The impact of strategic alignment and responsiveness to market on manufacturing firm's performance

Deepak Sardana [d.sardana@griffith.edu.au], Lecturer, Griffith Business School, Griffith University, Queensland, Australia. Phone: +61-7-55529691.

Mile Terziovski [mile.terziovski@curtin.edu.au], Professor and Dean, Curtin Graduate School of Business, Curtin Business School, 78 Murray Street, Perth WA 6000, Curtin University, Perth, Australia, Phone: +61 8 92667900, Mobile: 0421306065.

Narain Gupta [narain.gupta@mdi.ac.in], Assistant Professor, Management Development Institute, Mehrauli Road, Sukhrali, Gurgaon 122007, India, Phone: +91-9818037324.

Abstract

Drawing on dynamic capabilities theory and a sample based on the Indian manufacturing industry, we examine the influence of manufacturing operations' functioning, strategic alignment and responsiveness to market need for customization and firm performance. A multi-variate regression method is applied on the factors identified using confirmatory factor analysis. Our findings indicate that operations' strategic alignment to the firm's objectives is the single most key contributor to firm performance. The operations' capability to respond to market need for customization also significantly contributes to firm performance. Plant technology capability is also essential to respond effectively to market need for customization, and is positively and significantly related to firm performance. On the other hand, while delivery capability and cost control of the manufacturing operation are positively related to firm performance, they are not significant. Operations and marketing managers and firms' policy makers should emphasize operations' strategic alignment to firms' performance objectives, and build dynamic operational capability to be responsive to changing market needs.

Keywords: Operational capability, firm performance, strategic alignment, market responsiveness, customization, India.

1. Introduction

Increased competition in today's market has forced senior managers to constantly evaluate each of their key functional domains and its contribution to firm competitiveness and business performance (Sohal et al., 1999; Terziovski and Samson, 1999). This closely relates to the exercise of identifying 'best practices' within an organization (Laugen et al., 2005; Terziovski et al., 2002) and integration across functions (Calantone et al., 2002). The idea of and need for "strategic consensus" or "alignment" of competitive priorities among various functions in a manufacturing organization was initially conceptualized by Skinner (1974). Since then the strategic alignment of manufacturing operations and marketing functions is one 'best practice' that has widely been suggested to provide much needed competitive advantage to firms in the marketplace (O' Leary-Kelly and Flores, 2002), especially those firms located in emerging countries, such as Brazil and China (Ang et al., 2015). Similarly, other studies (such as Sun and Hong, 2002) show that solely using advanced manufacturing technologies may not lead to improvement in business performance until the firm has a proper strategy and responds adequately to market needs (Hill, 1995;Amoako et al., 2008). These studies thereby establish the need for manufacturing to be aligned with other functions, particularly marketing (Marques et al., 2014; Paiva, 2010; Karmarkar, 1996; Shapiro, 1977). However, citing gaps in the operations strategy literature, Joshi et al. (2003) claim that the issue of alignment of operations with strategy and marketing has not been extensively studied in a manufacturing organization, and when studied, scholars have seldom examined it to firm performance.

In this paper, we examine the benefits obtained from the overall strategic alignment of operational functions that arise out of its integration with marketing and the market responsiveness of operational functions in a manufacturing industry. We therefore investigate the impact of these two important and dynamic aspects of manufacturing operations on firm performance, while not neglecting manufacturing capabilities (identified as plant technology and operational competitiveness capabilities to manage cost and delivery efficiency). This approach provides a comprehensive understanding of the importance of each of these key aspects in the performance of the firm.

The overall strategic alignment of manufacturing within a firm will reflect on the operations' alignment to both corporate strategy and market requirements, while its market responsiveness can be gauged from its ability to respond to the customization requirements of its customers. By examining the manufacturing capabilities deemed necessary to execute marketing responsiveness, one is able to gauge the operational readiness and competitiveness of a firm in a holistic manner. This novel approach empirically validates and synthesizes previous findings relating to the integration of marketing and operations, operational responsiveness to markets and customers, and the manufacturing capabilities required to respond to the market's customization needs. This study thereby amalgamates the previous research identified in the following section and contributes to theory development.

Investigating the strategic alignment of manufacturing firms' operations, market responsiveness and performance – considered in totality – is unique (Ang et al., 2015; Jusoh, 2008; Ketokovi, 2004; Laugen, 2005; Morgan et al., 2009; Pine, 1993; Shin et al., 2015; Silveria, 2001). Several published consider manufacturing operations or market responsiveness, but little literature assesses integration of manufacturing and marketing in a coherent way (Morris and Morris, 1992; Marques et al., 2014). This study is in the Indian context, and as such provides a South Asian perspective.

