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SME Internet Adoption: Towards a Transporter Model

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Abstract

Internet adoption, in both large and small firms (SMEs), is promoted as a means to improve competitiveness. This paper questions current thinking that small firms progress through a 'stages of growth' model in their use of the Internet. Twelve SME cases are investigated. Outcomes suggest that most only perceive value in e-mail and possibly a marketing web site. However, some SMEs see strategic potential and invest in e-business. The paper suggests that owners' recognition of the business value of the Internet combined with their attitude to business growth are key factors in determining Internet adoption strategies. Thus, SMEs will aim for specific adoption strategies to satisfy these requirements rather than follow a stages model. A 'transporter' model is developed to reflect the drivers identified and its implications discussed.

1. Introduction

This paper investigates Internet adoption strategies in established small and medium-sized enterprises (SMEs). Extant theory suggests that businesses reap the greatest benefits from the Internet by integrating business systems and changing business processes. Indeed, such integration is the final outcome of growth models

that postulate businesses move in stages from one use to another. However, there is little evidence that SMEs do more than develop websites and adopt e-mail. This paper uses case studies of twelve SMEs to explore the adoption of Internet technologies. It considers the strategic issues limiting Internet adoption. A strategic model is developed that suggests the criteria for adoption are dependent upon the owners' attitude to growth. This leads to the development of a 'transporter' model rather than a 'stages' model of Internet adoption. This research has important policy implications as, at least in the UK, government SME e-business adoption facilitation is predicated upon an adoption 'ladder'. If no ladder or stages model is appropriate for SME then government encouragement to move from one level to another is misguided. The transporter model identifies four roles for Internet technologies in SMEs – brochureware, support, opportunity, and network. These are driven by business growth planning and perceived Internet value.

The paper is structured as follows. First, it investigates the current state of knowledge concerning SMEs adoption of the Internet. Then it describes the research approach and gives background to the cases. This leads to consideration of competitiveness, growth, and Internet adoption in SMEs. The transporter model is developed and its implications discussed.

2. Internet Adoption and SMEs

In essence, the Internet is a source of information and data. However, the value of the data depends on the provider, and its relevance, timeliness, accuracy, and retrievability. SMEs believe that the Internet will enable them to reach wider geographical markets and increase customers (Lunati 2000). Precise Internet benefits are, as yet, unclear, but speculation suggests the greatest benefits occur under full supply chain integration (Currie 2000). Implementation is thought to progress through several stages and evolves as businesses recognize the benefits. Costello and Tuchen (1997) suggest firms first *publish* information on the Web, then *interact* with customers and finally processes are *transacted* electronically. A further stage of *integration* focuses on full supply chain integration (Currie 2000). While Internet systems are necessary to develop these processes, value arises once businesses use the knowledge and experience to produce outputs accessible through the Internet (Willcocks et al 2000). The potential for transformation is thought to emerge once businesses recognise the need to re-organise processes and focus on core competencies (Figure 1). Initially firms use some basic Internet tools such as web pages, before moving to stage 2 - transacting business. Many businesses do not progress further, as they achieve no benefits.

Moving to Stage 2 may cause difficulties for SMEs due to resource constraints: ICT is only introduced when there is a business imperative (Levy et al 1999). At Stage 3 firms recognise that changes to processes, structures and skills are necessary to exploit the technology. Stage 4 is only reached once they recognise that the

business can transcend its existing products and use the Internet to develop new markets and products.

