation Strategy

10.5.1 Introduction

Following Miller & Friesen[43] strategy-making represents the behavioural repertoire the organisation adopts to enable it to cope with its environment.

The strategy-making process is described in terms of the eleven characteristics idenified by Miller & Friesen[44] and has been discussed in Chapter 3.

Table 18 lists the scores obtained[45] for these eleven characteristics at three points in time - 1969, 1976 and 1986.

Fig 23 presents a graphic representation of the information in Table 18.

Table 18

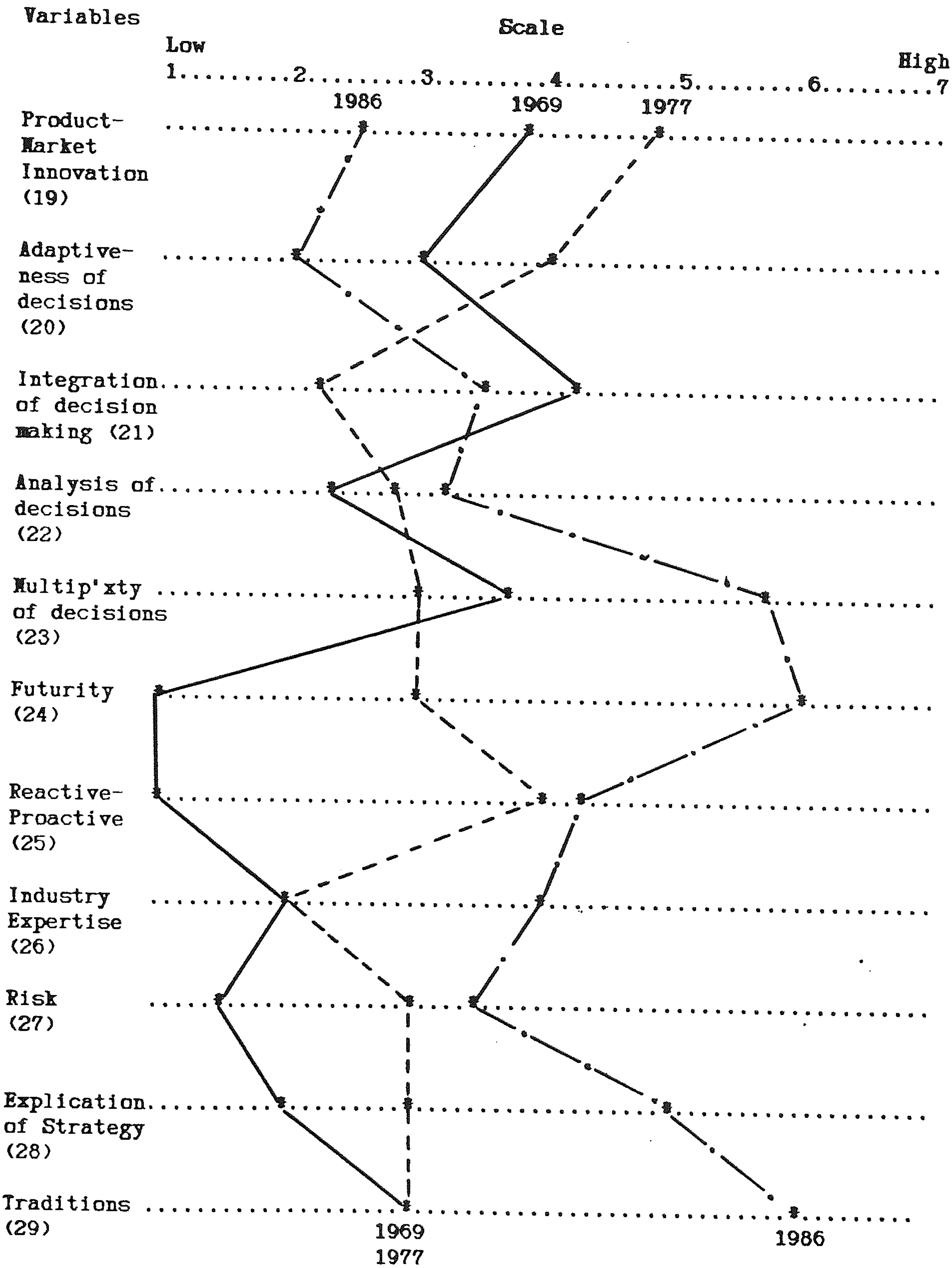
BRINTONS: ORGANISATION STRATEGY SCORES 1969 - 1986

Variables ( )	Period 1969	1977	1986
Innovation (19)	3.80	4.75	2.50
Adaptiveness of Decision making (20)	3.00	4.00	2.00
Integration of Decision making (21)	4.20	2.20	3.50
Analysis of Decisions (22)	2.30	2.80	3.20
Multiplexity of Decisions (23)	3.70	3.00	5.70
Futurity (24)	1.00	3.00	6.00
Reactive/Proactive (25)	1.00	4.00	4.30
Industry Expertise (26)	2.00	2.00	4.00
Risk Taking (27)	1.50	3.00	3.50
Explication of Strategy (28)	2.00	3.00	5.00
Traditions (29)	3.00	3.00	6.00

Source: Interviews

BRINTONS: ORGANISATION STRATEGY 1969 - 1986

Figure 23



Source: Table 18

10.5.2 Strategy profiles 1969 - 1986

As Fig 23 shows, all eleven variables characterising the strategy-making process show significant levels of change in the period under review.

10.5.2.(i) Strategy profile in 1969

The profile in 1969 indicates a moderate level of innovativeness (v19) in terms of the novelty of new products/services and new markets entered. Responsiveness to the external environment (v20) in terms of adaptiveness to competitor behaviour, customer buying habits, etc., is also shown to be at a moderate level. The moderate score for the complementarity of decision-making (v21) indicates measures were taken to ensure that decisions in one area were not in conflict with decisions elsewhere. The low score for the analysis of decision-making (v22), however, indicates that problems and alternative solutions were not subjected to much reflective thought and deliberation. Top managers did, however, give a moderate level of attention to addressing a broad range of factors in reaching decisions (v23) but, as indicated by the low score for Futurity (v24), such decisions were not in the main concerned with addressing long-term srategic issues with the result that the organisation is shown to be responding to rather than taking a lead in shaping the environment (v26). Top managers are shown to have a low level of familiarity with the detailed nature of products, markets and environmental issues (v26) and these top managers are risk-averse (v27) and do not have clear strategic goals and plans (v28). The organisation is shown to be shaping its response in terms of past traditions rather than in terms of consciously addressed contemporary strategies (v29).

This configuration indicates that while decision-making was integrated and addressed internal departmental requirements (vs 21 and 23) it did not take any great account of wider environmenal issues (v20) and, in the absence of any great exposure to analysis (v22), innovative responses (v19), although at a moderate level, were not so much as a result of identified market needs but more as a result of deploying scanning (v7) activities to exploit existing capabilities and/or adopting already established competitor responses. Such a reactive response (v25) is in line with the low risk (v27), low explication of strategy (v28) and low industry expertise (v26) scores, indicating that the organisation relies heavily on established traditions (v29), in this case its well-established high technological capability and market credibility, in exploiting an overall approach of 'anything you can do we can do better'.

This approach is demonstrated in the company's response to environmental changes at this time. As the historical overview shows, at 1969 the companys long-established recipes for successful operation were threatened by the tufted sector and by changes in both customer and consumer behaviour. The high quality - low cost product strategy which had emerged by 1896 and was refined in the 1930s and reaffirmed in the post-war period, depended on volume markets and high operating efficiencies and quality control systems geared to manufacturing carpet squares and full rolls. As noted, these recipes were highly successful in the woven sector until 1964 when efficiencies were threatened by changes in both consumer and customer behaviour when consumer preference for fitted carpets together with retailer preference for cut-length services resulted in less certain production requirements and the burden of financing stocks normally held by the retailer. The company focused its considerable technological capability in developing and building high-speed looms and complemented these developments with investment in updating and extending supporting systems to achieve efficient flexibility in accommodating these changes in consumer and customer behaviour. By this time developments in tufting technology directly threatened both axminster and wilton products and the company again resolved to meet this challenge by technological development to achieve higher efficiencies.

The configuration identifies a planning decision-making mode which Mintzberg[46] associates with an organisation in which the power-system is hierarchical, goals can be operationalised and the environment is controlled and relatively stable and predictable. The planning mode is, above all, characterised by the attention given to the integration of decisions and where efficiency and growth are primary goals of the organisation. The evidence in this case study supports this characterisation of the organisation at this period when efficiency and maintaining market share were primary considerations.

The entrepreneurial solution indicates a Defender strategy. Thus following Miles & Snow[47], the company elected to operate in the woven sector of the carpet industry and within this sector elected to pursue the high quality volume orders which exploited the highly efficient production system to give a considerable price advantage. As Miles & Snow[48] show, technical efficiency is central to the Defender's success since its domain is deliberately created to absorb outputs on a predictable basis. The evidence in this case study shows how the company equipped to operate effectively on the basis of full rolls and carpet squares, used its technical and administrative expertise to redesign looms and operating systems to operate an efficient cut-length service and, at the same time, to achieve efficient levels of operational flexibility to compete in the potentially less efficient smaller - order markets. including contracts. As the historical overview shows, Brintons' technical efficiency is pursued in typical Defender behaviour through vertical integration to include yarn spinning and loom development and construction capacities.

Lawrence & Dyer[44] associate Area 5 with a distinctive Readaptive strategy which they claim is similar to an Analyser strategy in that both efficiency and innovation are emphasised, but at high levels. Actual differences between the Analyser and Readaptive strategies are not, however, identified. This case study indicates Brintons is operating a Defender strategy at 1969 in which efficiency has a high profile. The findings here then do not confirm Lawrence & Dyer's expected Area 5 and Readaptive strategy outcome. It is noted, however, that the Defender strategy is consistent with the adjacent Area 6 conditions and that the organisation is operating near to the boundary of Area 6 at this time.

10.5.2.(ii) Strategy profile at 1977

As Fig 23 reveals, with the exception of industry expertise (v26) and traditions (v29), all the remaining variables changed in the period between 1969 and 1977, although two of these variables - analysis of decision-making (v27) and multiplexity of decisions (v23) - show minor levels of increase and decrease respectively and may be regarded as constant.

The profile shows that by 1977 Brintons was more innovative in terms of product-market innovation (v19) and the adaptiveness of decisions to take account of external issues (v 20), the scores for both variables increasing to a high-moderate level. As this responsiveness to the environment increased, however, the attention given to achieving intra-organisational complementarity decreased (v21) with the score falling to a low value. The marginal changes in variables 22 and 23 indicate that problems and alternative solutions were still not subjected to any great level of analysis and reflective thought (v22), although decisions-making continued to address a broad range of factors (v23). There is a significant change in the degree to which decision-making is concerned with longer-term issues (v24) with the score increasing from very low to a moderate-high level, and there is a similar level of change as the organisation becomes more proactive (v25). While top managers are still perceived to have a low level of industry expertise (v26), there is a greater degree of willingness to take risks (v27) with the score increasing from a low to a moderate level. The score value for explicating strategy (v28) still falls within the low levels, and the unchanged score for traditions (v29) indicates that the organisation still relies on established routines in formulating responses.

The significant shift in the variables characterising complementarity of decision-making (v21), futurity (v24), the higher degree of proactiveness (v25) and greater propensity for risk-taking (v27) are all in line with the relaxing of controls (v13) and with the historical overview which shows that in this period of high uncertainty for the woven industry, Brintons was successful in securing orders which in value terms often surpassed its own previous performance records and achieved higher levels of operational flexibility in adjusting to new smaller markets, particularly in accommodating the highly lucrative special contract orders in the American markets, and in developing special products for new markets. Sales were aggressively pursued and qualities and designs were manufactured in smaller batch sizes requiring high levels of flexibility in production scheduling and co-operation throughout the organisation to satisfy the often short delivery dates.

Following Mintzberg, the strategy-making profile indicates an entrepreneurial strategy mode which is characterised by the active search for new opportunities and by large and bold responses to these opportunities. These characteristics are supported by the historical overview which reveals Brintons unique record in this difficult industry environment of maintaining turnover with their high quality-low cost products and customer service by adjusting their operations from volume production of full rolls and carpet squares to smaller batch sizes and cut-length services, continued high investment in updating technology and operating systems and product and market development.

The strategy profile and historical overview indicate that the entrepreneurial solution at 1977 reflects a Prospector strategy mode which, following Miles & Snow, is in many respects the exact opposite of a Defender Strategy which this company was pursuing in the 1969 profile. Prospectors are characterised by a definition of the entrepreneurial problem in terms of locating and developng product and market opportunities, and a good deal of flexibiliy in its technological and administrative systems which are both concerned with facilitating rather than with controlling organisation operations, in other words, with achieving organic viability. The strategy profile for 1977 is consistent with this characterisation.

Fig 19 demonstrates that in 1977 the organisaion was operating in the boundary conditions between Areas 4 and 5. Lawrence & Dyer associate Area 4 conditions with a Prospector Strategy and Area 5 conditions, as already noted in the review for the 1969 profile, with a Readaptive Strategy.

The findings here indicate that Brintons' entepreneurial solution is in the Prospector mode and the evidence thus does not supports Lawrence & Dyer's expected Area 5 and Readaptive strategy relationship. It is noted that the company is operating close to the boundary with Area 4 at 1977 and that the Prospector strategy mode is consistent with an Area 4 environment.

10.5.2.(iii) Strategy profile at 1986

Fig 23 shows that all eleven variables characterising strategy changed between 1977 and 1986. Three of these eleven variables show only minor levels of change and may be regarded as remaining constant. Of the eight variables showing significant levels of change (ie one degree or more), two variables - innovativeness (v19) and adaptiveness of decisions (v20) regressed significantly over the 1977 levels to lower scores.

The profile shows that in 1986 the level of product-market innovation (v19) declined significantly to a low-moderate level and similarly the responsiveness of the organisation to external conditions (v20) declined significantly over the 1977 position to a low score. In terms of achieving complementarity of decisions within the organisation (v21), the score increases to a achieve a moderate score similar to the 1969 position. The minor change in the score characterising the degree to which decisions are exposed to analysis remains at a low-moderate level. There is a significant level of change in the score characterising the degree to which top managers addressed a broad range of factors in making strategic changes (v23) with the score changing from low-moderate in 1977 to high in 1986, and a similar significant change over the 1977 level in the variable characterising futurity of decisions (v24), indicating a high regard to the longer-term in decision-making. The organisation retains a high-moderate proactive profile (v25) with the score remaining unchanged over the 1977 profile. There is a significant increase in top management's familiarity with product and markets (v26) with the score changing from a low to a moderate level in 1986. Risk-taking (v27) shows a marginal change only and may be regarded as constant at the 1977 level indicating a moderate degree of risk-taking by top management. The remaining two variables, the degree to which corporate strategy is explicit (v28) and the degree to which traditions inform strategy (v29), both show significant changes from moderate to high scores in 1986 indicating that top management is more committed to formulating and communicating strategy and that such strategy is based on conscious assessments rather than a commitment to past traditions.