2. Theoretical background

Dynamic capabilities have often been used to determine firms' competitive advantages. Teece (2007) states that dynamic capabilities help firms to make their businesses sustainable by reconfiguring their capabilities and competencies in order to keep up with changing markets. A dynamic capabilities perspective is thus not static; it adds evolutionary considerations to the resource-based view (Chakrabarty and Wang, 2012). However, if there is always a capability behind a capability then it becomes impossible to identify and relate the ultimate source of competitive advantage to a firm. Cepeda and Vera (2007) call this as an "infinite regress problem". They suggest that dynamic capabilities relate to the change capabilities that reside in firms, which enable them to modify their resources and functions. Therefore, for any firm, both the current resources and the response mechanisms for changing its resources as per market needs are important (Eisenhardt and Martin, 2000; Makadok, 2001).

This article examines existing manufacturing capabilities and competencies that directly affect firm performance. We also pay attention to the ability of manufacturing to continuously align itself with firm strategy and demonstrate its responsiveness to new market needs. Hence, the resource based view, along with dynamic capabilities theory, brings a more systematic and comprehensive approach to firm level analysis (Lawson and Samson, 2001). It does this by relating a firm's performance to its resources and capabilities rather than employing more simplistic product-market perspectives (Wernerfelt, 1984). This is not to undermine the practical application of product-market approaches, but only to emphasise that they are good for any given moment, and thus static. It is therefore more valuable to understand the dynamic capability by which product-market positions are arrived at.

In this research, we place operational capability at the centre of manufacturing firms 'competitive advantage. We then seek to demonstrate that it is not only the technological and manufacturing competence that contributes to firm performance, but firm-wide strategic alignment and market responsiveness of the manufacturing operations also contribute to firm performance.

2.1 Strategic alignment of manufacturing operation

A firm discovers and establishes its sources of advantage in a given context by establishing a synergy between strategy, marketing, organizational resources and technological capabilities (Day, 1992). Such strategic alignment then contributes to firms' external and internal fit (Sun and Hong, 2002). However, it is input from the market (i.e. market orientation) that helps align firms to their external environments, and match and realign their competencies to market opportunities (Day, 1992; McKeena, 1991; Morgan et al., 2009). In fact, market orientation is intrinsically linked to a 'learning organization' that is continuously realigning its strategy and resources and creating 'superior customer value' (Slater and Narver, 1995). Manufacturing delivers this realignment by building market responsive capabilities in its set of functions. For example, Prajogo (2016) states that product innovation is more suited to a dynamic business context, whereas process innovation suits a competitive environment.

Schroeder et al. (1986) report that marketing strategy influences and drives manufacturing strategy. This is based on the traditional view of manufacturing as a mere operational function with the sole objective of achieving maximum efficiency (Avella et al., 1999). Others, in contrast, hold that manufacturing strategy can play an active role, not just in influencing marketing strategy, but in firms' overall strategy by determining factors of competitive advantage(e.g. Hayes and Wheelwright, 1984; Skinner, 1969, 1974; Zahra and Das, 1993). Both groups emphasise the alignment of manufacturing operations to marketing and business strategy. The latter group calls for manufacturing operations to be actively integrated into strategy and marketing. For example, findings by Ahmed et al. (2014) claim that while both marketing and operational capabilities impact firm performance in periods of economic growth, it is the latter that become more important in economic downturn.

Calantone et al. (2002) conclude that the strategic alignment of marketing and operations opens up important two-way communications: marketing will know more about operations, and can also communicate credibly with operations about its needs (such as new product development and range of product offering). It is because of this that a number of operations management scholars stress that marketing and manufacturing functions need to be more closely associated (Hausman et al., 2002). Scholars also suggest that closer interaction between marketing and operations will also improve strategic decision making, which, in a fast-paced hypercompetitive environment, is a critical to a firm's dynamic capabilities (Eisenhardt and Martin, 2000). For example, several key decision areas, such as strategic planning, forecasting, new product/process development and demand management are dependent on this cross-functional integration between marketing and operations (Malhotra and Sharma, 2002).

Clearly, communication and the exchange of ideas between different functional departments will engender a dynamic learning and knowledge creation environment (Garud and Kotha, 1994; Nonaka, 1994).This will facilitate the *strategic alignment* of manufacturing, marketing and other functions (Pine et al., 1993) leading to superior performance (Sun and Hong, 2002). This leads to first hypothesis.

Hypothesis H1: *A firm's Strategic Alignment has a positive and significant association with its performance.*

2.2 Manufacturing operational capability and market responsiveness

According to the resource based view of the firm, operational outcomes are essentially inputs to the marketing and strategic function. Further, operational outcomes cannot be viewed as ends in themselves, since marketing outcome affect firm performance, which may then impact firm's overall strategy and manufacturing operations (Tatikonda and

Montoya-Weiss, 2001). Therefore the operational capability and market responsiveness of a firm are intertwined and each contributes to a firm's competitive advantage (Lii and Kuo, 2016; Sun and Hong, 2002; Tatikonda and Montoya-Weiss, 2001).