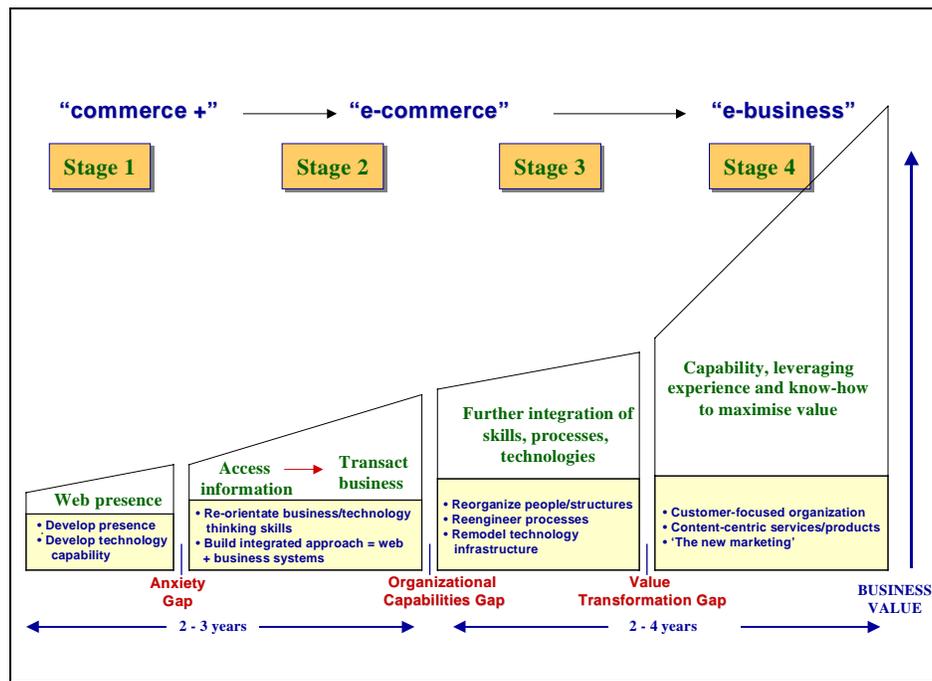


Figure 1: Moving to E-Business (Source Willcocks et al 2000)

An early study of SME Internet adoption finds SMEs followed a path similar to large firms (Poon and Swatman 1999). However, SMEs experience only three transformation stages, with integration of processes as the endpoint. This is only reached once SMEs identify benefits. However, this model does not allow for SMEs changing their business perspective. Innovative and entrepreneurial SMEs will change to take advantage of Internet opportunities (Levy et al 2001). Thus, Poon and Swatman's model is likely to be subsumed by Willcocks et al's.

In common with most large businesses, SMEs have embraced the use of e-mail (Poon and Swatman 1999), with 90% of SMEs using it regularly a year after its introduction to the business (Chapman et al 2000). There is evidence that many have also developed 'brochureware' websites. However, research indicates that few SMEs have integrated their websites with their back-office systems. While many see value in e-mail there is scant evidence of decisions to invest in internal networks or e-business systems (Keindl 2000).

One Internet adoption model (Mehrtens et al 2001) suggests there are three main factors that influence SMEs' decisions - perceived benefits, organisational readiness and external pressures. There are three aspects to perceived benefit. First,

efficiency benefits arise from improved communication using e-mail; this is also identified by Poon (2000). Second, effectiveness benefits obtain from the ability to gather research and competitor information, also identified by Poon. Third, use of the Internet presents a modern image and improves SME promotion.

Organisational readiness for Internet adoption is personified in the SME owner. SMEs do not see Internet adoption as an IT issue, but as a business one. SMEs that are attracted to Internet commerce tend to be more entrepreneurial, risk takers, innovative and invariably, creative (Poon and Swatman 1999). A second organisational readiness factor is the requirement for SMEs to have adequate IS in place to access the Internet.

The final factor, external pressure, is primarily from customers, though suppliers and employees are also influencing factors. While Poon (2000) recognises that customer pressure is influential, there is evidence that a lack of customer use is an inhibitor, particularly of e-mail (Sillence 1998).

There is little evidence of business strategy driving Internet adoption among SMEs. However, strategic commitment is critical in Singaporean SMEs (Kowtha and Choon 2001). Indeed, Internet adoption is faster when SMEs recognise a business need (Kendall et al 2001).

Thus, current research suggests that there are a number of factors that influence Internet adoption and development in SMEs. Business need and perceived benefits figure prominently in SME Internet development. However, despite their popularity in early IS adoption research and their intuitive appeal, there is little evidence that SMEs follow a 'stages of growth' model for Internet adoption. A contingent model that involves 'transportation' from one use to another without the implicit idea of growth may be more useful for understanding SME Internet adoption.

One explanation for this lack of evidence is the propensity of past research to consider SMEs as homogenous group. However, heterogeneity is evident in much SME research. For example, Levy et al (2001) demonstrate that there are four different adoption approaches to information and communication technologies (ICT) use depending upon customer dominance and strategic focus. Owner attitude and business strategy influence ICT adoption, as for Internet adoption. Hence, this research seeks to determine whether SME Internet adoption strategies are contingent on factors such as owners' attitude, business strategy, perceived benefits, and customer influence.