The significant changes in the direction of long-term (v24), integrated (v21), and wider coverage of decision-making (v23) is consistent with Mintzberg's[33] planning strategy mode. The conditions and characteristics of this mode have been identified in the discussion of the 1969 strategy profile (see 10.5.2(i) above). It is significant to note here, however, that planning in the 1986 profile is extended beyond operational considerations and is also more consciously formulated and concerned with the longer-term strategic issues.

The profile here is supported by the historical overview which shows that in the period between 1977 and 1986 the company had survived the industry recession but performance had not achieved the 1976 level by 1986 when industry conditions remained difficult. With the exception of 'Powerturf' a new late-entry product for a new sports market performance relied heavily on long-established axminser and wilton products and strict controls (v13) were imposed to conserve cash, increase efficiency and ensure quality as domestic markets were lost to tufted products and competition increased in the contracts market. Brintons, already established as the foremost manufacturer in terms of efficiency and quality in the woven carpet industry, aimed to achieve overall efficiencies that were equal to or better than the tufted process and invested heavily in improving ancillary processes, notably spinning and dyeing, to complement its existing high loom capability. The planning decision-making mode is typified in this approach and it is significant to note that although the solutions adopted remain in the process efficiency mode the scope is extended to include the production system as a whole, including yarn and dye engineering and styling. The contribution of these wider issues is reflected in the higher industry-expertise of top management (v26) score and in the loosening of past traditions (v29) in formulating and explicating strategy (v29).

The entrepreneurial solution in 1986 indicates a Defender mode which was discussed in the 1969 profile (see para.10.5.2(i) above). As Fig 19 shows, in 1986 the organisation is perceived to be operating in the central region of Area 5 and as previsouly noted in the discussion of the 1969 profile, Lawrence & Dyer associate this environment with a Readaptive strategy in which both efficiency and innovation have high outcomes. The evidence in this case study indicates a Defender strategy in which product-market innovation is at a low level and efficiency has a high emphasis. The findings here then do not support Lawrence & Dyer's expected Area 5 and Readaptive strategy relationship.

10.6 Brintons: Efficiency and Innovation 1969 -1986

This section discusses efficiency and innovation in the context of both the Lawrence & Dyer and Abernathy models and therefore draws on the data in the sections covering productive units, structure and strategy.

As noted in the previous sections, Brintons operated in Area 5 throughout the period 1969 - 1986 although its actual location within this area was different at each of the three dates examined. Lawrence & Dyer claim that the intermediate levels of IC and RS in Area 5 provide the unique potential for achieving high outcomes in both efficiency and innovation.

The structure and strategy profiles reveal that efficiency (v13) scores remained at a high level at each of the three dates examined and that product-market innovation (v19) scores attained the expected high level (4.75) in 1977 only, the scores at 1969 and 1986 (at 3.80 and 2.50) reflecting moderate and low levels respectively.

These findings in respect of efficiency are supported by the historical overview and by the productive unit profiles which show that Brintons has a strong and long-established commitment to efficiency in all aspects of its operations and that its achievements, particularly in the field of loom efficiencies, have been recognised nationally and internationally.

With respect to innovation, the product-market innovation scores do not reflect the high frequency of product styling changes noted in Section 2 which is a feature of competitive behaviour in this company and in the carpet industry generally, and nor do these scores reflect the high level of process innovation revealed in the productive unit profiles which also confirm that the capacity for incremental product innovation has been retained in both productive units. At 1986 in particular, none of the profiles reflect the high investment in process innovations in the spinning subsidiary which, as the historical overview and productive unit profiles show, makes a key contribution to efficiency and is a prime source of incremental product innovation.

In terms of efficiency, the findings in this case sudy support the claims made by both Lawrence & Dyer[57] and Abernathy[58]. The data shows that the organisation operated in Area 5 throughout the period under review and, as Lawrence & Dyer expect, that high efficiency outcomes were achieved throughout this period. The data shows that process efficieny was advanced in both the productive units examined and that as expected in the Abernathy model this advancement was in the same direction as product advancement.

In terms of innovation, the findings support Lawrence & Dyer's[59] expected Area 5 and high innovation outcome in one of the three cases examined and notes the failure of the model to examine the engineering solution and the effect of process-related innovations. The findings support Abernathy's[60] claim that high product standardisation is associated with a higher frequency of process innovations and incremental product innovation. The data shows that in both the productive units examined products were advanced to a high level of standardisation and that process innovations lagged behind product standardisation and were advanced in the same direction as product standardisation.

Lawrence & Dyer noted that efficiency and innovation are difficult to reconcile and that in the short run may impede and block each other. Taken over the entire period examined the findings in this case study demonstrate that efficiency and innovation scores attained high values alternately rather than simultaneously. It is reasonable then to conclude that in the context of the entire period reviewed efficiency and innovation outcomes conform with the expected Readaptive performance expected in Area 5.

10.7 Brintons Case Study: Summary

Chapters 8 and 9 provided an historical overview of Brintons in the period 1819 to 1946 and identified the key points in the period 1946 to 1986. Chapter 10 provided a structured analysis of the company in the period 1969 to 1986.

The analytical framework combined the Lawrence & Dyer and Abernathy models to describe the perceived environment and organisation strategy, structure and product-process system at three points in time with a view to identifying the evolving environment - organisation relationship and the impact of this relationship on efficiency and innovation.

The findings show that throughout the period 1969 - 1986 the company was located in Area 5 of the environmental framework. Organisation structure was identified as a Readaptive form and this form was retained throughout the period. Strategy changed at each of the three points in time examined and was identified as Defender in 1969, Prospector in 1977 and Defender in 1986.

The study traced the evolution of two productive units and identified the product - process relationship in these two productive units at the same three points in time. It was noted that in both cases the product had been advanced to a highly specific state and that in both cases the processing system had been advanced to a less specific state than the product.

With regard to the environment - organisation structure relationship, the data confirms Lawrence & Dyers expected relationship between Area 5 and a Readaptive organisation form. The data revealed that the organisation remained in Area 5 throughout the period 1969 - 1986 although its location with this area changed at each of the three periods examined. Organisation structure was identified as a Readaptive form in 1969 and remained in this form thoughout the period. It was noted that the distribution of power was skewed in favour of top management in 1969 and that stuctural changes at 1977 and 1986 adjusted this distribution to give a more even balance, although the adjusted balance remained imperfect.

With regard to the environment - strategy relationship the data revealed a Defender strategy in 1969, a Prospector strategy in 1977 and a Defender strategy in 1986 and the findings thus do not support Lawrence & Dyer's expected Area 5 and Readaptive strategy relationship at each of the three periods examined. It was noted that at 1969 the organisation was operating near the boundary with Area 6 and that the Defender strategy was consistent with Area 6. Similarly, in 1977 it was noted that the organisation was operating at the boundary with Area 4 and that the Prospector strategy was consistent with Area 4.

With regard to the product-process relationship the findings confirm Abernathy's claim that product standardisation is associated with an increase in the level of process innovation and that the level of advancement in the processing system lags behind product standardisation and provided this lag remains the capacity for incremental product innovation is retained. The data shows that in both axminster and wilton productive units the product was highly standardised and standardised respectively. The processing system in both cases was advanced to a lower level of standardisation than the product and the overall product-process relationship indicated that the capacity for incremenal product innovation had been retained.

With regard to efficiency the findings support Lawrence & Dyer's claim that Area 5 is associated with high levels of efficiency. The data shows that efficiency was maintained at a high level throughout the period. The findings here also support Abernathy's claim that process efficiency is associated with and lags behind product standardisation. The data shows that the processing system was advanced to a more specific or efficient state in both productive units and that in both cases the product remained more advanced than its related processing system.

With regard to innovation the findings support Lawrence & Dyer's expected Area 5 and high innovation outcome at one of the three periods examined. The data shows that the scores attained the required high level in 1977 only and in 1969 and 1986 registered moderate and low levels respectively. It was noted that in failing to examine the engineering system the Lawrence & Dyer model did not take account of process innovations and it was also noted that the profiles had failed to register the level of process innovation in a subsidiary unit.

The findings with regard to innovation support Abernathy's claim that product standardisation is associated with an increase in the level of process innovations and incremental product innovations. The data shows that process innovations were recorded in both productive units and that both products were standardised and subject to a high frequency of incremental product innovation.

The findings support Lawrence & Dyers claim that efficiency and innovation may block and impede ach other. The data shows that efficiency and innovation performances were high in alternate periods rather than simultaneously. The study concludes that when these two outcomes are viewed from the perspective of the entire period examined then performance in terms of efficiency and innovation conforms with Lawrence & Dyer's expected Readaptive behaviour in Area 5.

Fig 24 summarises the information contained in Sections 10.3-10.5. The information is presented here in terms of the Miles & Snow Adaptive Cycle and identifies the solutions to the three major organisation problems informing the adaptive process - the definition of domain, the determination of the supporting administrative system and the determination of the technology and processes for producing the goods and services. The resulting patterns of solutions to the first two problems portray the organisation's adaptive behaviour in terms of Lawrence & Dyer's model. The solution to the third problem is ignored

Figure 24

BRINTONS: SUMMARY OF FINDINGS 1969 -1986

	Period 1969	1977	1986
ADAPTIVE CYCLE			
Entrepreneurial Solution - in terms of			
1. domain	5	5	5
2. Product/ Market Strategy	Defender*	Prospector*	Defender*
Administrative Solution - structure	Readaptive	Readaptive	Readaptive
Engineering Solution - product:process relationship			
1. Axminster	4:2.80	4:3.00	4:3.00
2. Wilton	4:2.60	5:3.40	5:3.40
Aggregate	4:2.70	4.5:3.20	4.5:3.20
Profit Margin**	9.58%	4.79%	8.82%

* discrepancy with Lawrence & Dyer model at dates shown but over whole period 1969 -1986 conforms with Readaptive strategy

** Source: Appendix V

in the Lawrence & Dyer model and in this study is portrayed in terms of Abernathy's model of product-process behaviour.

As Fig 24 demonstrates, Brintons operated within Area 5 of the environmental framework throughout the period reviewed although its location within this period changed at each of the three dates examined. The entrepreneurial solution adopted changed at each of the three dates examined from Defender in 1969 to Prospector in 1977 and to Defender in 1986. In 1969 and 1977 these solutions were shown to be consistent with the adjacent environment conditions in Areas 6 and 4 respectively.

The administrative solution adopted was identified as a Readaptive form and this form was retained throughout the period reviewed.

Throughout the period reviewed the engineering solution was represented by two carpet manufacturing units and yarn spinning and equipment building capacities which, taken as a whole, represent a classic Defender solution to the engineering problem. The processing system in both carpet manufacturing units indicated a balance between the typical Defender and Prospector characteristics of efficiency and innovation throughout the period.

The resulting configurations demonstrate the adaptive cycle in the Readaptive mode which shows that a Readaptive administrative solution and an engineering solution balanced between the Defender and Prospector modes supports an entrepreneurial solution in either Defender or Prospector modes.

PART THREE: CONCLUSIONS

CHAPTER 11: CONCLUSIONS

This study aimed to refine the firm in sector perspsective by constructing an analytical framework which combined the established historicised case study and multi-variable ordinal scale approaches to examine the organisation-environment-performance relationship holistically, longitudinally and comparatively. The framework was applied to examine the organisation-environment-performance relationship of two organisations in the same industry over the same twenty-five year period.

The findings arising from these examinations were detailed and compared with the expected outcomes of the two theoretical models informing this study in Chapters 5 - 10.

This chapter compares the environment-organisation-performance relationships of the two organisations before revisiting the points of departure to identify the clarifications made and issues raised by the firm in sector perspective, and commenting on the implications of the findings for the two models informing the study.

11.1. Comparisons between Tomkinsons and Brintons

Figs 15 and 24 summarise the organisation-environment relationship of Tomkinsons and Brintons respectively. The following sections compare the two organisations in terms of their solutions at each stage of the Adaptive Cycle, their performances in terms of efficiency and innovation, and their overall adaptive behaviour.

11.1.1. Entrepreneurial Solution

(a) Environment

The data shows that at 1959 Tomkinsons operated in Area 7 of the environmental framework and migrated into Area 4 in 1969 and Area 5 at 1975 and 1986, although its location at 1986 shifted to the boundary of Areas 5 and 6. Brintons operated in Area 5 in 1969 and remained in this area at 1977 and 1986 although its location within this area changed at each of the dates examined.

The findings reveal that whereas Tomkinsons enacted significantly different environments at each of the dates examined, Brintons remained in the same environment. At 1975/1977 and 1986 the two organisations operated in the same environment, although at different locations within this environment. Over the period as a whole the environment was thus dynamic from the perspective of Tomkinsons and relatively stable from the perspective of Brintons.

(b) Strategy

The data shows that Tomkinsons operated a Reactor strategy and an adaptive strategy process mode in 1959. The adaptive process mode was maintained in 1969 and at 1975 when the organisation operated an Analyser strategy. At 1986 the Analyser strategy was maintained and the strategy process mode had shifted towards a planning mode. There were significant changes to the variables characterising strategy at each of the dates examined in terms of both the number of variables affected and the degree to which they were affected.

The data on Brintons reveals a Defender strategy in 1969, a Prospector Strategy in 1975 and a Defender strategy in 1986 and these alternating poses were redefined as a Readaptive strategy. Brintons' strategy - making process was identified as operating in a planning mode at 1969, in an entrepreneurial mode at 1977 and in a planning mode at 1986. There were significant changes to the variables characterising strategy at each of the dates examined in terms of both the number of variables affected and the degree to which they were affected..

At 1969 the two companies occupied different environments and Tomkinsons' Analyser strategy expressed both Defender and Prospector characteristics in contrast to Brintons' Readaptive strategy then operating in a Defender mode. At 1975/1977 and 1986 when the two companies operated in the same environment, Tomkinsons continued its dual Defender and Prospector response while Brintons switched to a Prospector mode in 1977 and back to Defender mode at 1986.

Differences between the two companies are also evident in their approach to strategy formulation. At 1969 when the two companies operated in different environments Tomkinsons operated in an adaptive mode in contrast to Brintons' planning mode, and at 1975/1977 and 1986 when the two companies were operating in the same environment, Tomkinsons maintained its adaptive mode in contrast to Brintons' entrepreneurial mode at 1975/1977, and both companies operated in a planning mode at 1986.

11.1.2. Administrative Solution

The data reveals that Tomkinsons adopted a different administrative solution at each of the four dates examined, although the solutions at 1975 and 1986 represent variations of a matrix structure. The different solutions involved significant changes in both the range of variables examined and in the degree of change within these variables, and these changes were particulaly pronounced at 1975. Brintons' administrative solution remained in the Readaptive form at each of the periods examined although there were significant changes in a small number of variables affecting mainly the distribution of power.