Hausman et al. (2002) conclude that a firm's manufacturing strategy directly influences its competitive position, whereas a marketing strategy indirectly affects firm performance, being mediated by the interface between manufacturing and marketing. Sawhney and Piper (2002) also support this view. Their empirical findings suggest that a lack of synergy between marketing and manufacturing may hamper a firm's timely delivery, quality and cost of goods and services. Several scholars (such as Blois, 1991; Ettlie, 1997; Clark and Fujimoto, 1991; St. John and Hall, 1991; Morris and Morris, 1992;Olson et al., 2001; Paiva, 2010; Song et al., 1997;Sawhneyand Piper, 2002; Tatikonda and Montoya-Weiss, 2001) have found that the integration between marketing and operations positively impacts several aspects of a firm, for example new product development, production planning, quality management, just-in-time implementation, advanced manufacturing implementation, on-time delivery and short lead time.

Although the idea of marketing and operations working cohesively is appealing, it is not easy to achieve (Sawhney and Piper, 2002). This is primarily because of the difference in their efficiency goals and the ways in which each seek to achieve these. For example, operational efficiency is achieved through long run of a product, minimal product diversity and little customization. Contrary to this, marketing efficiency is enhanced by variety in product mix, high customization and quick responses to any perceived need of customers. Thus, despite the intuitive appeal of integrating and balancing operations and marketing, it is not an easy task to do so (Calantone et al., 2002; O'Leary-Kelly and Flores, 2002; Swink and Song, 2007). Notwithstanding this, empirical studies (such as by Paiva, 2010) show that integrating marketing and operations can potentially help achieve high performance in multiple competitive criteria.

Furthermore, customer demand has been shifting towards increased product variety (Pine, 1993), and it is the agility of a manufacturing company to adapt to customers' need and requirements that will likely have a positive impact on customer retention and firm performance (Shin et al., 2015); customer orientation is shown to positively impact product innovation in manufacturing firms (Wang et al., 2016). Therefore, manufacturing needs to be responsive and flexible enough to provide this variety (Hayes and Pisano, 1994; Kotha, 1995; Sanchez, 1995). This shift in customer demand has led to the increased popularity of mass customization, whereby firms use their operational capabilities to provide variety by customizing their offerings (Da Silveria et al., 2001; Fogliatto et al., 2012; Pine et al., 1993). Zhang et al. (2014) show that a firm's mass customization capability is impacted by cross-functional coordination particularly between operations and marketing.

To be able to respond to this market need for customized products, a manufacturing firm needs to look beyond the simplistic (and mandatory) requirement of developing a manufacturing plant capability relating to technology competence only; it also requires the dynamic ability to internally align different functions, such as strategy, operations and marketing (Shin et al., 2015). A firm has also to develop additional operational capabilities that will help it deliver customized quality products without compromising on the *cost control capability* and *delivery reliability*, both of which have been posited to be important to customers (Kotha, 1995; Paiva, 2010; Tu et al., 2001). Firms that develop these operational capabilities gain a competitive advantage (Avella et al., 1999; Hill, 1995; Ketokivi and Schroeder, 2004; Paiva, 2010; Wheelwright, 1984) and improve their performance, as shown in Figure 1 and hypothesized below.