3. Method

This research identifies whether approaches to Internet adoption are dependent upon contingent variables. Therefore, it is necessary to understand the reasons for SME Internet adoption. Case studies are a useful approach in achieving this

objective, as it is possible to pose reflective questions. Additionally, case study research is effective when theory is relatively underdeveloped (Eisenhardt 1989). In particular, when the boundaries of the research are not clear, there is a need to investigate the issue within a real life context, drawing on the views of a number of sources (Yin 1994). Case study research provides a means to review theory and practice iteratively. Multiple cases ensure that common patterns are identified rather than generalised from what might be chance occurrences (Eisenhardt 1989). Interviews are a key feature of successful cases.

The case studies employed here are all SMEs in the UK West Midlands. SMEs are chosen according to the EU definition of firms with 10-250 employees. All are established firms that have been trading for a number of years. There is no attempt to control for industrial sector as it has been shown that for ICT adoption that sector has little influence (Levy et al 2001). While most of the case firms have been researched for a number of years as part of a larger research project investigating ICT use in SMEs, for the purposes of this paper semi-structured interviews lasting between one and two hours were held with SME owners to discuss approaches to Internet development. Interview reports were sent to the owners subsequently for validation and refinement. The issues are divided into four sections: business objectives, business strategy, competitive environment, and technology and e-business. The questioning on business objectives and strategy identifies whether different strategic approaches lead to differences in Internet adoption decisions. The competitive environment discussion enables consideration of the influence of customers, competitors and suppliers on Internet adoption. The questioning on technology and e-business provide a means of identifying the level of knowledge about the potential role of ICT and the Internet for the business and the way in which it relates to business strategy.

4. Background to the Cases

The case research was carried out during the summer of 2001 among SMEs in the UK West Midlands. The background to the firms is shown in Table 1. Most case firms are small (fewer than 100 employees), though two are micro firms, Equipment Hire Centre and Curtain Textile Co (1-10 employees). Automotive Spring Manufacturer is, just, medium-sized. However, as Levy et al (2001) find, size is not a determinant of ICT adoption, the owners' knowledge of ICT and attitude to growth dominate.

Firm	Product	Ownership	Turnover (Euro)	Employees
Automotive Spring Manufacturer	Design and manufacture of springs	Owned by CEO, part of US group	10m	100
Polymer Resin Manufacturer	Development and manufacture of advanced polymer resin technology	Family owned	N/A	22
Oil Flow Co.	Consultancy services to oil and gas industry Design/manufacture of flow equipment to oil industry	Jointly owned by Chairman and CEO	N/A	20
Reduced Power Co.	Design and manufacture of energy saving devices	A number of equity partners including the CEO	2m	14
Savoury Pie Manufacturer	Manufacturer of Savoury Pies	Family owned	6.4m	75
Corporate Gift Co.	Design/Manufacture of corporate gifts	Family owned	8.8m	50
Garden Ceramics	Design/manufacture of ceramic pottery	Family owned	1.6m	30
Patent Attorneys	Registering patents	Partnership	N/A	21
CAD Service Co	Laser Scanning for CAD. software support	Owned by CEO	2.4m	14
Equipment Hire Centre	Hire of builders' equipment	Family owned	0.55m	7
Curtain Textile Co.	Curtain materials and accessories to trade	Family owned	1.2m	7
IT Services Co	Systems Development/ Training ICT solutions	Owned by CEO	N/A	13

Table 1: Background to Case Firms

5. Growth, Competitiveness and the Internet

The outcomes from the case interviews are summarized in Table 2. The analysis reviews the business strategy and attitude to growth of the owner. In most cases this is one of staying in existing markets with existing products. While some owners are looking for growth, there are a number that are in business for lifestyle

reasons, which impacts on their strategic intent. Additionally, owners were asked about the business value of the Internet for their firm. This ranged from high future potential to many who saw little value. For example the owner of Curtain Textiles said ‘I deal with major manufacturers of curtain materials, I’ve known them for years, and we talk on the phone. I don’t see that situation changing’. However, the opposite view holds in the automotive spring manufacturer who has a clear vision for the future ‘The automotive industry must work more closely together in the future otherwise suppliers won’t survive, I see networks using the Internet as the way forward in the future’.