Tomkinsons' administrative solution in 1959 was identified as a Professional Bureaucracy. At 1969 when the two organisation were operating in different environments the administrative solutions were identified as an Entrepreneurial Group form and a Readaptive form for Tomkinsons and Brintons respectively. At 1975/1977 and at 1986 when the two companies were operating in the same environment, Tomkinsons" matrix structure was shown to be similar to Brintons' Readaptive form in terms of Team Spirit but different from this form in terms of Integration, Differentiation and Communication.

11.1.4. Engineering Solution

The data shows that at 1959 Tomkinsons engineering solution was represented by two productive units manufacturing woven carpets and a commitment to invest in spinning and experiment with the new tufted carpet process was noted. By 1969 the company was operating three productive units - two manufacturing woven carpets and one manufacturing tufted carpets, plus a spinning capacity, and this solution was maintained at 1975 and at 1986. Brintons' engineering solution was represented throughout the period by two productive units manufacturing woven carpets, a spinning capacity, and a loom construction and research capacity. It was noted that in 1956 the company collaborated with other leading woven carpet manufacturers to establish a tufted carpet company and withdrew from this venture in 1968.

The profiles characterised the relationship between carpet products and their related manufacturing processes only, and the detailed findings for each of the productive units are given in Chapters 7 and 10. This section compares the aggregate productive unit profiles and the overall engineering solution typologies of the two organisations.

Tomkinsons in 1959 was shown to have an aggregate product - process ratio of 2.50:2.25 and was identified as operating a Prospector engineering solution. At 1969 the aggregate product - process ratio was 3.0:2.50 and the engineering solution was identified as operating in an Analyser mode. The Analyser mode was continued at 1975 and 1986 when the product - process ratio was adjusted to 5.0:2.86.

Brintons in 1969 was shown to have an aggregate product - process ratio of 4.0:2.7 which was adjusted to 4.5:3.20 at 1977 and 1986, and was identified as operating an engineering solution which was balanced between the Defender and Prospector modes.

At 1969 when the two companies operated in different environments the product - process ratios for Tomkinsons and Brintons at 3.0:2.50 and 4:2.7 respectively reflect similar levels of process advancement and a significantly higher level of product standardisation at Brintons. At 1975/1977 and 1986 when the two companies were operating in the same environment, Tomkinsons' product:process ratio was adjusted to 5.0:2.86 and maintained at this level at 1986, and Brintons' product:process ratio was adjusted to 4.5:3.20 and maintained at this level at 1986.

The findings thus show that while the engineering solutions in both companies reflect both Defender and Prospector characteristics the expression of the solutions as shown in the overall product-process ratios is different. Thus while Tomkinsons Defender - Prospector balance is achieved by product standardisation and process flexibility, Brintons' balance between these two poses is achieved by relatively higher product flexibility and relatively higher process efficiency

11.1.5. Efficiency and Innovation

Efficiency was assessed by the level of integration and the advancement of the product - process relationship. Innovation was assessed in terms of product - market innovation and process innovation and innovations were identified as radical or incremental. Gross profit margin was used to assess the overall efficiency of operations.

(a) Integration

The data shows that the level of integration in Tomkinsons was low at both 1959 and 1969, and at 1975 and 1986 was at moderate and high levels respectively. The level of integration in Brintons was at a high level in 1969, at a moderate level in 1977 and at a high level in 1986.

(b) Product - process Relationship

As the data in para 11.1.4 above shows, at Tomkinsons the product - process configuration at 2.50:2.25 operated at a highly flexible level at 1959 and was advanced to 3.0:2.50 at 1969 reflecting the adoption of the radical tufted process innovation and representing a configuration at the mid-point of the flexible-specific scale. At 1975 and at 1986 the product:process ratio at 5.0:2.86 indicates that the product was advanced to a high level of standardisation and the process system, although incrementally advanced, remained at the mid-point of the scale.

Brintons at 1969 shows a product - process relationship of 4.0:2.7 which represents a configuration operating at the mid-point of the flexible - specific scale. At 1977 and 1986 this relationship was incrementally advanced to 4.50:3.20 indicating a configuration which continued to operate at the mid-point of the scale but with a process system which exploited the efficiencies afforded by the level of product stanardisation achieved, particularly with regard to process equipment.

(c) Product - market innovation

The data shows that Tomkinsons in 1959 recorded a low level of product - market innovation. By 1969 the company had adopted the radical tufted carpet process and product market innovation was at a moderate level and remained at a moderate level at 1975 and 1986.

Brintons' profile shows that at 1969 product-market innovation was at a moderate level and was maintained at a moderae level at 1977 and 1986.

It was noted that in both companies incremental product innovation as reflected in annual design and/or yarn changes was a significant competitive characteristic throughout the period examined.

(d) Gross Profit Margin

In Tomkinsons at 1959 and 1969 gross profit margin was at 8.32% and 8.20% respectively. The gross profit margin declined to 3.71% in 1975 and increased to 9.30% in 1986. Brintons gross profit margin at 1969 was 9.58% and this declined to 4.79% in 1977 and increased to 8.82% in 1986.

Taking account then of the overall efficiency and innovation outcomes, the data shows that Tomkinsons in 1959 operated at low levels of both efficiency and innovation. Although efficiency remained at a low level in 1969, product - market innovation increased to a moderate level. At 1975 both efficiency and innovation were at moderate levels and in 1986 innovation was moderate and efficiency high.. In 1969 efficiency at Brintons was at a high level and product - market innovation at a moderate level. Both outcomes were at a moderate level at 1977. Innovation was maintained at a moderate level in 1986 and efficiency was increased to a high level.

At 1969 when the two organisations operated in different environments Tomkinsons' achieved low efficiency and moderate product-market outcomes compared with Brintons' high efficiency and moderate innovation outcomes. At 1975/1977 and 1986 when the two organisations operated in the same environment they both achieved moderate outcomes in both efficiency and innovation at 1975/1977, and at 1986 both organisations record moderate levels of product - market innovation and high efficiency.

The gross profit margin records show that Brintons' results are significantly greater at 1969. Both organisations achieve comparable performances at 1975/1977 and at 1986.

11.1.6. Adaptive Behaviour

The data demonstrates the relatively higher frequency and extent of change in the entrepreneurial solutions in both organisations. In both organisations the engineering solutions were shown to reflect a lower frequency of change and, athough advanced to a higher level of standardisation, the solutions retained a balanced innovation - efficiency capability. Significant differences were noted in the frequency and extent of change in the administrative solutions of the two organisations. Whereas Tomkinsons was shown to experience a higher frequency and a greater extent of change in all three elements of the adaptive cycle and with correspondingly greater inconsistencies between these elements, Brintons was shown to retain a relatively stable administrative solution throughout the period, with a relatively less stable engineering solution and with polarised responses in terms of its entrepreneurial solution.

The degree of compatibility between the environment and organisation relationship was shown to vary between the two organisations. Tomkinsons showed ongoing inconsistencies in achieving the necessary relationships in all three solutions, particularly in adopting a structural response that configured with the entrepreneurial and engineering solutions. Brintons, as previously noted, retained a high level of stability in its environment - structure relationship, a flexible engineering pose and a widely fluctuating strategic response. It is significant to note that it is only when observed over the long term that this configuration demonstrates its ability to respond in either strategy mode: when observed in the short term the configuration is consistent, or inconsistent, depending on the entrepreneurial solution being examined.

In terms of performance, Brintons' moderate/high efficiency and moderate innovation outcomes were maintained throughout the period, whereas Tomkinsons' performance was low at the start of the period and achieved moderate levels in both outcomes at 1975, and moderate innovation and high efficiency in 1986. The gross profit margin was greater for Brintons at each of the dates examined to 1977. At 1986 the two organisations show comparable gross profit margins with Tomkinsons achieving a relatively higher figure.

11.2 Points of Departure Revisited: Firms in Sector Perspective & the Analytical Framework

Chapter 1 drew attention to the rival claims of the orthodox contingency and neo-contingency models regarding the significance of the organisation - environment relationship to organisational performance. It was noted that whereas the orthodox contingency model relates effective performance to compatible organisation - environment relationships and assumes that organisations have the capacity to adapt to maintain this relationship in the event of environmental change, the neo-contingency model relates effective performance to the ability of the organisation to adapt and claims that adaptation itself requires the organisation to achieve effective outcomes in efficiency and innovation, and that these outcomes are supported only in a Readaptive organisation - environment configuration.

Attention was drawn to rival claims regarding the organisation - environment relationships of firms in the same industry and it was noted that mature organisations in mature industries were claimed to experience difficulty in achieving satisfactory adaptive outcomes, notwithstanding the phenomenon of the longevity of some such organisations and industries in non-Readaptive environments.

It was noted that blame for much of the fragmentation and confusion in organisation theory was attributed to research methodology and attention was drawn to the need for a holistic and longitudinal approach which examined a focused population of organisations. Such an approach was supported by the Work Organisation Research Centre's firm in sector perspective which aims to examine the behaviour of firms within their sectors, namely the population of firms which provide similar goods and services, with a view to examining organisational adaptation for the insight it affords into the relationship of organisations with their environments and the implications of this relationship for effective organisational performance. This approach was demonstrated by the firm in sector perspective studies, at Aston University and it was noted that although these studies overcame some of the methodological criticisms they exposed weaknesses in identifying the organisation - environment nexus and the ability to locate their findings within this nexus.

This study constructed and demonstrated an analytical framework which characterised both the environment and organisations within that environment, and tracked the organisation - environment relationship over time to expose the significance of the relationship for organisational performance and adaptation. This mode of inquiry aimed to refine the firm in sector perspective and the findings, considered below in terms of the adaptive cycle, contribute some clarification of the issues raised in the literature and identify areas warranting further study.

11.2.1. Entrepreneurial solution

(a) Environment

The environment was described in terms of Information Complexity and Resource Scarcity. A 7-point scale was applied to these dimensions and the scales were divided to construct a nine-cell framework of environmental areas. The two focal organisations were located within this nine-cell framework according to their perceptions of the environment, and the changing nature of the environment and the organisations' locations within this framework were tracked at the given dates over a twenty-five year period.

The data demonstrates that the industry afforded different environments up to 1969 and a single environment at 1975/1977 and 1986, and this single environment was operational throughout the period examined. The findings thus offer some clarification of the opposing claims made by Lawrence & Dyer[2] and Miles and Snow[3] with regard to the organisation form and strategy of firms in the same industry. The findings in this study indicate that where the industry supports multiple environments the member firms have different organisation forms and strategies, and where the industry supports a single environment then member firms display similar organisation forms and strategies.

Following on from the above statements about the nature of the industry environment, the data demonstrates that from the perspective of one organisation the environment was dynamic and from the perspective of the second organisation the environment was stable. The findings in this study thus demonstrate that the practice, following Lawrence & Dyer[4], of describing the industry in terms of its dominant organisation is misleading in explaining the behaviour of other organisations in the same industry unless the environment characteristics of the industry itself is explained.

Following Lawrence & Dyers conventional definitions[5], the carpet industry is a mature industry and was thus not expected to provide a Readaptive environment. The findings demonstrate that the carpet industry provided a Readaptive environment from 1969 - 1986 in which one of the two 'mature' organisations used a 'mature' core technology to achieve Readaptive outcomes. It is suggested, therefore, that the concept of maturity requires redefinition and the findings in this study indicate that Abernathy's definition of the concept which relates maturity to the product - process profile provides a viable model for interpreting maturity and examining its influence on organisational performance.

If, as this study indicates, the diversity of organisation forms and strategies is a function of the industry, then the industry itself is a significant unit of analysis in understanding the organisation - environment relationship and the factors influencing the diversity of industry environments require further explanation. The findings in this study suggest that the level of product - process advancement in the industry is one of the important factors infuencing environmental diversity.

(b) Strategy

Organisation strategy and the strategy-making process was characterised by eleven variables which were subjected to a 7-point scale. Profiles were constructed for each of the two organisations at the given points in time over the same twenty-five year period and these profiles were classified in terms of Miles & Snow's strategic typology and Mintzberg's strategy-making modes.

The data demonstrates the similarities and differences between the Analyser and Readaptive strategies. While both strategies seek to reconcile efficiency and innovation, the findings confirm Miles & Snow's[illegible] classic dual focus Analyser response in reconciling efficiency and innovation, and demonstrate the alternating Defender and Prospector responses as one interpretation of a Readaptive strategy mode.

The study extended Miles & Snow's[10] typology by demonstrating the strategy-process modes adopted in the Defender, Prospector and Analyser strategic types as planning, entrepreneurial and adaptive-planning modes respectively. Lawrence & Dyer's Readaptive strategy was associated with alternating planning and entrepreneurial modes.

11.2.2 Administrative Solution

The administrative solution was characterised by twelve variables which were subjected to a 7-point scale. Profiles were constructed for each of the two companies at each of the selected dates in the period 1959 - 1986.

The data demonstrates the similarities and differences between the Analyser and Readaptive solutions to the administrative problem. While both solutions require high levels of integration and differentiation to reconcile efficiency and innovation, the levels sustained in a Readaptive form are greater than in the Analyser form.

11.2.3 Engineering Solution

The engineering solution was described in terms of seven variables which were subjected to a 5 - point scale. Profiles were constructed for each of the two companies' portfolio of carpet manufacturing units at each of the selected dates in the period 1959 - 1986.

The study contributed a methodology for characterising the engineering solution and is unique in presenting this relationship within the organisation - environment configuration. The findings demonstrate the differences beween the Analyser and Readaptive approaches to resolving the problem of achieving efficiency and innovation. The typical dual technology approach of the Analyser response is confirmed and attention is drawn to the role of loosely connected organisations in extending the scope for flexibility in this mode. The Readaptive engineering response is demonstrated to rely on retaining product flexibility while advancing the processing system to exploit the level of efficiency afforded by the level of product standardisation attained.

The data demonstrates the significance of the engineering solution in maintaining a balance between efficiency and innovation and indicates that the capacity to reformulate the entrepreneurial solution may be linked to the characteristics of the engineering solution.

Given the strategic importance of the engineering solution it is suggested that its characterisation requires extension in three ways. Firstly, the characterisation of the productive unit could usefully be disaggregated to capture the differences between the competitive and non-competitive aspects of the product - process relationship. Secondly, the characterisation of equipment in the productive unit profile requires elaboration to identify the level of sophistication attained at each stage of the process. Thirdly, the productive unit concept should be extended to include complementary production-related facilities.

While the data supports the claim made by Lawrence & Dyer(1) that there is considerable scope for management choice in the way core technology is deployed, the findings tentatively indicate that the scope for such choice may be linked to the level of product-process advancement in the industry and this aspect warrants further study.

11.2.4 Innovation and Efficiency

Two different patterns of innovation were observed. Radical innovation was shown to be associated with higher levels of environmental IC and incremental innovation was shown to be associated with product - process certainty. External agents from suppliers and distributors were shown to have a significant role in the development of both patterns of innovation. These relationships were not captured by the organisation profiles and it is possible that such relationships may compensate for the relatively low technocratisation scores. It is suggested that the variables characterising the organisation should be extended to accommodate external relationships accordingly.