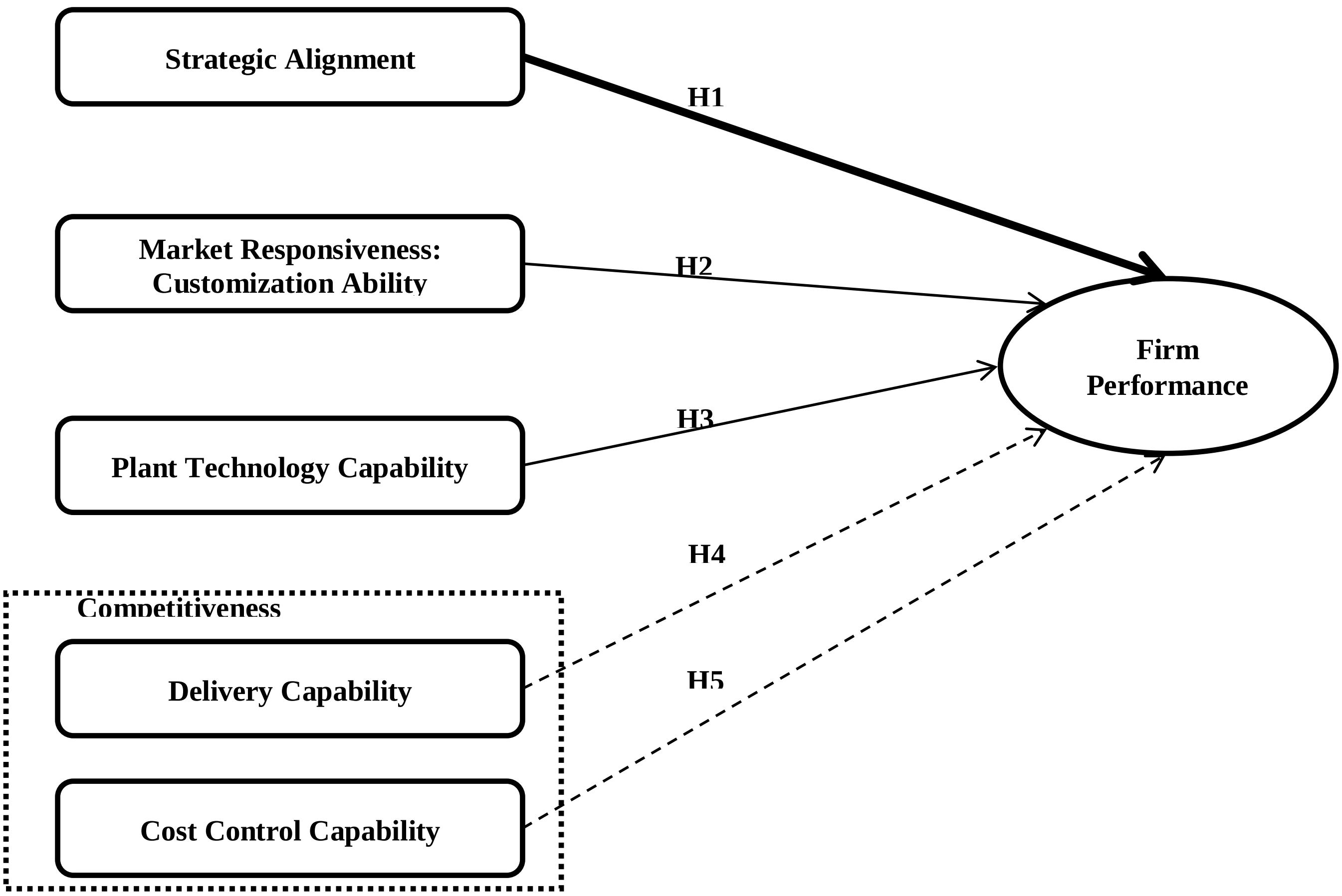

Figure 1. Key determinants of manufacturing operation that impact firm performance

Hypothesis H2: *Manufacturing Operations' 'market responsiveness' ability has a positive and significant association with firm performance.*

Hypothesis H3: *Manufacturing Operations' 'plant technology capability' has a positive and significant association with firm performance.*

Hypothesis H4: *Manufacturing Operations' 'delivery capability' has a positive and significant association with firm performance.*

Hypothesis H5: *Manufacturing Operations 'cost control capability' has a positive and significant association with firm performance.*

3. Research methodology

This research drew extensively on the pre-defined survey instrument of the Global manufacturing Research Group (GMRG). The GMRG survey instrument has been tested for research in the manufacturing industry across the globe, and its scales have been validated by multiple researchers worldwide. We collected the sample data from 58 Indian manufacturing firms between November 2012 and March 2013.We approached110 firms, requesting interviews to complete the survey questionnaire. Of these 110 firms,58 agreed to participate, with a total response rate of 52.7%.For only one of the 58 responses were data values missing in some fields, which were replaced with the column means.

About 43% of the sample is represented by textile and apparels manufacturers, and electronics. Other manufacturing domains in the sample include chemicals, rubber, plastics, automobile, industrial and commercial machines, paper and printing, food products, leather, wood, and stone and metal processing. The top to middle level managers of these firms responded to the survey, and the average number of employees of organizations in the sample was 1206.

3.1Independent constructs

In this section we explain the steps of the research analysis methodology adopted from designing the survey instrument to determining the five independent constructs and then logically redefining these as per the homogeneity of the variables in a group.

Reliability analysis

The objective of reliability analysis is to ensure that responses are not too varied across time periods so that a measurement taken at any point in time is reliable. Reliability analysis confirms the reliability of survey instrument with the standards of Cronbach Alpha (Nunnally, 1978). There is no single measure of reliability. As suggested by Hair et al. (2010), reliability in this research is measured by aggregating three measures: the internal consistency of inter-item correlation and item-to-total correlation, the reliability coefficient Cronbach alpha, and composite reliability and the total variance explained using confirmatory factor analysis, CFA).