Firm	Business Strategy	Competitive Influences	Future Internet Potential	Internet Technologies				
				E-Mail	Web Site	Internal Network	E-business	EDI
Automotive Spring Manufacturer	Same products, new markets, double turnover	High rivalry between firms Competition from overseas markets Customer pressure on price Customer dominance - high	Strong, enabling networks between customers and suppliers to develop	Internal and external	Brochureware	LAN		Used extensively with customers
Polymer Resin Manufacturer	New products into existing markets Survival is main objective	Customers demand high quality and innovative products Customer dominance - low	Not seen as important	external	Brochureware			
Oil Flow Co.	New services into new markets Business survival through diversification	Declining industry has led to diversification: offering consultancy services to the industry Customer dominance - high	Not seen as important	external	Brochureware	LAN		
Reduced Power Co.	Existing products into new markets Steady growth	Customer pressure on price Customer dominance	Not seen as important	external	Brochureware	LAN		
Savoury Pie Manufacturer	New products into existing markets, but not looking for growth	High rivalry between firms	Not seen as important	Has, but not used	None	LAN		
Corporate Gift Co.	New Products into new markets Looking to grow business	High rivalry between firms Corporate customers pressure on price	Critical to future development	Internal and external, used extensively	On-line sales available	Intranet	under development	Internet EDI being introduced with major customers
Garden Ceramics	Existing products into existing markets Not looking for growth	Highly competitive industry Focus on quality	Not seen as important	Not used	Brochureware			

Patent Attorneys	Existing product into existing markets Not looking for growth	Competition between existing firms	Important to manage business more effectively	External	Under development	WAN		
CAD Service Co	Existing products into new market Looking for business growth	Customer pressure on quality	Would like to use, but customers resistant	External	Interaction with customers	LAN		
Equipment Hire Centre	Existing products into existing markets Lifestyle, therefore not looking for growth	Some rivalry between firms	Not seen as important, but owner enjoys IT	External	Brochureware	LAN		
Curtain Textile Co.	Existing products into existing markets Lifestyle, therefore not looking for growth	Suppliers influence product availability; no pressure from customers	Seen as irrelevant	External, but not used	Had one but discontinued use	LAN		
IT Services Co	Existing products into new markets Focus is on survival	Customers pressure on price	'must have' as others do	External and internal	Brochureware	LAN		

Table 2: Strategic Analysis and Internet Adoption in Case Firms

All the case firms bar Garden Ceramics have Internet access and e-mail. In the UK these usually occur together due to the way internet service providers (ISPs) operate. Curtain Textile was provided with e-mail as part of an EU-funded project, but once this finished no longer uses it. Three firms have internal e-mail as well. Two are larger SMEs that use ICT to manage their businesses. The third, CAD Services, started as 'dot.com' where staff expected to be able to use e-mail internally.

Nine firms have websites. Most are brochureware, providing limited information about the firms and their products or services. Only Corporate Gift uses a website as part of its strategy to develop its e-business markets. CAD Services developed its website as part of its business, but customers do not use it, primarily because of security concerns, and also because of data file size. There are difficulties over the time it takes to download files and the danger of file corruption. Hence, CAD Services finds that it is becoming more a brochureware site. Again, Curtain Textile decided to not use its website once it had to pay for it to be available. Garden Ceramics website was developed by an employee and is hosted by the employee's ISP, it is not seen as relevant to the firm. None of the firms has an Intranet, although Corporate Gift is considering the further development of its system. Patent Attorney's wide area network development will be using Internet technologies.

Overall, this research provides support for the current literature, as there is only limited Internet development in the case SMEs. E-mail and websites are common. What is of greater interest is whether the firms perceive that the Internet holds future benefit, either to mitigate competitive pressures from competitors or customers, or to grow the business.

6. Business Growth and the Internet

Analysis of the interview data reveals that two drivers are key in determining SME use of the Internet. The first driver is business growth. In some firms business growth is planned and investment made ahead of need. In many other SMEs growth may occur but it is not as a result of planning. Attitudes to business growth often determine whether SME owners consider resource investment in the business. IS investment is traditionally restricted in SMEs, with many investing at start-up, but no further investment is usually made until the business outgrows existing systems (Levy et al 2001). Therefore, it is plausible that attitudes to growth will impact SMEs' decisions to invest in the Internet. The second driver is business value from use of Internet technologies. Business value of the Internet is identified through response to the firms' competitive positioning and their knowledge of what is happening within their industry.