The data demonstrates the different approaches of the two organisations to adopting the radical tufted carpet process. The findings suggest that this difference may be linked to the 'nibble' and 'bite' characteristics of their respective adaptive and planning strategy-process modes.

The data demonstrates the two-way influence on product - process characteristics between the new tufted and established woven sectors. For example, Tomkinsons' development of the tufted product - process reflects the styling and competitive characteristics of the woven process, and Brintons' innovative latex backing of woven carpets reflects the characteristics of the tufted process. Similar exchanges between the two processes were noted in the adoption of fibres and approaches to quality standards.

Incremental innovation was observed to be reflected in both product and process. Incremental product innovation was shown to have a high profile in both companies throughout the period and was perceived to be a feature of competitive behaviour in the industry. The capacity to maintain this level of incremental product innovation was reflected in the product - process relationship which reveals the high profile of raw materials, particularly yarns, and the preparatory stages in maintaining incremental product innovation in the carpet industry.

Process innovation was shown to be linked to product standardisation and geared to achieving higher levels of operating efficiency. Efficiency was shown to increase with higher levels of environmental RS. Although the major impact of efficiency related innovations were refleced in the engineering solutions, and particularly in the non-competitive elements of production processes, structrual changes emphasising efficiency were also shown to be related to higher levels of environmental RS.

11.2.5 Adaptation and Readaptation

In exposing the adaptive behaviour of the two organisations longitudinally and comparatively, the study supports and demonstrates the claim made by Lawrence & Dyer[12] regarding the link beween the organisation - environment relationship and adaptive behaviour.

The adaptive experiences of the two organisations examined expose the significance of the organisation - environment configuration for the frequency, extent and location of changes necessary to effect a reconciliation and demonstrates the resilience of the Readaptive configuration in achieving this reconciliation with a relatively lower level of change.

The study uniquely demonstrates the significance of the engineering solution in achieving and maintaining an adaptive capability.

11.2.6 Configurations and performance

The findings demonstrate that the Area 5 environment is associated with the highest efficiency and innovation outcomes in both the organisations examined.

The claim made by the neo-contingency model[17] is thus supported to the extent that Brintons' Area5/Readaptive form achieved effective performances over the period as a whole. This support is, however, qualified by the fact that the Area5/Readaptive configuration was shown to be consistent throughout the period examined and its performance was in effect compared with the performances of inconsistent configurations in other areas.

The study ended at the point at which the Area 5 environment supported both a consistent Readaptive configuration and a consistent Analyser configuration, when the Readaptive configuration indicated higher efficiency outcomes and the Analyser configuration indicated higher innovation outcomes. Clearly further longitudinal, holistic and comparative research is necessary to demonstrate the competitive strengths of consistent configurations.

11.3 Implications for the theoretical models informing this study

11.3.1 Lawrence & Dyer[14]

This study extended Lawrence & Dyer's Analytical Framework of Adaptation by providing a 7-point scale to RS and IC to enable perceptions of change in these elements to be identified over time. The model of organisation form and strategy was extended to include the strategy - making mode and the product - process profile and scales were provided to identify changes in these elements over time.

The findings in this study, following Abernathy[15], indicate that both efficiency and innovation are functions of the product - process relationship. In this way the potential for both efficiency and innovation were shown to be related to the level of environmental IC. The findings here suggest that the potential for radical innovation is linked to higher levels of IC whereas the potential for incremental innovation, which itself was shown to be linked with efficiency, is related to lower levels of IC. While this indicates that certain revisions are necessary to the theoretical models informing the Lawrence & Dyer model it remains likely that the propensity to realise the potential for efficiency is related to the levels of environmental RS as demonstrated by Lawrence & Dyer[16]. Such an adjustment would not detract from the claims made for the Readaptive configuration and may help to explain the adaptive behaviour of mature organisations and mature industries in non-Area 5 environments[17].

11.3.2 Abernathy

This study extended Abernathy's model by locating it in the context of the organisation - environment relationship and demonstrated the significance of the product - process relationship in maintaining organisational efficiency and innovation. The portfolio of productive units and the level of product - process standardisation was shown to influence strategic poses and adaptive capability. Given the strategic importance of the product - process relationship it is suggested that its characterisation should be extended to include an indication of the sophistication of equipment deployed.

The longitudinal and comparative study of the porfolio of productive units in the two organisations examined suggest that the degree of similarity between organisation - environment configurations in the same industry, and therefore, the range of adaptive responses, may be related to the level of product - process standardisation in the sector.

In conclusion, the firms in sector perspective espoused in this study demonstrates a viable way forward for examining the environment - organisation relationship holistically, longitudinally and comparatively and exposed the significance of this relationship for reconciling efficiency and innovation and for the frequency and scope of organisational adaptation.

REFERENCES

CHAPTER 1

1. Chandler A (1962) Strategy & Structure:Chapters in the history of the Industrial Enterprise. Cambridge, Mass: The MIT Press
2. Channon D (1973) Strategy & Structure of British Enterprise. Boston: Harvard University Press
3. Burns T & Stalker G (1961) The Management of Innovation. London: Tavistock Press
4. Lawrence PR & Lorsch JW (1967) Organisation & Environment Cambridge, Mass: Harvard Business School
5. Miller D & Mintzberg H (1984) The Case for Configuration in Miller D & Friesen P (1984) Organisations: A Quantum View.Chap 1 Englewood Cliffs, New Jersey: Prentice-Hall
6. Rumelt RP (1974) Strategy, Structure & Economic Performance Cambridge, Mass: Division of Research, Graduate School of Business Administration, Harvard University
7. Miles R & Snow C (1978) Organisational Strategy, Structure & Process New York: McGraw Hill
8. Hambrick D et al (1982) Strategic Attributes & Performance in the Four Cells of the BCG Matrix. Academy of Management Journal 25 pp510-531 1982
9. Miller D & Friesen P (1984) Organisations: A Quantum View Englewood Cliffs, New Jersey: Prentice-Hall
10. Lawrence P and Dyer D (1983) Renewing American Industry New York: The Free Press: A Division of Macmillan, Inc.
11. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry. Baltimore: The John Hopkins University Press
12. Whipp R & Clark P (1986) Innovation and the Auto Industry, p10 London: Frances Pinter (Publishers)
13. Miles R & Snow C (1978) Organisational, Strategy, Structure & Process New York: McGraw Hill
14. Lawrence P & Dyer D (1983) Renewing American Industry, p316 New York: The Free Press: A Division of Macmillan, Inc.
15. Ibid p295
16. Miller D & Friesen P (1984) Organisations: A Quantum View, p10 Englewood Cliffs, New Jersey: Prentice-Hall
17. Ibid p11
18. McKelvey B (1975) Guidelines for the Empirical Classification of Organisations. Administrative Science Quarterly, 20 pp509-525 1975
19. Lawrence P & Dyer D (1983) Renewing American Industry New York: The Free Press: A Division of Macmillan, Inc.
20. Miller D & Friesen P (1984) Organisations: A Quantum View Englewood Cliffs, New Jersey: Prentice-Hall
21. Lawrence P & Dyer D (1983) Renewing American Industry New York: The Free Press: A Division of Macmillan, Inc.
22. Ibid p326 & p331
23. Miller D & Friesen P (1984) Organisations: A Quantum View, p88 Englewood Cliffs, New Jersey: Prentice-Hall
24. Child J (1972) Organisational Structure, Environment and Performance:The Role of Strategic Choice.Sociology 6 pp1-22 January

25. Lawrence P & Dyer D (1983) Renewing American Industry, p2 New York: The Free Press: A Division of Macmillan, Inc.
26. McKelvey B (1978) Organisational Systematics: Taxonomic Lesson from Biology Management Science 24 pp1428-40 1978
27. Holdaway EA et al (1975) Dimensions of Organisations in Complex Societies: The Educational Sector Administrative Science Quarterly 20 pp37-58 1975
28. Pugh DS et al (1968) Dimensions of Organisation Structure Administrative Science Quarterly, 13 pp65-105 1968
29. McKelvey B (1978) Organisational Systematics: Taxonomic Lesson from Biology Management Science 24 pp1428-40 1978
30. Child J & Smith C (1987) The Context & Process of Organisational Transformation - Cadbury Limited in its Sector Journal of Management Studies 24 vol 6 pp565 -588 November 1987
31. Whipp R & Clark P (1986) Innovation & the Auto Industry London: Frances Pinter (Publishers)
32. Child J & Smith C (1987) The Context & Process of Organisational Transformation - Cadbury Limited in its Sector Journal of Management Studies 24 vol 6 p565 November 1987
33. Ibid p590
34. Whipp R & Clark P (1986) Innovation & the Auto Industry London: Frances Pinter (Publishers)
35. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p172, Baltimore: The John Hopkins University Press
36. Whipp R & Clark P (1986) Innovation & the Auto Industry p17 - 25 London: Frances Pinter (Publishers)
37. Ibid p15
38. Lawrence P & Dyer D (1983) Renewing American Industry Chaps 2 - 8 New York: The Free Press: A Division of Macmillan, Inc.
39. Miller D & Friesen P (1984) Organisations: A Quantum View Chap 4 Englewood Cliffs, New Jersey: Prentice-Hall
40. Whipp R & Clark P (1986) Innovation & the Auto Industry London: Frances Pinter (Publishers)
41. Child J & Smith C (1987) The Context & Process of Organisational Transformation - Cadbury Limited in its Sector Journal of Management Studies 24 vol 6 pp565-588 November 1987
42. Lawrence P & Dyer D (1983) Renewing American Industry New York: The Free Press: A Division of Macmillan, Inc.
43. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry. Baltimore: The John Hopkins University Press

CHAPTER 2

1. Lawrence P & Dyer D (1983) Renewing American Industry New York: The Free Press: A Division of Macmillan, Inc.
2. Ibid p4
3. Ibid p8
4. Ibid p294
5. Ibid p4
6. Ibid p6

7. Mintzberg H (1979) The Structuring of Organisations in The Strategy Process: Concepts, Contexts and Cases pp276-304 JB Quinn et al(1988) Englewood Cliffs, New Jersey: Prentice-Hall International Editions
8. Miles R & Snow C (1978) Organisational Strategy, Structure & Process New York: McGraw Hill
9. Lawrence P & Dyer D (1983) Renewing American Industry p246 & p316 New York: The Free Press: A Division of Macmillan, Inc.
10. Ibid p253
11. Ibid p9
12. Ibid p8
13. Ibid p9
14. Ibid p296
15. Ibid 8
16. Ibid p9
17. Ibid p10
18. Ibid p11
19. Ibid p12
20. Lawrence PR & Lorsch J (1967) Organisation & Environment Cambridge, Mass: Harvard Business School
21. Lawrence P & Dyer D (1983) Renewing American Industry p10 New York: The Free Press: A Division of Macmillan, Inc.
22. Ibid p10
23. Ibid p11
24. Ibid p301
25. Ibid p302-303
26. Ibid p8
27. Ibid p9
28. Ibid p334
29. Ibid p335
30. Ibid p302
31. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p68. Baltimore: The John Hopkins University Press
32 Lawrence P & Dyer D (1983) Renewing American Industry p303 New York: The Free Press: A Division of Macmillan, Inc.
33. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p69. Baltimore: The John Hopkins University Press
34. Lawrence P & Dyer D (1983) Renewing Amrican Industry p8-13 New York: The Free Press: A Division of Macmillan, Inc.
35. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry. Baltimore: The John Hopkins University Press
36. Lawrence P & Dyer D (1983) Renewing American Industry p314 New York: The Free Press: A Division of Macmillan, Inc.
37. Miles R & Snow C (1978) Organisational Strategy, Structure & Process New York: McGraw Hill
38. Lawrence P & Dyer D (1983) Renewing American Industry p4 New York: The Free Press: A Division of Macmillan, Inc.
39. Mintzberg H (1979) The Structuring of Organisation in The Strategy Process: Concepts, Contexts and Cases pp276-304 JB Quinn et al (1988) Englewood Cliffs, New Jersey: Prentice-Hall International Editions

40. Miles R & Snow C (1978) Organisational Strategy, Structure & Process New York: McGraw Hill
41. Lawrence P & Dyer D (1983) Renewing American Industry p316 New York: The Free Press: A Division of Macmillan, Inc.
42. Ibid p326 & p331
43. Miles R & Snow C (1978) Organisational Strategy. Structure & Process New York: McGraw Hill
44. Lawrence P & Dyer D (1983) Renewing American Industry p327 New York: The Free Press: A Division of Macmillan, Inc.
45. Ibid p326
46. Ibid p326
47. Thompson J (1967) Organisations in Action New York: McGraw Hill
48. Woodward J (1965) Industrial Organisations: Theory & Practice London: Oxford University Press
49. Lawrence P & Dyer D (1983) Renewing American Industry p242 New York: The Free Press: A Division of Macmillan, Inc.
50. Ibid p257
51. Ibid p8
52. Ibid p9
53. Ibid p332
54. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry. Baltimore: The John Hopkins University Press
55. Ibid p48-49
56. Ibid p168
57. Ibid p168
58. Ibid p4
59. Ibid p8
60. Ibid p48-50
61. Ibid Chap 7
62. Ibid p151
63. Ibid p153
64. Ibid p64
65. Ibid p74-76
66. Ibid p62
67. Ibid p80
68. Miles R & Snow C (1978) Organisational Strategy, Structure & Process New York: McGraw Hill
69. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p72. Baltimore: The John Hopkins University Press
70. Ibid p76
71. Lawrence P & Dyer D (1983) Renewing American Industry p334 New York: The Free Press: A Division of Macmillan, Inc.
72. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p153. Baltimore: The John Hopkins University Press
73. Lawrence P & Dyer D (1983) Renewing American Industry p11 New York: The Free Press: A Division of Macmillan, Inc.
74. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry. Baltimore: The John Hopkins University Press

75. Lawrence P & Dyer D (1983) Renewing American Industry p8
New York: The Free Press: A Division of Macmillan, Inc.

CHAPTER 3

1. Lawrence P & Dyer D (1983) Renewing American Industry
New York:The Free Press: A Division of Macmillan, Inc.
2. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry. Baltimore: The John Hopkins University Press
3. Lawrence P & Dyer D (1983) Renewing American Industry p4-13
New York: The Free Press: A Division of Macmillan, Inc.
4. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p147-153. Baltimore:The John Hopkins University Press
5. Miles R & Snow C (1978) Organisational Strategy, Structure & Process
New York: McGraw Hill
6. Lawrence P & Dyer D (1983) Renewing American Industry p13
New York: The Free Press: A Division of Macmillan, Inc.
7. Ibid p298
8. Ibid p295
9. Ibid p298
10. Ibid p328
11. Ibid p4
12. Ibid p5
13. Ibid p292-294
14. Ibid p10
15. Ibid p30
16. Ibid p327
17. Ibid p241-242
18. Ibid p242
19. Ibid p326
20. Woodward J (1965) Industrial Organisations: Theory & Practice
London: Oxford University Press
21. Lawrence P & Dyer D (1983) Renewing American Industry p6
New York: The Free Press: A Division of Macmillan, Inc.
22. Ibid p11
23. Ibid p291
24. Ibid p257
25. Ibid p9
26. Ibid p298
27. Ibid p295
28. Ibid p257
29. Mintzberg H (1979) The Structuring of Organisations in The Strategy Process: Concepts, Contexts and Cases pp276-304 JB Quinn et al (1988) Englewood Cliffs, New Jersey: Prentice Hall International Editions
30. Miles R & Snow C (1978) Organisational Strategy, Structure & Process
New York: McGraw Hill
31. Lawrence P & Dyer D (1983) Renewing American Industry p262-265
New York: The Free Press: A Division of Macmillan, Inc.
32. Miles R & Snow C (1978) Organisational Strategy, Structure & Process
New York: McGraw Hill