Reliability is considered in the context of validity, which comprises the content of the literature, confirmatory factor analysis, and criterion (Hair et al., 2010).Content validity is determined using prior literature to identify the studied constructs. In the following, criterion validity is the explanatory power of the model measured by the adjusted R-Squared. Following, the reliability of our survey instrument in reference to these measures is justified:

- Since we use the GMRG questionnaire instrument, and the data was collected in a continuous short time-span, we believe that the issue of varied responses across different time periods is accounted for.
- Internal consistency is measured (Churchill, 1979; Nunnally, 1978) by the inter-item correlation among the variables of a construct, and the item-to-total correlation

(between individual variable and the summed scale score of the construct). If the item-to-total correlation exceeds 0.5 and the inter-item correlation exceeds 0.3 (Robinson et al. 1991), a survey is taken to be internally consistent. We found inter-item correlations for each pair of variables for each construct were far above 0.3; similarly, the item-to-total correlation of each variable with its corresponding construct was also far above 0.5.

- The reliability coefficient assesses the consistency of the entire scale, using Cronbach alpha (Cronbach, 1951; Nunnally, 1978; Peter, 1979). The generally agreed upon lower limit for Cronbach alpha is 0.6 (Robinsons et al., 1991). For the first four constructs the Cronbach alpha is close to 0.6 or much higher. The fifth factor reliability coefficient is 0.483, which is slightly less than desired. Due to multiple alternative strong measures of reliability of the scale (composite reliability, % variance explained by the constructs in CFA, the internal consistency), criteria validity (measured by Adjusted R^2), and the content validity, we retain the construct as a part of our hypothesized framework.
- The Cronbach alpha of measuring composite reliability was 0.868 for consistency of entire scale (considering the entire set of variables), which is a well-accepted limit for the measure.
- The average variance extracted for the five factors of confirmatory factor analysis is 59.63%. The variance extracted by the fifth factor F5 is 6.195%.
- The measure of criteria validity, the adjusted R^2in the multi-variate regression, was 0.2819, which is reasonably high. This was used to verify that the addition of the fifth construct had not weakened the model's explanatory power.
- We conducted a content validity analysis to ensure the right selection of variables for the hypothesized constructs in the theoretical framework. The variables expected to be

loaded on a factor are validated through the literature on manufacturing firms' performance on strategic, market and operational capabilities and competitiveness (see Tables 1 and 2 in following pages).

Next, to ensure the structural validity of the constructs, we conducted a confirmatory factor analysis. The KMO measure of sampling adequacy was 0.657, which is well above the 0.5 that is considered as a requirement to conduct the factor analysis. The Chi-square test statistics of Bartlett's test of sphericity was found to be significant. The statistics confirmed that the variables in the population are uncorrelated. We examined the communality of each variable, and for 25 of the 26 variables this was above 0.651. A total of eight independent components emerged based on an *Eigen value* criterion of greater than one. Examining the elbow in the Scree plot we extracted five independent factors. These five factors were able to explain a total variance of 59.63%. The rotated component matrix resulted from varimax rotation and clearly showed the loading of variables on the factors. The rotation converged in 12 iterations. A factor loading criterion of greater than +0.4 reduced the weak indicators. The total 26 initial variables reduced to only 21 variables loaded on five principal independent constructs (Figure 2). The factor loading results are presented in Tables 1 and 2. Variables that show a factor loading greater than0.5 are considered as significant (Hair et al., 1992). Mostly, the variables that showed a factor loading above +0.5 were considered to be loaded on independent components only.

Based on our initial theoretical framework, the designed survey instrument had 26 variables under four major constructs as follows: manufacturing operations' strategic alignment, plant technology capability, manufacturing operations' competitiveness ability, and manufacturing operations' responsiveness to market (i.e. customization capability). The variables were identified as belonging to each major construct based on theoretical understanding (as discussed) developed from the extant literature and in line with the objectives of this research. Strategic alignment had 7 variables; plant technology capability had 6 variables, customization capability 5 variables, and operations' competitive performance 8 variables. A Likert scale of 1–7 was used as the response scale for the variables.

The confirmatory factor analysis under varimax rotation resulted in five major constructs that had the factor loadings presented in Figure 2 and Table 1. The strategic alignment and plant technology capability (which also includes workforce technical know-how) constructs resulted in7 variables for Factor 1 and 6 variables for Factor 2. Three of the 5variables of customization capability were dropped due to low factor loading scores, which resulted in the eighth factor, which explained marginal variability in the responses. The remaining two of the five variables of customization capability shown have a very high factor loading on the third factor.