The analysis indicates that SMEs have considered the role of the Internet for their businesses. Their approach is generally cautious. Most firms do not see the value of the Internet to their growth strategy. However, a number of visionary owners believe that they can change their business through the use of the Internet. What is striking in discussions with the SME owners is that they are not Luddites, but are very knowledgeable about their industries. They also appreciate the tight resource constraints they are under and, as with ICT investment, Internet investment has to have more than a perceived benefit.

Interaction of the two drivers allows the identification of four groupings or SME segments. These are brochureware, business opportunity, business network and business support (Figure 1). The characteristics of these groupings and some exemplar SMEs are discussed in the next section.

Business Value of the Internet	High	Business Opportunity IT Services Co. Patent Attorneys	Business Network Automotive Spring Manufacturer Corporate Gift Co.
	Low	Polymer Resin Co Savoury Pie Manufacturer Garden Ceramics Equipment Hire Centre Curtain Textile Co Brochureware	Oil Flow Co. Reduced Power Co. CAD Service Co. Business Support
		Unplanned Business Growth	Planned

Figure 1: Segmentation Strategy for SME Internet Adoption

6.1 Brochureware

Those firms that do not plan business growth and see the value of the Internet as low all have e-mail and have experimented with website development. The owners have thought about the Internet, but cannot see its relevance to their business. Among the reasons for this is the nature of the industry. Savoury Pie Manufacturer said (as he presented a large, well-thumbed black tome) *‘This is my bible, I can’t take my computer to bed with me, this tells me everything I need to know and I can’t see it changing’*. Not only did he not need the Internet for information, but he said *‘I have a close relationship with the managing director of (major regional supermarket), we prefer to meet regularly to discuss orders and promotional activities. Neither of us wants to change this’*. Curtain Textile expresses similar sentiments. Garden Ceramics believes that their customers will not buy on-line, they tend to sell to the quality end of the market and sales are made through garden exhibitions. In contrast, Equipment Hire Centre has invested heavily in IT, but mainly because the owner enjoys using it. It is not seen as a means of growing the business. For example, the owner decided that mobile toilets were a useful addition to his hire range and was pleased to advertise them on his web site, but when asked whether he would deliver them to a town about 80kms away said *‘No, I only want to trade locally’*. He is a ‘lifestyle’ owner not looking for growth.

This group contains the largest proportion of case SMEs. They have all investigated the Internet and taken what they consider to be the most useful parts, e-mail and websites, in some cases, and made a decision not to invest further. Hence,

there is a role for the Internet for these firms but it is restricted to the presentation of on-line firm information or brochures.

6.2 Business Opportunity

Two SMEs perceive the Internet to offer high business value but are not planning business growth. Patent Attorneys is looking for business efficiencies from the use of Internet technologies. In particular, access to international patent information is faster using the Internet. Otherwise they primarily see it as a tool to obtain advice from their experts located in different offices. They foresee the Internet as a key medium for information and research for their industry. The current systems development is being planned to support this future growth. However, the firm does not foresee a need to move into e-business.

IT Services has been using the Internet for some time to provide information on its services and products. The firm provides training services, employment services and systems development opportunities. It sees the Internet as a means to promote employment and training services. Systems development is declining as business investment in IT is generally slowing. The SME does not see the Internet playing a role here. Its main function is to manage the business internally and to communicate with customers. Therefore, the main issue for IT Services is to maintain its presence with its current Internet service provision, and plan for the future.

This group of SMEs recognises that the Internet has some value to them, in the future. However, it is limited to improving efficiency internally, customer communication and research. The contrast between this group and the brochureware group is that owners recognise the business value of the Internet and although not seeking growth, recognise that competitive pressures demand investment. These firms see a business opportunity from use of the Internet.

6.3 Business Support

Firms using the Internet for business support are planning growth, but currently see little future for their businesses from the Internet. All the SMEs here are innovative firms seeking to grow. Oil Flow Services is undergoing a major change from providing a key product to the oil industry to providing global consultancy services. They believe this will provide them with growth opportunities. As the patent on their key product is expiring shortly, diversification is seen as a means of leveraging the knowledge within the firm. However, while the Internet is used for research and e-mail is used extensively, they do not believe that it will change the way they do business in the next three years. Although, they use for customer communication will increase. Similar sentiments are expressed by Reduced Power.