33. Ibid
34. Ibid
35. Lawrence P & Dyer D (1983) Renewing American Industry p296
New York: The Free Press: A Division of Macmillan, Inc.
36. Ibid p8-13
37. Mintzberg H (1973) Strategy Making in Three Modes in
Quinn JB, Mintzberg H & James RM (1988)The Strategy Process -
Concepts, Contexts and Cases pp82-89 Englewood Cliffs, New Jersey:
Prentice Hall International Editions
38. Miles R & Snow C (1978) Organisational Strategy, Structure & Process
New York: McGraw Hill
39. Lawrence P & Dyer D (1983) Renewing American Industry p8-9
New York:The Free Press: A Division of Macmillan, Inc.
40. Ibid p270
41. Ibid p10
42. Ibid p270
43. Ibid p11
44. Ibid p303
45. Ibid p9
46. Ibid p303
47. Ibid p10 & p270
48. Ibid p12
49. Ibid p271
50. Ibid p272
51 Ibid p273
52. Miles R & Snow C (1978) Organisational Strategy, Structure & Process
in Quinn JB, Mintzberg H & James RM (1988) The Strategy Process:
Concepts, Contexts & Cases p524 Englewood Cliffs, New Jersey:
Prentice Hall International Editions
53. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to
Innovation in the Automobile Industry p149-153. Baltimore:The John
Hopkins University Press
54. Lawrence P & Dyer D (1983) Renewing American Industry p8
New York: The Free Press: A Division of Macmillan, Inc.
55. Ibid p303
56. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to
Innovation in the Automobile Industry p72. Baltimore: The John
Hopkins University Press
57. Lawrence P & Dyer D (1983) Renewing American Industry p8
New York: The Free Press: A Division of Macmillan, Inc.
58. Ibid p302
59. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to
Innovation in the Automobile Industry p72. Baltimore:The John
Hopkins University Press
60. Ibid p70
61. Ibid p59
62. Lawrence P & Dyer D (1983) Renewing American Industry p301-304
New York: The Free Press: A Division of Macmillan, Inc.
63. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to
Innovation in the Automobile Industry p72. Baltimore: The John
Hopkins University Press
64. Lawrence P & Dyer D (1983) Renewing American Industry p4-13
New York: The Free Press: A Division of Macmillan, Inc.
65. Ibid p316

66. March J & Olsen J (1976) Ambiguity & Choice in Organisations Bergen, Norway: Universitetsforlaget
67. Mintzberg H (1979) The Structuring of Organisations in The Strategy Process: Concepts, Contexts and Cases. pp276-304 JB Quinn et al (1988) Englewood Cliffs, New Jersey: Prentice Hall International Editions
68. Miles R & Snow C (1978) Organisational Strategy, Structure & Process New York: McGraw Hill
69. Lawrence P & Dyer D (1983) Renewing American Industry p321 New York: The Free Press: A Division of Macmillan, Inc.
70. Burns T & Stalker GM (1961) The Management of Innovation London: Tavistock Press
71. Miles R & Snow C (1978) Organisational Strategy, Structure & Process New York: McGraw Hill
72. Mintzberg H (1979) The Structuring of Organisations in The Strategy Process: Concepts, Contexts and Cases pp276-304 JB Quinn et al (1988) Englewood Cliffs, New Jersey: Prentice Hall International Editions
73. Eccles RG (1980) Subcontracing & Management in the Homebuilding Industry: The Role of the Quasi-firm Draft Paper Harvard Business School
74. Miles R & Snow C (1978) Organisational Strategy, Structure & Process New York: McGraw Hill
75. Mintzberg H (1979) The Structuring of Organisations in The Strategy Process: Concepts, Contexts and Cases pp276-304 JB Quinn et al (1988) Englewood Cliffs, New Jersey: Prentice Hall International Editions
76. Burns T & Stalker GM (1961) The Management of Innovation London: Tavistock Press
77. Lawrence P & Lorsch J (1967) Organisation & Environment Cambridge, Mass: Harvard Business School
78. Miles R & Snow C (1978) Organisational Strategy, Structure & Process New York: McGraw Hill
79. Mintzberg H (1979) The Structuring of Organisations in The Strategy Process: Concepts, Contexts and Cases pp276-304 JB Quinn et al (1988) Englewood Cliffs, New Jersey: Prentice Hall International Editions
80. Barnard C (1938) The Functions of the Executive. Cambridge, Mass: Harvard University Press
81. Weber M (1964) The Theory of Social & Economic Organisation New York: The Free Press
82. Crozier M (1964) The Bureaucratic Phenomenon Chicago: The University of Chicago Press
83. Parkinson CN (1957) Parkinson's Law & Other Studies in Administration. Boston, Mass: Houghton Mifflin
84. Pfefer J (1980) Management as Symbolic Action: The Creation and Maintenance of Organisational Paradigms in Research in Organisational Behaviour Vol 3. Cummings, Larry & Staw, Barry eds. Greenwich, Conn: JAI Press
85. Schumpeter JA (1961) The Theory of Economic Development Cambridge, Mass: Harvard University Press
86. Lawrence P & Lorsch J (1967) Organisation & Environment Cambridge, Mass: Harvard Business School

87. Miles R & Snow C (1978) Organisational Strategy, Structure & Process New York: McGraw Hill
88. Ouchi WG & Jaeger A (1978) Type Z Organisation: Stability in the Midst of Mobility. The Academy of Science Review pp305-314 April 1978
89. Davis S & Lawrence P (1977) Matrix. New York: Addison - Wesley
90. Sayles LR (1976) Matrix Management: The Structure with a Future Organisational Dynamics pp2-17 Autumn 1976
91. Galbraith J (1973) Designing Complex Organisations New York: Addison - Wesley
92. Lawrence P & Dyer D (1983) Renewing American Industry p315 New York: The Free Press: A Division of Macmillan, Inc.
93. Ibid p320
94. Ibid p320
95. Weick KE (1980) The Social Psychology of Organising 2 ed. Reading, Mass: Addison - Wesley
96. Lawrence P & Lorsch J (1967) Organisation & Environment. Cambridge, Mass: Harvard Business School
97. Miller D & Friesen P (1984) Organisations: A Quantum View Englewood Cliffs, New Jersey: Prentice Hall. Appendix 4.2. provides a detailed definition of the variables. Variables 30 and 31 are omitted here.
98. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p149. Baltimore:The John Hopkins University Press. A 5-point scale is added to represent the movement from Flexible to Specific
99. Lawrence P & Dyer D (1983) Renewing American Industry p33 & 298 New York: The Free Press: A Division of Macmillan, Inc.
100. Ibid p4-7
101. Miller D & Friesen P (1984) Organisations:A Quantum View App 4.2 Englewood Cliffs, New Jersey: Prentice Hall
102. Lawrence P & Dyer D (1983) Renewing American Industry p 5-7 & p300-301 New York:The Free Press: A Division of Macmillan, Inc.
103. Miles R & Snow C et al (1978) Organisation Strategy, Structure & Process p524-525 in Quinn JB, Mintzberg H & James RM (1988) The Strategy Process:Concepts. Contexts & Cases. Englewood Cliffs, New Jersey: Prentice Hall International Editions
104 Miller D & Friesen P (1984) Organisations: A Quantum View App 4.2 Englewood Cliffs, New Jersey: Prentice Hall
105. Ibid
106. Lawrence P & Dyer D (1983) Renewing American Industry p10-12 New York: The Free Press: A Division of Macmillan, Inc.
107. Ibid p271-274 & p299
108. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p149 Baltimore: The John Hopkins University Press
109. Lawrence P & Dyer D (1983) Renewing American Industry p10-11 New York: The Free Press: A Division of Macmillan, Inc.
110. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p71-72 Baltimore: The John Hopkins University Press
111. Lawrence P & Dyer D (1983) Renewing American Industry p8 New York: The Free Press: A Division of Macmillan, Inc.

112. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p68-71 Baltimore: The John Hopkins University Press
113. Ibid p68-71

CHAPTER 4

1. Robinson G (1966) Carpets p8. London: Pitman
2. Ibid p8
3. Ibid p72
4. Ibid p10
5. Ibid p10
6. Ibid p11
7. Ibid p11
8. Bartlett JN (1976) Carpeting the Millions. Edinburgh: John Donald
9. Smith LD (1986) The Carpet Weavers of Kidderminster 1780-1850 Kidderminster: K. Tomkinson Ltd.
10. Ibid p2
11. Robinson G (1966) Carpets p12. London: Pitman
12. Ibid p12
13. Ibid p12
14. Ibid p12
15. Silverman HA Ed (1946) Studies in Industrial Organisation p299 London: Methuen
16. Ibid p300
17. Ibid p301
18. Ibid p301
19. Carpet Annual, 1949. London: Haymarket Press
20. Ibid
21. Federation of British Carpet Manufacturers, Annual Report 1954 p7 London: Federation of British Carpet Manufacturers
22. Board of Trade (Working Party) Reports 1947 Carpets. London: HMSO
23. Ibid p5
24. Ibid p5
25. Silverman HA Ed (1946) Studies in Industrial Organisation p272 London: Methuen
26. Federation of British Carpet Manufacturers, Annual Report 1963 p6 London: Federation of British Carpet Manufacturers
27. Board of Trade (Working Party) Reports 1947 Carpets. London: HMSO
28. Brinton RS (1939) Carpets p128. London: Pitman
29. Bartlett JN (1976) Carpeting the Millions p95. Edinburgh: John Donald
30. Board of Trade (Working Party) Reports 1947 Carpets p18. London:HMSO
31. Brinton RS (1939) Carpets p65. London: Pitman
32. Ibid p128
33. Carpet Annual 1948. London: Haymarket Press
34. Board of Trade (Working Party) Reports 1947 Carpets London: HMSO
35. Ibid
36. Silverman HA Ed (1946) Studies in Industrial Organisation p283 London: Methuen
37. Ibid p294
38. Bartlett JN (1976) Carpeting the Millions p96. Edinburgh: John Donald

39. Silverman HA Ed (1946) Studies in Industrial Organisation p294 London: Methuen
40. Board of Trade (Working Party) Reports 1947 Carpets p10. London:HMSO
41. Ibid p10
42. Silverman HA Ed (1946) Studies in Industrial Organisation p278 London: Methuen
43. Ibid p277
44. Carpet Annual 1949. London: Haymarket Press
45. Robinson G (1966) Carpets p12. London: Pitman
46. Federation of British Carpet Manufacturers, Annual Report p11 1963 London: Federation of British Carpet Manufacturers
47. Ibid Annual Report p11 1969
48. Ibid Annual Report p10 1954
49. Ibid p10
50. Ibid p9
51. Ibid p10
52. Ibid p21
53. Ibid p10
54. Ibid Annual Report p16 1955
55. Scott TWK (1976) Diffusion of New Technology in the British & West German Carpet Manufacturing Industries: The Case of the Tufted Process D Phil Thesis University of Sussex p60-65 and AppIV & VII
56. Ibid p60 and Table 8.3 p266
57. Federation of British Carpet Manufacturers, Annual Report p4 1955 London: Federation of British Carpet Manufacturers
58. Ibid Annual Report p2 1959
59. Scott TWK (1976) Diffusion of New Technology in the British & West German Carpet Manufacturing Industries: The Case of the Tufted Process D Phil Thesis University of Sussex p60 -65 and App IV & VII
60. Federation of British Carpet Manufacturers, Annual Report p8 1962 London: Federation of British Carpet Manufacturers
61. Scott TWK (1976) Diffusion of New Technology in the British & West German Carpet Manufacturing Industries: The Case of the Tufted Process D Phil Thesis University of Sussex p60-65 and App Iv & VII
62. Ibid p60 and Table 8.3 p266
63. Federation of British Carpet Manufacturers, Annual Report p4 1966 London: Federation of British Carpet Manufacturers
64. Ibid Annual Report p8 1968
65. Ibid Annual Report p2 1973
66. Ibid p2
67. Ibid Annual Report p2 1974
68. British Carpet Manufacurers' Association Annual Report p2 1975 London: British Carpet Manufacturers' Association
69. Institute of Manpower Studies (1979) Manpower in the Carpet Industry: Expected Developments over the next Ten Years Vol 1 p24. Wilmslow: Carpet Industry Training Board
70. Ibid p6
71. Ibid p20
72. Ibid Vol 2 p22.
73. Ibid Vol 1 p22.
74. Ibid p20
75. Ibid p24
76. Ibid p17
77. Ibid p18

78. Ibid p11, all figures in this paragraph
79. Ibid p11
80. Ibid p11 and Vol 2 Table 2.11 p7
81. Ibid p15
82. Ibid p17
83. Ibid Vol 2 Table 3.1 p12
84. Ibid Vol 1 p17
85. Ibid p17
86. Ibid p18 -19
87. Ibid p36
88. Ibid p36

CHAPTER 5

1. Unless otherwise shown the information in this section is extracted from Jacob B et al (1969) 1869 - 1969: Tomkinsons Carpets - One Hundred Years of Manufacture. Supplement in Carpet Review Weekly, pp10-63 January 1969. London: Carpet Review
2. Tomkinson K (1972) A Kidderminster Victorian Journal p33 Kidderminster: K. Tomkinson
3. Tomkinson K & Hall G (1975) Kidderminster Since 1800 p65 Kidderminster: Tomkinson & Hall
4. Tomkinson K (1972) A Kidderminster Victorian Journal p33 Kidderminster: K. Tomkinson
5. Ibid p59
6. Ibid p60
7. Ibid p33
8. Jacob B et al (1969) 1869 - 1969: Tomkinsons Carpets - One Hundred Years of Manufacture. Supplement in Carpet Review Weekly, pp10-63 January 1969. London: Carpet Review
9. Interview with Senior Executive
10. Directors' Report & Accounts 1959 - 1987 and Interviews with Senior Executives
11. Directors' Report & Accounts 1959 - 1964 and Interviews with Senior Executives
12. Directors' Report & Accounts 1965 - 1969 and Interviews with Senior Executives
13. Directors' Report & Accounts 1970 - 1979 and Interviews with Senior Executives
14. Directors' Report & Accounts 1980 - 1987 and Interviews with Senior Executives