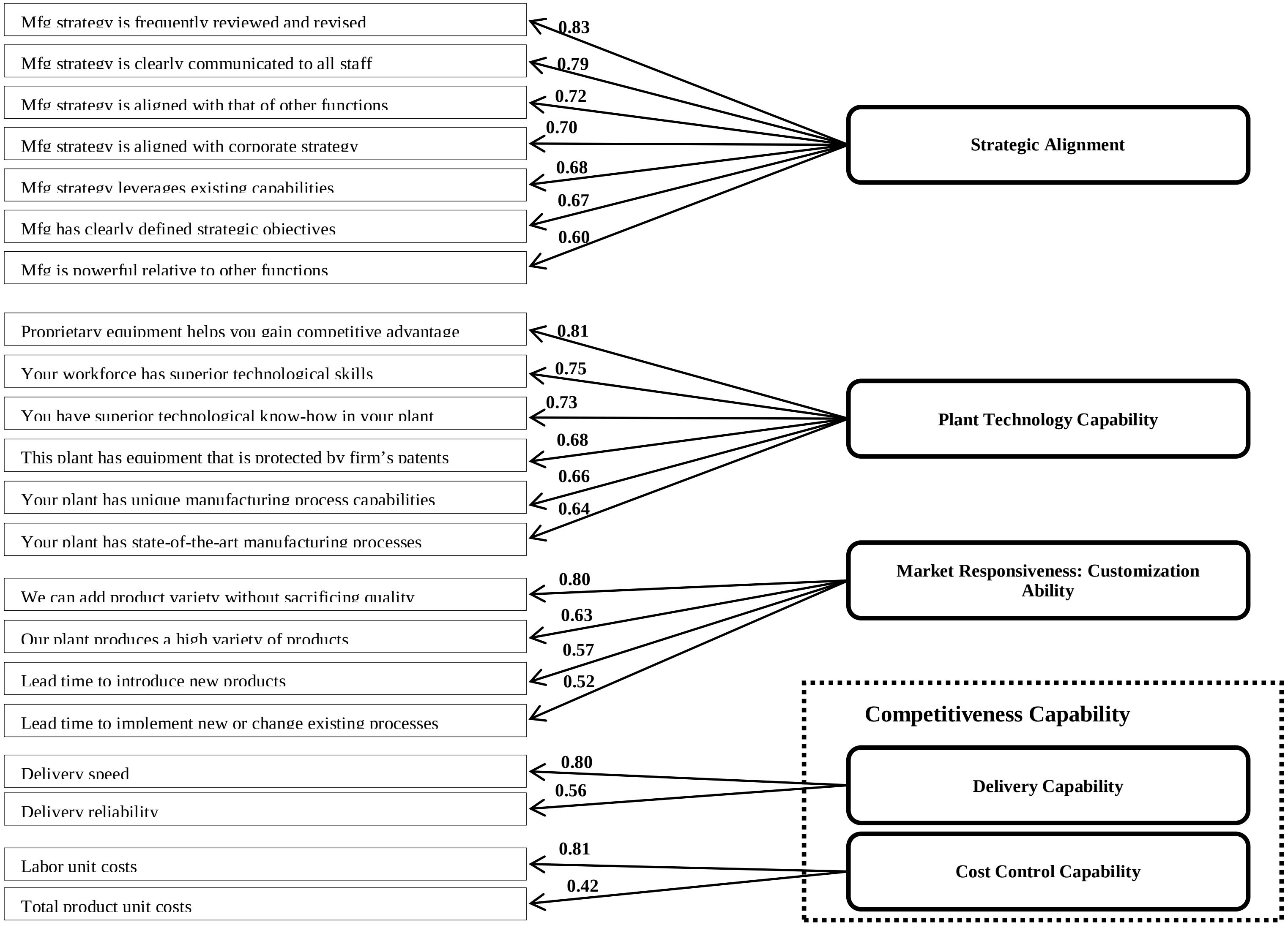

Figure 2: Confirmatory factor analysis (Independent constructs)

Two of the eight variables of operations' competitiveness show a high loading on Factor 3, customization capability. These two variables were "lead time to introduce new products", and "lead time to implement new or change existing process". The two variables not only indicate operations' competitive performance, but also indicate the response to customization capability. We redefined the customization capability construct as "market responsiveness". Eight variables were related to the competitive performance of firms, and these included operations' market response capabilities and plant capabilities. The two variables related to market response capabilities were already included in the redefined "market responsiveness" construct.

Table 1: Confirmatory factor analysis: Independent variables (Constructs).