They have a number of innovative products that are sold into large firms, so personal contact is regarded by customers as important and there is little indication that the Internet is of value.

This contrasts with the experience of CAD Services that developed an e-business website to provide services to customers for their CAD systems. However, their experience is that customers prefer personal contact and that traditional marketing techniques are more effective. While CAD Services uses the Internet, it does not plan to develop it further as part of its growth plans.

These SMEs are seeking to grow, but do not believe that the industry demands investment in Internet systems to support that growth. These SMEs see the worth of the Internet as a business support medium.

6.4 Business Network

Opportunity from the Internet is seen as key to the development of the two SMEs in the final grouping. Both see their future tied into using the Internet. Corporate Gift is furthest ahead in its development with a strategic decision to diversify its business from its corporate customer base. It is building on its core competencies of design and quality manufacture to develop on-line retail sales. The firm has always developed its IT strategy alongside its business strategy. Hence, it is well positioned to take advantage of e-business. Corporate Gift has an effective internal network that is accessible and used by all staff as means to manage the business processes. The firm is integrating on-line sales with their back-office systems. Additionally they are introducing Internet-EDI systems to work more closely with their major corporate customers.

Automotive Spring Manufacturer is, in contrast, at the planning stage of its Internet development. Currently EDI is used to deliver order processing information from customers. Design material is also delivered electronically. The firm is not yet using the Internet to any great extent, but the CEO foresees major industry restructuring that will require the formation of strategic partnerships among suppliers. He is focusing on changing the business strategy to develop the network partnership he sees as important for future development.

These two firms plan their growth and perceive value from the Internet. Its role therefore is in supporting a business network.

7. Discussion and Conclusions

This research has investigated the role of the Internet in twelve case SMEs. It has derived a model of Internet use driven by perceived value and growth planning.

The message from the research is that, overall, there is little sign that SMEs see the Internet as being a major future change agent. However, there is evidence that the owners' attitudes to growth and their understanding of the business value of the Internet are instrumental in their decisions to adopt. There is scant support from these cases for a stages model of development, as the SMEs appear to consider the role of the Internet as they would other technology investments: if it supports the business then the investment will be made. Thus, this research supports Kowtha and Choon (2001), as strategic commitment is essential. There is some confirmation here too for the concept of perceived benefits as articulated by Mehrrens et al (2001). However, it is important to note that those SMEs in the brochureware quadrant perceive little or no benefits. Organisational readiness as indicated by level of Internet knowledge among SME owners is a factor in adoption, although as has been shown, it is also a factor in the decision not to adopt. There is only limited evidence of external pressure for change in this group of firms. Only one case firm sees the need to refocus due to industry pressure, Automotive Spring Manufacturer.

Business Value of the Internet	High	Business Opportunity Some perceived benefits Owner has knowledge of IT Some competitive pressure	Business Network High perceived benefits Good Knowledge of IT opportunities High competitive pressure
	Low	No perceived benefit Little or no knowledge of IT value to the business No competitive pressure Brochureware	Some perceived benefits Owner has knowledge of IT No Competitive pressure Business Support
		Not Planned	Planned
Business Growth			

Figure 2: *Segmented Internet Adoption Patterns in SMEs*

Figure 2 summarises the adoption issues and demonstrates that different types of business will view Internet adoption in very different lights. This suggests that SMEs are unlikely to follow a stages model. Rather, they will focus on what is best to meet the owners' strategy for business growth. Internet development in SMEs is likely to be slow to reflect this approach to resource investment. This analysis reflects earlier research by Levy et al (2001).

However, Levy et al (2002) find that SMEs adoption of ICT does develop - changes in ICT adoption are made as the strategic focus of the business changes of as growth requires improved systems. Thus this paper suggests that the situation with Internet technologies will be similar. Steady growth is not the path adopted, rather

SME owners focus on the best potential of technology for their business – a 'transporter' model. Further longitudinal research will identify whether this is the case.

While this research is only in twelve case SMEs and replication is needed, the research does have implications for policy development. In the UK, policy guidelines from the Department of Trade and Industry are developed around the stages of growth concept for SME Internet development. The government expects all SMEs to follow this path and directs its policy to achieving this objective. This paper suggests that Internet adoption policies should more closely reflect the four segments identified here, recognising that the Internet is a business tool for some but not all SMEs.

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