CHAPTER 6

1. Information here is distilled from Chapter 5 of the Case Study and Interviews with Senior Executives
2. Ibid
3. Tattersall CEC (1934) A History of British Carpets South Benfleet, Essex: F.Lewis
4. Bartlet JN (1976) Carpeting the Millions. Edinburgh: John Donald.
5. Interviews with Senior Executives
6. Tomkinson K (1972) A Kidderminster Victorian Journal p32 Kidderminster: K. Tomkinson
7. Ibid p59

8. Ibid p60
9. Interview with Senior Executive
10. Tattersall CEC (1934) A History of British Carpets. South Benfleet Essex: F.Lewis
11. Bartlett JN (1976) Carpeting the Millions. Edinburgh: John Donald.
12. Robinson G (1966) Carpets. London: Pitman.
13. Interviews with Senior Executives
14. Robinson G (1966) Carpets, Chap 7. London: Pitman.
15. Ibid Chap 7
16. Ibid p88
17. Ibid Chap 7
18. Unless otherwise shown the information is extracted from Jacob B et al (1969) 1869 - 1969: Tomkinsons Carpets - One Hundred Years of Manufacture. Supplement in Carpet Review Weekly, pp10-63 January 1969. London: Carpet Review
19. Directors' Report & Accounts 1959 - 1987 and Interviews with Senior Executives
20. Interview with Senior Executive
21. Robinson G (1966) Carpets p12 and p131. London: Pitman.
22. Federation of British Carpet Manufacturers' Annual Report p11 1969 London: Federation of British Carpet Manufacturer
23. Robinson G (1966) Carpets Chap 14. London: Pitman.
24. Interviews with Senior Executives
25. Directors' Report & Accounts 1959 - 1987 and Interviews with Senior Executives
26. Interview with Senior Executive

CHAPTER 7
----

1. Miller D & Friesen P (1984) Organisations: A Quantum View Englewood Cliffs, New Jersey: Prentice Hall
2. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry. Baltimore: The John Hopkins University Press
3. Lawrence P & Dyer D (1983) Renewing American Industry New York: The Free Press: A Division of Macmillan Inc.
4. Structured Interviews with nominated Senior Executive with experience of the company throughout 1959 - 1986
5. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p149 Baltimore: The John Hopkins University Press
6. Structured Interviews with nominated Senior Executive with experience of the company throughout 1959 - 1986
7. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p148. Baltimore: The John Hopkins University Press
8. Ibid p149
9. Ibid p149
10. Ibid p149
11. Ibid p149
12. Bartlett JN (1976) Carpeting the Millions. Edinburgh: John Donald.
13. Smith LD (1986) Carpet Weavers & Carpet Masters 1780-1850 Kidderminster: K. Tomkinson Ltd.

14. Abernathy WJ (1978) The Productivity Dilemmma: Roadblock to Innovation in the Automobile Industry p149. Baltimore: The John Hopkins University Press
15. Ibid p149
16. Ibid p152
17. Ibid p149
18. Ibid p149
19. Structured Interview with Senior Executive
20. Abernathy WJ (1978) The Productivity Dilemmma: Roadblock to Innovation in the Automobile Industry p149. Baltimore: The John Hopkins University Press
21. Ibid p149
22. Ibid p148
23. Ibid p149
24. Ibid p149
25. Bartlett JN (1976) Carpeting the Millions. Edinburgh: John Donald.
26. Smith LD (1986) Carpet Weavers & Carpet Masters 1780-1850 Kidderminster: K. Tomkinson Ltd
27. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p149. Baltimore: The John Hopkins University Press
28. Ibid p149
29. Ibid p149
30. Ibid p149
31. Ibid p149
32. Ibid p149
33. Structured Interview wih Senior Executive
34. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p149. Baltimore: The John Hopkins University Press
35. Ibid p148
36. Ibid p149
37. Ibid p149
38. Ibid p149
39. Ibid p149
40. Ibid p149
41. Ibid p149
42. Ibid p153
43. Miller D & Friesen P (1984) Organisations: A Quantum View Englewood Cliffs, New Jersey: Prentice-Hall
44. Structured Interview with nominated Senior Executive with experience of the company throughout the period 1959 - 1986
45. Miller D & Friesen P (1984) Organisations: A Quantum View p89 Englewood Cliffs, New Jersey: Prentice-Hall
46. Ibid
47. Structured Interview with nominated Senior Executive with experience of the company throughout the period 1959 - 1986
48. Lawrence P & Dyer D (1983) Renewing American Industry New York: The Free Press: A Division of Macmillan Inc.
49. Abernathy WJ (1978) The Productivity Dilemma: A Roadblock to Innovation in the Automobile Industry. Baltimore: The John Hopkins University Press
50. Lawrence P & Dyer D (1983) Renewing American Industry p251 New York: The Free Press: A Division of Macmillan Inc

51. Ibid p257
52. Ibid p257
53. Mintzberg H (1983) Structure in Fives: Designing Effective Organisations Chap 10. Englewood Cliffs, New Jersey: Prentice-Hall International Editions
54. Structured Interview with nominated Senior Executive with experience of the Company throughout 1959 - 1986
55. Mintzberg H et al (1984) Strategy Formation in the University Setting in Quinn JB, Mintzberg H & James RM (1988) The Strategy Process: Concepts, Contexts & Cases pp649-660 Englewood Cliffs, New Jersey: Prentice-Hall International Editions.
56. Mintzberg H (1973) Strategy Making in Three Modes in Quinn JB, Mintzberg H & James RM (1988) The Strategy Process: Concepts, Contexts & Cases p84 Englewood Cliffs, New Jersey: Prentice-Hall International Editions.
57. Ibid
58. Ibid
59. Ibid
60. Lawrence P & Dyer D (1983) Renewing American Industry p321 New York: The Free Press: A Division of Macmillan Inc.
61. Miles R & Snow C et al (1978) Organisational Strategy, Structure & Process in Quinn JB, Mintzberg H & James RM (1988) The Strategy Process: Concepts, Contexts & Cases p529. Englewood Cliffs, New Jersey: Prentice-Hall International Editions
62. Ibid p526
63. Lawrence P & Dyer D (1983) Renewing American Industry p 257 New York: The Free Press: A Division of Macmillan Inc
64. Ibid p301-307
65. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p75. Baltimore: The John Hopkins University Press
66. Ibid p75
67. Lawrence P & Dyer D (1983) Renewing American Industry p301-307 New York: The Free Press: A Division of Macmillan Inc
68. Ibid p9
69. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p163-167. Baltimore: The John Hopkins University Press
70. Lawrence P & Dyer D (1983) Renewing American Industry p301 New York: The Free Press: A Division of Macmillan Inc
71. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p75. Baltimore: The John Hopkins University Press
72. Lawrence P & Dyer D (1983) Renewing American Industry p303 New York: The Free Press: A Division of Macmillan Inc
73. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p153. Baltimore: The John Hopkins University Press
74. Lawrence P & Dyer D (1983) Renewing American Industry p252 New York: The Free Press: A Division of Macmillan Inc
75. Ibid p318
76. Ibid p318
77. Ibid p257

78. Mintzberg H (1983) Structure in Fives: Designing Effective Organisations Chap 11. Englewood Cliffs, New Jersey: Prentice-Hall International Editions
79. Ibid p229
80. Lawrence P & Dyer D (1983) Renewing American Industry p252 New York: The Free Press: A Division of Macmillan Inc
81. Ibid p252
82. Ibid p325
83. Mintzberg H (1973) Strategy Making in Three Modes in Quinn JB, Mintzberg H & James RM (1988) The Strategy Process: Concepts, Contexts & Cases p84 Englewood Cliffs, New Jersey: Prentice-Hall International Editions.
84. Ibid p85
85. Miles R & Snow C et al (1978) Organisational Strategy, Structure & Process in Quinn JB, Mintzberg H & James RM (1988) The Strategy Process: Concepts, Contexts & Cases p528. Englewood Cliffs, New Jersey: Prentice-Hall International Editions.
86. Lawrence P & Dyer D (1983) Renewing American Industry p325 New York: The Free Press: A Division of Macmillan Inc
87. Ibid p325
88. Ibid p325
89. Ibid p301-302
90. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p168. Baltimore: The John Hopkins University Press
91. Lawrence P & Dyer D (1983) Renewing American Industry p325 New York: The Free Press: A Division of Macmillan Inc
92. Ibid p318
93. Ibid p325
94. Ibid p8
95. Ibid p325
96. Minsberg H (1983) Structure in Fives: Designing Effective Organisations Chapter 12. Englewood Cliffs, New Jersey: Prentice-Hall International Editions.
97. Lawrence P & Dyer D (1983) Renewing American Industry p320 New York: The Free Press: A Division of Macmillan Inc
98. Mintzberg H (1973) Strategy Making in Three Modes in Quinn JB, Mintzberg H & James RM (1988) The Strategy Process: Concepts, Contexts & Cases p84 Englewood Cliffs, New Jersey: Prentice-Hall International Editions
99. Lawrence P & Dyer D (1983) Renewing American Industry p319 New York: The Free Press: A Division of Macmillan Inc
100. Ibid p321
101. Miles R & Snow C et al (1978) Organisational Strategy, Structure & Process in Quinn JB, Mintzberg H & James RM (1988) The Strategy Process: Concepts, Contexts & Cases p528. Englewood Cliffs, New Jersey: Prentice-Hall International Editions.
102. Lawrence P & Dyer D (1983) Renewing American Industry p315 New York: The Free Press: A Division of Macmillan Inc
103. Ibid p301-305
104. Ibid p9
105. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p69-71. Baltimore: The John Hopkins University Press

106. Ibid p166-167
107. Lawrence P & Dyer D (1983) Renewing American Industry p325 New York: The Free Press: A Division of Macmillan Inc
108. Ibid p325
109. Mintzberg H (1983) Structure in Fives: Designing Effective Organisations p269-270. Englewood Cliffs, New Jersey: Prentice-Hall International Editions.
110. Lawrence P & Dyer D (1983) Renewing American Industry p325 New York: The Free Press: A Division of Macmillan Inc
111. Ibid p325
112. Mintzberg H (1983) Structure in Fives: Designing Effective Organisations p269-270. Englewood Cliffs, New Jersey: Prentice-Hall International Editions.
113. Ibid
114. Lawrence P & Dyer D (1983) Renewing American Industry p315 New York: The Free Press: A Division of Macmillan Inc
115. Mintzberg H (1973) Strategy Making in Three Modes in Quinn JB, Mintzberg H & James RM (1988) The Strategy Process: Concepts, Contexts & Cases p85 Englewood Cliffs, New Jersey: Prentice-Hall International Editions.
116. Lawrence P & Dyer D (1983) Renewing American Industry p325 New York: The Free Press: A Division of Macmillan Inc
117. Ibid p325
118. Ibid p315 & p325
119. Ibid p301-303
120. Ibid p325
121. Ibid p301-303
122. Ibid p242
123. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p147-153. Baltimore: The John Hopkins University Press

CHAPTER 8

1 Information here is compiled from 'Brintons: The Story of a Middle Class Family' Unpublished company document. Author and Date Unknown
2. Ibid
3. Information here is compiled from company documents, mainly The Beacon, a quarterly internal publication and interviews with Senior Executives
3a Industry executives interviewed for this thesis support these claims
4. Ibid
5. Ibid
6. Ibid

CHAPTER 9

1. This is a summary of information contained in Chapter 8 of the Case Study
2 . Brintons: The Story of a Middle Class Family. Company document Author and date unknown
3 . Bartlett JN (1976) Carpeting the Millions. Edinburgh: John Donald.
4. Robinson G (1966) Carpets. London: Pitman.

5. Interviews with Senior Executives
6. Robinson G (1966) Carpets Chap 12. London: Pitman.
7. Ibid
8. As identified in material compiled for this study - see Key Events 1959 and 1969
9. Robinson G (1966) Carpets Chap 12. London: Pitman.
10. Interviews with Senior Executives
11. Brintons: The Story of a Middle Class Family Company document - Author and date unknown
12. Ibid
13. Ibid
14. Interviews with Senior Executives
15. Brintons: The Story of a Middle Class Family Company document - Author and date unknown
16. Ibid
17. Ibid
18. Ibid
19. Ibid
20. Interviews with Senior Executives
21. Compiled from material quoted in this study - see Key Events 1959 - 1986
22. Ibid
23. Ibid
24. Ibid
25. Ibid
26. Ibid
27. Ibid
28. Ibid
29. Ibid
30. Ibid
31. Ibid
32. Ibid
33. Ibid
34. Ibid
35. Ibid
36. Ibid
37. Ibid
38. Ibid
39. Interviews with Senior Executive
40. Compiled from Chapter 8 of this Case Study to highlight product information plus interviews with Senior Executives
41. Bartlett JN (1976) Carpeting the Millions. Edinburgh: John Donald.
42. Compiled from Chapter 8 of this Case Study to highlight product information plus interviews with Senior Executives
43. Ibid
44. Ibid
45. Ibid
46. Ibid
47. Ibid
48. Ibid
49. Ibid
50. Ibid
51. Interview with Senior Executive

CHAPTER 10

1. Miller D & Friesen P (1984) Organisations: A Quantum View Englewood Cliffs, New Jersey: Prentice-Hall
2. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry. Baltimore: The John Hopkins University Press
3. Lawrence P & Dyer D (1983) Renewing American Industry New York: The Free Press: A Division of Macmillan Inc
4. Structured interview with nominated Senior Executive with experience of the company throughout the period and related to information in previous sections of this Case Study
5. Lawrence P & Dyer D (1983) Renewing American Industry p6 New York: The Free Press: A Division of Macmillan Inc
6. Ibid p5
7. Ibid p5
8. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p149. Baltimore: The John Hopkins University Press
9. Structured interview with nominated Senior Executive with experience of the company throughout the period and related to information in previous sections of this Case Study
10. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p149. Baltimore: The John Hopkins University Press
11. Ibid p149
12. Ibid p149
13. Bartlett JN (1976) Carpeting the Millions. Edinburgh John Donald.
14. Smith LD (1986) Carpet Weavers & Carpet Masters 1780-1850 Kidderminster:K. Tomkinson Ltd.
15. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p149. Baltimore: The John Hopkins University Press
16. Ibid p149
17. Ibid p149
18. Ibid p149
19. Structured interview with nominated Senior Executive with experience of the Company throughout the period and related to information in previous sections of this Case Study
20. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p149. Baltimore: The John Hopkins University Press
21. Ibid p149
22. Ibid p149
23. Ibid p149
24. Ibid p149
25. Ibid p149
26. Bartlett JN (1976) Carpeting the Millions. Edinburgh: John Donald.
27. Smith LD (1986) Carpet Weavers & Carpet Masters 1780-1850 Kidderminster: K. Tomkinson Ltd.
28. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p149. Baltimore: The John Hopkins University Press
29. Ibid p149