Construct or Variables	Description of Construct or Variable	Factor Loading	Reliability
F1:	**Strategic Alignment**		**Alpha = 0.878**
F1-1	Manufacturing strategy is frequently reviewed and revised	.838	
F1-2	Manufacturing strategy is clearly communicated to all staff	.792	
F1-3	Manufacturing strategy is aligned with that of other functions	.720	
F1-4	Manufacturing strategy is aligned with corporate strategy	.703	
F1-5	Manufacturing strategy leverages existing capabilities	.687	
F1-6	Manufacturing has clearly defined strategic objectives	.677	
F1-7	Manufacturing is powerful relative to other functions	.607	
F2:	**Plant Technology Capability**		**Alpha = 0.863**
F2-1	Proprietary equipment helps you gain competitive advantage	.813	
F2-2	Your workforce has superior technological skills	.759	
F2-3	You have superior technological know-how in your plant	.731	
F2-4	This plant has equipment that is protected by the firm's patents	.680	
F2-5	Your plant has unique manufacturing process capabilities	.669	
F2-6	Your plant has state-of-the-art manufacturing processes	.646	
F3:	**Customization Ability**		**Alpha = 0.717**
F3-1	We can add product variety without sacrificing quality	.805	
F3-2	Our plant produces a high variety of products	.633	
F3-3	Lead time to introduce new products	.575	
F3-4	Lead time to implement new or change existing processes	.526	
F4:	**Delivery Capability**		**Alpha = 0.580**
F4-1	Delivery speed	.804	
F4-2	Delivery reliability	.568	
F5:	**Cost Control Capability**		*** Alpha = 0.483**
F5-1	Labour unit costs	.813	
F5-2	Total product unit costs	.426	

**Other reliability analysis diagnostic measures, discussed in the Reliability Analysis section, were applied and tested, the inter-item correlation was well above 0.3, and the item-to-total correlation was well above 0.5.*

Two of the remaining six variables show a high loading on the fourth factor, which we then defined as “delivery capability”. Further, of the four remaining variables, two show a high factor loading on the fifth factor, which we now define as the “cost control capability” of the manufacturing operation. The remaining two variables were loaded on factors explaining very low variability of the responses, which we did not consider in our study.

3.2 Dependent construct

Performance measurement of firms has been of enduring importance to scholars, but it has also been widely debated and much contested. Traditional performance measurements based on finance and accounting are now seen as insufficient for comprehensive decision-making, and hence there is a call to include non-financial performance measures (Jusoh et al., 2008). Tseng et al. (2009) in their empirical study in the manufacturing industry found that competitive performance measures (i.e. sales growth rate and market share) followed by a financial performance measure (earning profitability) were the top-rated performance measures. Following Tseng et al. (2009), this study measures firm performance using these three variables, denoted by per cent change in: total sales of goods and services; market share; and profitability (Figure 3).

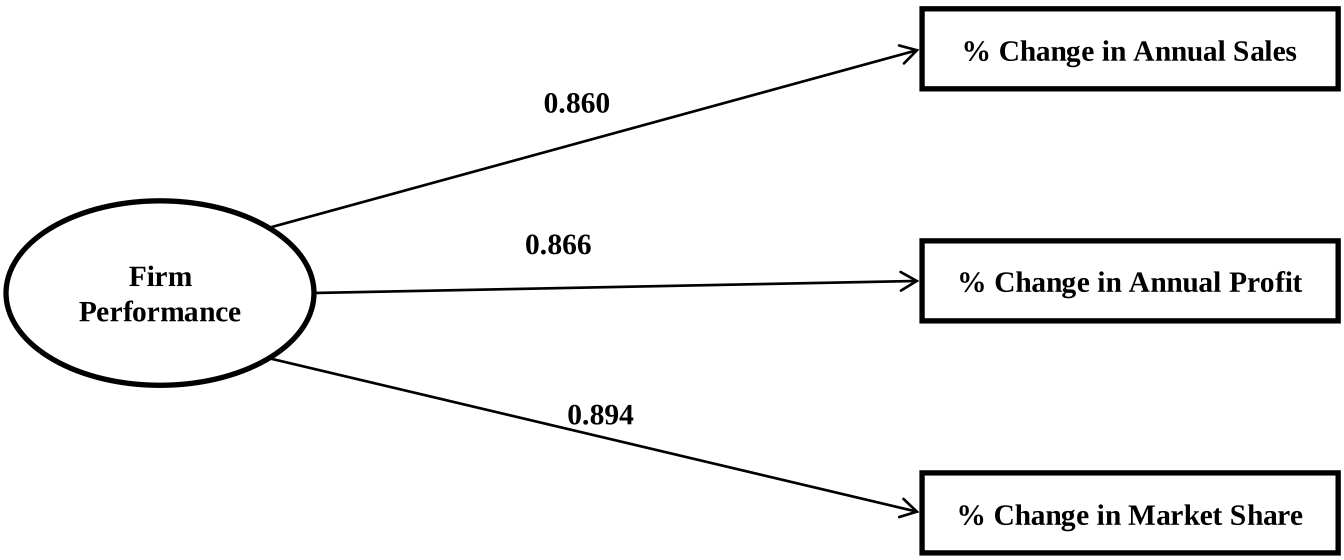

Figure 3: Confirmatory factor analysis (Dependent construct)