30. Ibid p149
31. Ibid p149
32. Miller D & Friesen P (1984) Organisations: A Quantum View App 4.2 Englewood Cliffs, New Jersey: Prentice-Hall
33. Structured Interview with nominated Senior Executive with experience of the company throughout the period and related to information in previous sections of this case study
34. Lawrence P & Dyer D (1983) Renewing American Industry p4-13 New York: The Free Press: A Division of Macmillan Inc
35. Ibid p325
36. Ibid p325
37. Ibid p12
38. Ibid p12 & p271
39. Ibid p4-13
40. Ibid p12 & p271
41. Ibid p325
42. Ibid p320
43. Miller D & Friesen P (1984) Organisations: A Quantum View p89 Englewood Cliffs, New Jersey: Prentice-Hall
44. Ibid Appendix 4.2
45. Structured Interview with nominated Senior Executive with experience of the company throughout the period and related to information in previous sections of this case sudy
46. Mintzberg H (1973) Strategy Making in Three Modes in Quinn JB, Mintzberg H & James RN (1988) The Strategy Process: Concepts, Contexts & Cases p88 Englewood Cliffs, New Jersey: Prentice-Hall International Editions
47. Miles R & Snow C et al (1978) Organisational Stratgy, Structure & Process in Quinn JB, Mintzberg H & James RN (1988) The Strategy Process: Concepts, Contexts & Cases p526. Englewood Cliffs, New Jersey: Prentice-Hall International Editions
48. Ibid p526
49. Lawrence P & Dyer D (1983) Renewing American Industry p325 & p315 New York: The Free Press: A Division of Macmillan Inc
50. Mintzberg H (1973) Strategy Making in Three Modes in Quinn JB, Mintzberg H & James RN (1988) The Strategy Process: Concepts, Contexts & Cases p82 Englewood Cliffs, New Jersey: Prentice-Hall International Editions
51. Miles R & Snow C et al (1978) Organisational Strategy, Structure & Process in Quinn JB, Mintzberg H & James RN (1988) The Strategy Process:Concepts, Contexts & Cases p527. Englewood Cliffs, New Jersey:Prentice-Hall International Editions
52. Lawrence P & Dyer D (1983) Renewing American Industry p325 New York: The Free Press: A Division of Macmillan Inc
53. Mintzberg H (1973) Strategy Making in Three Modes in Quinn JB. Mintzberg H & James RN (1988) The Strategy Process p85 Englewood Cliffs, New Jersey: Prentice-Hall International Editions.
54. Lawrence P & Dyer D (1983) Renewing American Industry p301-303 New York: The Free Press: A Division of Macmillan Inc
55. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry Chap 4. Baltimore: The John Hopkins University Press
56. Lawrence P & Dyer D (1983) Renewing American Industry p325 New York: The Free Press: A Division of Macmillan Inc

57. Ibid p303
58. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p163-167. Baltimore: The John Hopkins University Press
59. Lawrence P & Dyer D (1983) Renewing American Industry p301 New York: The Free Press: A Division of Macmillan Inc
60. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry Chap 4. Baltimore: The John Hopkins University Press
61. Lawrence P & Dyer D (1983) Renewing American Industry p8 New York: The Free Press: A Division of Macmillan Inc

CHAPTER 11
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1. Whipp R & Clark P (1986) Innovation & the Auto Industry London: Frances Pinter (Publishers) Also Child J & Smith C (1987) The Context & Process of Organisational Transformation - Cadbury Limited in its Sector. Journal of Management Studies 24 vol 6 pp565-588 November 1987
2. Lawrence P & Dyer D (1983) Renewing American Industry p326 & 331 New York: The Free Press: A Division of Macmillan Inc
3. Miles R and Snow C (1978) Organisational Strategy: Structure and Process New York:McGraw-Hill
4. Lawrence P & Dyer D (1983) Renewing American Industry New York: The Free Press: A Division of Macmillan Inc
5. Ibid Chapter 1
6. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry p167. Baltimore: The John Hopkins University Press
7. Miles R et al (1978) Organisational Strategy, Structure and Process in Quinn JB et al (1988) The Strategy Process Concepts, Contexts & Cases p524 - 530. Englewood Cliffs, New Jersey:Prentice-Hall International Editions
8. Mintzberg H (1973) Strategy-Making in Three Modes in Quinn JB et al (1988) The Strategy Process:Concepts, Contexts & Cases pp82-89 Englewood Cliffs, New Jersey: Prentice-Hall International Editions
9. Miles R et al (1978) Organisational Strategy, Structure and Process in Quinn JB et al (1988) The Strategy Process Concepts, Contexts & Cases pp524-530 Englewood Cliffs, New Jersey: Prentice-Hall International Editions
10. Ibid
11. Lawrence P & Dyer D (1983) Renewing American Industry p241 New York: The Free Press: A Division of Macmillan Inc
12. Ibid Chap 1
13. Ibid Chap 1
14. Ibid Chap 1
15. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry. Baltimore: The John Hopkins University Press
16. Lawrence P & Dyer D (1983) Renewing American Industry Chap 1 New York:The Free Press: A Division of Macmillan Inc
17. Ibid p x & p334 - 335
18. Abernathy WJ (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry. Baltimore: The John Hopkins University Press

APPENDIX I

DEFINITIONS OF THE VARIABLES: Source Appendix 4-2 Miller D & Friesen P (1984) Organisations: A Quantum View. Prentice-Hall Inc. Englewood Cliffs, New Jersey

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ENVIRONMENT

DYNAMISM in the environment is manifested by the amount and unpredictability of change in customer tastes, production or service technologies, and the modes of competition in the firm's principal industries.

v1. Past dynamism refers to dynamism which existed x years before the case date

Much less than other firms	1	2	3	4 same	5	6	7	Much greater than other firms *

*Scales are identical for all variables except V11

v2. Current dynamism

HETEROGENEITY in the environment concerns the differences in competitive tactics, customer tastes, product lines, channels of distribution, and so on, across the firm's respective markets. These differences are significant only to the extent that they require very different marketing, production and administrative practices.

v3. Past heterogeneity
v4 Current heterogeneity

HOSTILITY in the environment is evidenced by price, product, technological and distribution competition, severe regulatory restrictions, shortages of labour or raw materials, and unfavourable demographic trends.

v5. Past hostility
v6. Current hostility

ORGANISATION

v7. SCANNING involves the search for problems and opportunities in the external environment of the firm. Firms are to be scored in terms of the amount of tracking performed of consumer tastes, competition, technological and administrative developments, and the like. The greater the number of factors tracked and the more widespread the participation in scanning activity, the higher the score.

v8 DELEGATION of operating authority concerns the amount of authority transferred to lower and middle levels of management for administration of the day-to-day operation of the business.

v9 CENTRALISATION of strategy-making power involves the distribution of power for making strategic decisions regarding acquisitions, diversification, major new product introductions, long-term goals etc.

v10 RESOURCE AVAILABILITY concerns the state of the firm's material and human resource supply.

v11 MANAGEMENT TENURE measures the length of time the most important strategist or executive of the firm has been in the post. If it is more than five years, score 2: if less, score 1

v12 CONFLICT gauges the amount of dissent, overt or covert dis - satisfaction, and hostility among members of the firm. Conflict may concern organisational goals and means. It may be indicated if it takes very long to arrive at a consensus on courses of action, if turnover is high, if there is much politicking etc.

v13 CONTROLS monitor the internal trends and incidents relevant to organisational performance. MIS, performance appraisals, quality controls, cost and profit centres, budgeting, cost accounting are all control devices.

v14 TEAM SPIRIT involves the desire on the part of employees to work diligently to achieve organisational objectives and to do so in concert with others so that team goals take precedence over individual needs

v15 COMMUNICATION concerns the openness and fidelity of information channels in the organisation. A high score is given when information reaches decision makers quickly, when it is relevant and undistorted, and when communication flows readily in top-down bottom-up, and lateral directions.

v16 DIFFERENTIATION measures the degree of difference among organisational divisions in terms of their overall goals, marketing and production methods and decision-making styles. The more disparate the divisions, the higher the score.

v17 TECHNOCRATISATION - do there appear to be a great many staff specialists and professionally qualified people (accountants, engineers. etc) as a percentage of the number of employees?

v18 SUCCESS - is strategy perceived to be intelligent and sound?

STRATEGY
----

v19 PRODUCT-MARKET INNOVATION does the firm seem particularly innovative in terms of the number and novelty of new products and services that are introduced and the new markets that are entered?

v20 ADAPTIVENESS OF DECISIONS concerns the responsiveness and appropriateness of decisions to external environmental conditions. Unadaptive decisions (low score) would consistently neglect an important set of external factors.

v21 INTEGRATION OF DECISIONS - are actions in one area of the firm complementary or supportive of those in other areas or are they conflicting and mutually inhibiting? High integration would result in/from a concerted and well-coordinated strategy.

v22 ANALYSIS OF DECISION MAKING - do decision makers devote much reflective thought and deliberation to a problem and the array of proposed responses?

v23 MULTIPLEXITY OF DECISIONS - do top managers address a broad range of factors in making strategic decisions or merely a narrow set of factors?

v24 FUTURITY OF DECISIONS concerns how far ahead the firm looks into the future in planning its strategies and operations. A relatively long time horizon (five years) warrants a high score.

v25 PROACTIVENESS OF DECISIONS - does the firm react to trends in its environment, or does it shape the environment by introducing new products, technologies etc. A reactive firm (low proactiveness) follows the leader; a proactive firm is the first to act.

v26 INDUSTRY EXPERTISE OF TOP MANAGEMENT - are top managers very familiar with their products and markets? That is are they in a position to make the most routine decisions because of their excellent knowledge of internal operations and the outside environment, or are managers removed from the field of action and cognizant only of the very gross aspects of the big picture (low score)

v27 RISK TAKING - is there evidence that top managers are risk averse (low score) or does the firm frequently make large and risk resource commitments?

v28 CONSCIOUSNESS OF STRATEGIES concerns the degree of conscious commitment to an explicit corporate strategy ie a set of objectives coupled with stated means for attaining these. Unclear goals (low score)

v29 TRADITIONS - does the firm often rethink its strategies or are these tied largely to precedent

APPENDIX II

PRODUCTIVE UNIT CHARACTERISTICS: Source Abernathy W (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry The John Hopkins University Press/Baltimore & London Table 7.1 p147 -152

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v1 PRODUCT Overall there is progress toward a dominant design. Initially a productive unit accommodates substantial product variety and each product is specialised in the sense that it has limited breadth and duration in market appeal - it is virtually produced to customer order. Evolutionary progression ultimately leads to a high-volume, functionally standardised product.

Scale*	1	2	3	4	5
	Flexible custom product				Specific standard product

* same scale is used for all variables

v2 PRODUCTION FACILITIES as a productive unit develops from initial conditions to those of the later stages, the configuration of the production process is altered from one that affords a high degree of independence among included operations and tasks (eg job shop)to one with a high degree of integration and balance among these operations(eg continuous flow).

v3 TASK & LABOUR CHARACTERISTICS Task characteristics and the skills sought in the work force shift with development from high trade/craft skill and manual tasks towards operative skills/maintenance skills

v4 PROCESS EQUIPMENT as the productive unit develops the type of equipment changes from general purpose, independent equipment to equipment that is designed, integrated and purchased as a system

v5 SOURCING OF INPUTS as the productive unit develops changes take place in the types of material input that are utilised and in the sources for these inputs. Initially materials used are commonly available through traditional supply sources. In highly developed stages the materials are special and supply sources are wholly devoted.

v6 CAPACITY - initially the capacity is centralised, it includes heterogenous technologies and capacity limits are ill-defined since the process itself is unstructured. In a highly developed state capacity is very specific it includes homogeneous technologies and it is provided by a decentralised and independent facility.

v7 PRODUCT & PROCESS CHANGE the nature of change evolves from frequent, fluid and novel product changes toward conditions of stability. A dominant design increases the level of change directed at design refinement and cost reduction.

Appendix III

BRITISH CARPET INDUSTRY 1950 - 1985: INDUSTRY & COMPANY CHANGES

Note - 'changes' refer to markets, products, technology and work processes, resources, structure and controls, performance indicators

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1. What were the main changes?

2. What triggered these changes?

3. What were the main issues affecting these changes?
   (eg resources, implementation, acceptance, communication, etc)

4. Who were the key figures?

5. What were the major opportunities and constraints influencing these changes?

6. How was competitive strategy affected?

7. What control mechanisms were necessary?

8. What were the effects on existing arrangements?

9. Were there differences between planned and actual outcomes?

10. Why were some outcomes more successful than others?

S Probert
Summer 1987

APPENDIX II

CONFIDENTIAL

ASTON UNIVERSITY - DOCTORAL PROGRAMME

QUESTIONNAIRE* for Ph.D thesis

An interpretation of the environment and related organisation strategy and structure of selected organisations in the British carpet industry 1950 - 1985

Shirley Probert
Summer 1987

* ADAPTED FROM MILLER D & FRIESEN P (1984) ORGANISATIONS: A QUANTUM VIE[W] P162

Aston University

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BIBLIOGRAPHY

1. General

ABERNATHY W J (1978) The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry. Baltimore: The John Hopkins University Press

ALDRICH HE (1979) Organisations and Environments. New York:Prentice-Hall

ALFORD BWE (1973) WD & HO Wills and the Development of the UK Tobacco Industry 1786 - 1965. London:Methuen

ANDERSON CR & PAINE FT (1975) Personal Values and Corporate Strategy Academy of Management Journal Vol 18, pp811-823 December 1975

ATKINSON IMS (1984) The Flexible firm Shapes Up: Economics Agenda in The Guardian p19 col.1 18 April 1984 London:Guardian Newspaper Ltd

BARKER TC (1977). The Glassmakers:Pilkington: The Rise of an International Company 1826 - 1976. London: Weidenfeld & Nicolson

BARNARD C (1938) The Functions of the Executive Cambridge, Mass: Harvard University Press

BRADLEY D & WILKIE R (1974) The Concept of Organisation: An Introduction. Glasgow: Blackie.

BRECH EF (1965) Organisation: The framework of Management. London: Longmans.

BRITTAN JW & FREEMAN JH (1980) Organisational Profliferation and Density Dependent Selection in Organisation Life Cycles Ed Kimberkey, JR et al (1980). London: Jossey-Bass

BROOKS E (1980) Organisational Change: The Managerial Dilemma. London: Macmillan

BROWN M Ed.(1967) The Theory and Empirical Analysis of Production. New York: Columbia University Press

BURNS T & STALKER G (1961) The Management of Innovation London: Tavistock Press

CARNALL CA (1982) The Evaluation of Organisational Change. Aldershot: Gower

CHANDLER AD (1962) Strategy and Structure: Chapters in the History of the Industrial Enterprise. Cambridge, Mass:The MIT Press

CHANDLER AD (1977) The Visible Hand: The Managerial Revolution in American Business. Cambridge, Mass: Harvard University Press

CHANDLER AD & DAEMS H (1980) Managerial Hierarchies: Comparative Perspectives on the Rise of the Modern Industrial Enterprise. Cambridge, Mass: Harvard University Press

CHANNON DF (1973) Strategy and Structure of British Enterprise. Boston: Harvard University Press

CHAPMAN S (1974) Jesse Boot of Boots the Chemists: A Study in Business History. London: Hodder & Stoughton

CHILD J (1972) Organisational Structure, Environment and Performance the Role of Strategic Choice Sociology 6, pp1-22 January 1972

CHILD J & SMITH C (1987) The Context and Process of Organisational Transformation - Cadbury Limited in its Sector Journal of Management Studies Vol 24:6 pp565-588 November 1987

CLARK PA & STARKEY K (1988) Organisation Transitions and Innovation-Design. London:Pinter Publications,

COCHRAN TC (1977) 200 Years of American Business. New York:McGraw Hill

COLEMAN DC (1969) Courtaulds: an Economic and Social History Vols I and II. Oxford: Clarendon Press

COLEMAN DC (1980) Courtaulds: an Economic and Social History: Crisis and Change, Vol III. Oxford: Clarendon Press

CROZIER M (1964) The Bureaucratic Phenomenon Chicago: The University of Chicago Press

DAVID PA (1975) Technical Innovation and Economic Growth: Essays on American & British Experience in the Nineteenth Century. Cambridge: Cambridge University Press.

DAVIS S & LAWRENCE P (1977) Matrix New York: Addison-Wesley

ECCLES RG (1980) Subcontracting and Management in the Homebuilding Industry: The Role of the Quasi-Firm Draft Paper, Harvard Business School.

GALBRAITH J (1973) Designing Complex Organisations. New York: Addison - Wesley

GOLDSMITH W & CLUTTERBUCK D (1984) The Winning Streak. Harmondsworth, Middx: Penguin Books Ltd

HAMBRICK D et al (1982) Strategic Attributes & Performance in the Four Cells of the BCG Matrix. Academy of Management Journal 25 pp510-31 1982

HANNAH L Ed (1976) Management Strategy and Business Development: An Historical & Comparative Study. London: Macmillan.

HANNAH L (1976) The Rise of the Corporate Economy. London: Methuen.

HANNAH L & KAY JA (1977) Concentration in Modern Industry: Theory, Measurement and the UK Experience. London: Macmillan.

HICKSON DJ et al (1969) Operations Technology and Organisation Structure: An Empirical Reappraisal Administrative Science Quarterly 14 No 3 pp378-397 September 1969

HOFER CW (1975) Toward a Contingency Theory of Business Strategy Academy of Management Journal Vol 18 pp784-810 December 1975

HOLDAWAY EA et al (1975) Dimensions of Organisations in Complex Societies: The Educational Sector Administrative Science Quarterly 20 pp37-58 1975

JOHNSON G Ed (1987) Business Strategy and Retailing. Chichester, West Sussex: John Wiley & Sons Ltd

JONES R & MARRIOTT (1970) Anatomy of a Merger: A history of GEC, AEI and English Electric. London: Jonathan Cape.

KANTER RM (1983) The Change Masters. London: Unwin Paperbacks 4th imp

KIMBERLY JR & MILES RH (1980) The Organisation Life Cycle. San Francisco: Jossey-Bass

LAWRENCE PR & DYER D (1983) Renewing American Industry. New York: The Free Press: A Division of Macmillan, Inc.

LAWRENCE PR & LORSCH JW (1967) Organisation & Environment Cambridge, Mass: Harvard Business School

LITTERER JA (1963) Organisations: Structure and Behaviour. Chichester, West Sussex: John Wiley & Sons Ltd

MARCH J & OLSEN J (1976) Ambiguity & Choice in Organisations Bergen, Norway: Universitetsforlaget

McKELVEY B (1975) Guidelines for the Empirical Classification of Organisations Administrative Science Quarterly 20 pp509-525 1975

McKELVEY B (1978) Organisational Systematics: Taxonomic Lesson from Biology Management Science 24 pp1428-40 1978

MERRETT AJ & LEHR ME (1971) The Private Company Today: An investigation into the economic position of the unquoted company in the UK. London: Gower Press.

MILES RE & SNOW CC (1978) Organisational Strategy, Structure & Process. New York: McGraw-Hill

MILES RE & SNOW CC (1978) Organisational Strategy, Structure & Process in Quinn JB et al (1988) The Strategy Process: Concepts, Contexts & Cases pp518-530 Englewood Cliffs, New Jersey: Prentice-Hall International Editions

MILLER D & FRIESEN PH (1984) Organisations: A Quantum View. Englewood Cliffs, New Jersey: Prentice-Hall

MILLER D & MINTZBERG H (1984) The Case for Configuration in Miller D & Friesen P (1984) Organisations: A Quantum View Chap 1 Englewood Cliffs, New Jersey: Prentice-Hall

MINTZBERG H (1973) Strategy Making in Three Modes in Quinn JB et al (1988) The Strategy Process: Concepts, Contexts & Cases pp82-89 Englewood Cliffs, New Jersey: Prentice-Hall International Editions

MINTZBERG H (1979) The Structuring of Organisations in Quinn JB et al (1988) The Strategy Process: Concepts, Contexts & Cases pp276-304 Englewood Cliffs, New Jersey: Prentice-Hall International Editions

MINTZBERG H (1983) Structure in Fives: Designing Effective Organisations. Englewood Cliffs, New Jersey: Prentice-Hall International Editions.

MINTZBERG H et al (1984) Strategy Formation in the University Setting pp649-660 in JB Quinn et al (1988) The Strategy Process: Concepts, Contexts & Cases Englewood Cliffs, New Jersey: Prentice-Hall International Editions

MUSSON AE (1978) The Growth of British Industry. London: Batsford (BT) Ltd.

OHMAE K (1982) The Mind of the Strategist: Business Planning for Competitive Advantage. Harmondsworth, Middx: Penguin Books Ltd

OUCHI WG & JAEGER A (1978) Type Z Organisation: Stability in the Midst of Mobility The Academy of Science Review pp305-314 April 1978

PARKINSON CN (1957) Parkinson's Law & Other Studies in Administration Boston, Mass: Houghton Mifflin

PAYNE PL (1974) British Entrepreneurship in the Nineteenth Century: Studies in Economic History. Economic History Society. London: Macmillan.

PETERS T & AUSTIN N (1986) A Passion for Excellence. Glasgow: Fontana/Collins

PETERS T & WATERMAN RH (1982) In search of Excellence. New York: Harper & Row Publishers

PETTIGREW A (1973) The Politics of Organisational Decision Making. London: Tavistock

PETTIGREW A (1979) On studying Organisation Cultures Administrative Science Quarterly (4) pp570-581 1979

PETTIGREW A (1985) The Awakening Giant: Continuity and Change in ICI. Oxford: Blackwell

PFFEFER J (1980) Management as Symbolic Action: The Creation and Maintenance of Organisational Paradigms in Research in Organisational Behaviour Vol 3 Cummings, Larry & Staw, Barry Eds. Greenwich, Conn: JAI Press

PUGH DS et al (1968) Dimensions of Organisation Structure Administrative Science Quarterly 13 pp65-105 1968

QUINN JB, MINTZBERG H & JAMES RM (1988) The Strategy Process: Concepts, Contexts, & Cases. Englewood Cliffs, New Jersey: Prentice-Hall International Editions

READER WJ (1970) Imperial Chemical Industries: A History Vol 1 - The Forerunners 1870 - 1926. London: Oxford University Press.

READER WJ (1975) Imperial Chemical Industries: A History Vol 2 - The First Quarter Century. London: Oxford University Press.

READER WJ (1976) Metal Box - a History. London: Heinemann.

RUMELT RP (1974) Strategy, Structure & Economic Performance Cambridge, Mass: Division of Research, Graduate School of Business Administration, Harvard University

SAYLES LR (1976) Matrix Management: The Structure with a Future Organisational Dynamics pp2-17 Autumn 1976

SCHUMPETER JA (1961) The Theory of Economic Development Cambridge, Mass: Harvard University Press

SMITH GD & STEADMAN LE (1981) Present Value of Corporate History Harvard Business Review Vol 59 No 6 pp164-173 Nov/Dec 1981 .

STARBUCK WH & HEDBERG B (1976) Saving an Organisation from a Stagnating Environment in Strategy + Structure = Performance Thorelli H Ed. (1977) Chap 12 Indiana: Indiana University Press

SUPPLE B Ed (1977) Essays in British Business History. London: Oxford University Press.

THOMPSON JD (1967) Organisations in Action. New York: McGraw-Hill

USELDING P (1981) The History of Business and the Future Education of Managers: Paper for 'The Use of Business History in Management Teaching' A Conference at the London Business School, 2 October 1981.

VAN DER HAAS H (1967) The Enterprise in Transition - An Analysis of the European and American Practice. London: Tavistock Publications.

WEBER M (1964) The Theory of Social & Economic Organisation New York: The Free Press

WEICK KE (1980) The Social Psychology of Organising 2 Ed Reading, Mass: Addison- Wesley

WEINSHALL TD, YAEL A & RAVE H (1983) Managing Growing Organisations. Chichester, West Sussex: John Wiley & Sons Ltd..

WHIPP R & CLARK P (1986) Innovation and the Auto Industry. London: Frances Pinter (Publishers)

WILSON CH , The History of Unilever: A Study in Economic Growth and Social Change Vols 1 & 2. London: Cassell.

WOODWARD J, (1965) Industrial Organisations: Theory & Practice. London: Oxford University Press.

2. Carpets

ANON: Brintons - The Story of a Middle Class Family Undated & Unpublished company document at Brintons Limited, Kidderminster, Worcs

BARTLET JN (1967) The Mechanisation of the Carpet Industry Business History Vol 9 No 1 pp49-69 January (1967)

BARTLETT JN (1976) Carpeting the Millions. Edinburgh: John Donald.

BEACON (The) 1951 - 1987 Quarterly internal company publication Kidderminster: Brintons Limited

BEAUMONT R (1924) Carpets and Rugs: History and Manufacture. London: Scott, Greenwood & Son Ltd.

BOARD OF TRADE (WORKING PARTY) REPORTS (1947) Carpets London: HMSO

BRADBURY F (1904) Carpet Manufacture. Halifax, Yorks: Langdale House.

BRINTON RS (1939) Carpets. London: Pitman.

BRINTONS LIMITED Directors' Report & Accounts 1969 - 1986 Kidderminster: Brintons Limited

BRITISH CARPET MANUFACTURERS' ASSOCIATION: Annual Reports 1954 - 1985 (Formerly Federation of British Carpet Manufacturers) London: British Carpet Manufacturers' Association

CARPET ANNUAL 1936, 1948 and 1949 London: Haymarket Press

COLE AH & WILLIAMSON HG (1941) The American Carpet Manufacture A History and Analysis 1750 - 1930. Cambridge, Mass: Harvard University Press.

EWING J & NORTON NP (1955) Broadlooms and Businessmen: A History of the Bigelow-Sanford Carpet Company. Cambridge, Mass: Harvard University Press.

FEDERATION OF BRITISH CARPET MANUFACTURERS: Annual Reports - See British Carpet Manufacturers' Association above

HALL RJ (1978) The Carpet Industry 1975 - 1982: Economic Environment Sales and Costs. Slough: Staniland Hall Associates Ltd..

HARTE NB & PONTING KG Eds (1973) Textile History and Economic History. Manchester: Manchester University Press.

INSTITUTE OF MANPOWER STUDIES (1979) Manpower in the Carpet Industry: Expected Developments over the Next Ten Years. Vols 1 & 2 Wilmslow, Chesire: Carpet Industry Training Board

INTERVIEWS WITH SENIOR EXECUTIVES: Transcripts held by author

JACOBS B (1968) The Story of British Carpets. London: Carpet Review

JACOBS B et al (1969) 1869 -1969: Tomkinsons Carpets - One Hundred Years of Manufacture Supplement in Carpet Review Weekly pp10-63 January 1969 London: Carpet Review

JONES R & LAKIN C (1978) The Carpetmakers. London: McGraw-Hill

LAWRENCE J (1987) Incisive, Decisive Marketing in Carpet & Floorcoverings Review pp53-64 5 March 1987 Brighton: Benn Publications Ltd

OAKLEY CA (1962) AF Stoddard & Co:The Carpet Makers. Elderslie, Scotland: Stoddard.

REYNOLDS, WM Innovation in the US Carpet Industry 1947 - 1963. London: Van Nostrand Reinhold (International) Co Ltd.

ROBINSON G (1966) Carpets. London: Pitman.

SCOTT TWK (1976) Diffusion of New Technology in the British & West German Carpet Manufacturing Industries: The Case of the Tufted Process D Phil Thesis University of Sussex

SIEGHART, MA (1983) Proving that Quality Takes Some Beating Financial Times p12 col 1 12 January 1983 London: Financial Times Newspapers Ltd

SILVERMAN HA Ed (1946) Studies in Industrial Organisation. London: Methuen.

SMITH LD (1982) The Carpet Weavers of Kidderminster 1800 - 1850 PhD Thesis Birmingham University

SMITH LD (1986) Carpet Weavers and Carpet Masters 1780 - 1850. Kidderminster:K Tomkinson Ltd.

SWANN D & O'BRIEN DP (1974) Competition in British Industry; Restrictive Practices Legislation in Theory & Practice. London: Allen & Unwin.

TATTERSALL CEC (1934) A History of British Carpets. South Benfleet, Essex: F Lewis.

TAYLOR A (1874) History of the Carpet Trade. Heckmondwike, Yorks: Joseph Ellis.

TOMKINSON K (1972) A Kidderminster Victorian Journal - Based on the Diaries of Annie Tomkinson 1884 - 1920. Kidderminster:K Tomkinson

TOMKINSON K ed (1985) The Tomkinson Story - or More Damned Tomkinsons. Kidderminster: Kenneth Tomkinson Ltd.

TOMKINSON K & HALL G (1975) Kidderminser Since 1800. Kidderminster: Tomkinson & Hall

TOMKINSONS plc, Kidderminster: Directors' Report & Accounts 1959 - 1987

WALSGRAVE D (1981) Deskilling in the Carpet Industry: A Critical Case Study BA (Hons) Thesis Birmingham Polytechnic

YOUNG FH (1944) A Century of Carpet Making 1839 - 1939: Templeton & Co. Glasgow: J. Templeton.

3. Research Methodology

BAILEY KD (1978) Methods of Social Research. London: Collier Macmillan

BERKHOFER RF (1969) A Behavioural Approach to Historical Analysis London: Collier Macmillan

KERLINGER FN (1969) Foundations of Behavioural Research London: Holt, Rinehart & Winston

NACHMIAS D & C (1978) Research Methods in the Social Sciences London: Edward Arnold (Publishers) Ltd.

PHILLIPS BS (1976) Social Research: Strategy and Tactics London: Collier-Macmillan.

THOMPSON P (1978) The Voice of the Past - Oral History London: Oxford University Press.