Table 2: Confirmatory factor analysis: Dependent variable (Construct)

Construct or Variables	Description of Construct or Variable	Factor Loading	Reliability
F6:	**Firm Performance**		**Alpha = 0.839**
F6-1	% change in total sales of goods and services	0.860	
F6-2	% change in profitability	0.866	
F6-3	% change in market share	0.894	

4. Analysis

We use multiple regression analysis to test the hypotheses. We check the criteria validity and model fit for multiple linear regression analysis. We examine the Multiple R ($R = 0.5873$), and an Adjusted R square value (0.2819). These values suggest that the model has an acceptable level of criteria validity and explain 28.19% of the variance of firm performance (refer to Table 2). The F value of 5.475 and Sig $F = 0.0004$ also signify the overall model fit. To ensure the use of a multiple linear regression, it is important to check the assumptions about the constant variance of the error terms, the independence of the error terms, and the normality of the error distribution. We examined the error terms for the linearity checks (Hair et al., 1992) and found that the regression model developed based on a small sample of 58 manufacturing firms accurately represents the population. The model is reliable and explains an acceptable level of variance in the firms' performance.

4.1 Results of hypothesis testing

Table 3 shows the bi-variate correlation relationship between manufacturing practices and firms' performance. This study assumes that independent variables generated by confirmatory factor analysis have a causal relationship with firms' performance. Conversely, it is also possible that firms' high performance drives some manufacturing practices over time.

Table 3: Bi-variate correlation matrix of independent and dependent constructs

Factors	*Strategic Alignment*	*Plant Tech Capability*	*Market Responsiveness*	*Delivery Capability*	*Cost Control Capability*	*Firm's Performance*
F1	1.0000					
F2	0.5939	1.0000				
F3	0.4581	0.3662	1.0000			
F4	0.0590	(0.2156)	(0.0621)	1.0000		
F5	0.0733	0.1649	0.1945	0.0015	1.0000	
F6	0.5707	0.2734	0.3488	0.0317	0.0426	1.0000

Table 4: Multiple regression analysis

Multiple regression analysis				
Multiple R				0.5873
R Square				0.3449
Adjusted R Square				0.2819
Standard Error				0.7177
Analysis of variance		**Df**	**SS**	**MS**
Regression		5	14.1016	2.8203
Residual		52	26.7867	0.5151
F = 5.4750		Significance F = 0.0004		
Factor	**Construct**	**Beta**	**T**	**Sig T**
F1:	Strategic Alignment	0.6493	3.8730	0.0003
F2:	Plant Tech Capability	(0.1285)	(0.8545)	0.3968
F3:	Market Responsiveness	0.1417	0.9569	0.3430
F4:	Delivery Capability	(0.0270)	(0.1931)	0.8476
F5:	Cost Control Capability	(0.0038)	(0.0331)	0.9737

Table 4 shows the results of multiple linear regression analysis. The model considers the firm's performance as the dependent variable. The firm's performance is defined in terms of the percent change in the annual sales, annual profit, and market share of the firm. Firm performance is regressed against five independent constructs.

The construct *Strategic Alignment* of the manufacturing operation shows a significant and positive correlation with firm performance, therefore we accept the hypothesis H1 ($r = 0.57$, $p < 0.001$, Sig T = 0.0003). In initial *Eigen values*, this construct explained a total variance of 29.031%. The acceptance of this construct signifies that the manufacturing operations' strategic alignment to the business positively and significantly improves the firm's performance.

The constructs *Market Responsiveness* and *Plant Technology Capability* show a positive and significant correlation with firm performance. The constructs are not found significant in regression analysis, yet since both show strong and positive correlation with the firm's performance, we partially accept the Hypothesis H2 ($r = 0.3488$, Sig T = 0.3430) and H3 ($r = 0.2734$, and Sig T = 0.3968) at a reasonably low confidence relative to *Strategic Alignment*. The low significance level of the two constructs, while having a reasonably high correlation with the firm's performance can be explained by interpreting the regression results (Hair et al. 1992). The presence of a powerful construct *Strategic Alignment* in the regression caused the solution to be positioned such that the *Market Responsiveness* resulted in a weaker significant positive position, and the *Plant Technology Capability* resulted in a weaker significant negative position (Samson and Terziovski, 1999; Hair et al. 1992).

The constructs *Delivery Capability* and *Cost Control Capability* show an insignificant and positive correlation with firm performance. The constructs were also found to be not significant in the regression analysis. We therefore reject hypotheses H4 ($r = 0.0317$, Sig T =

0.8476) and H5 ($r = 0.0426$, Sig $T = 0.9737$). The results of all the hypothesis testing are illustrated in figure 4 as below.

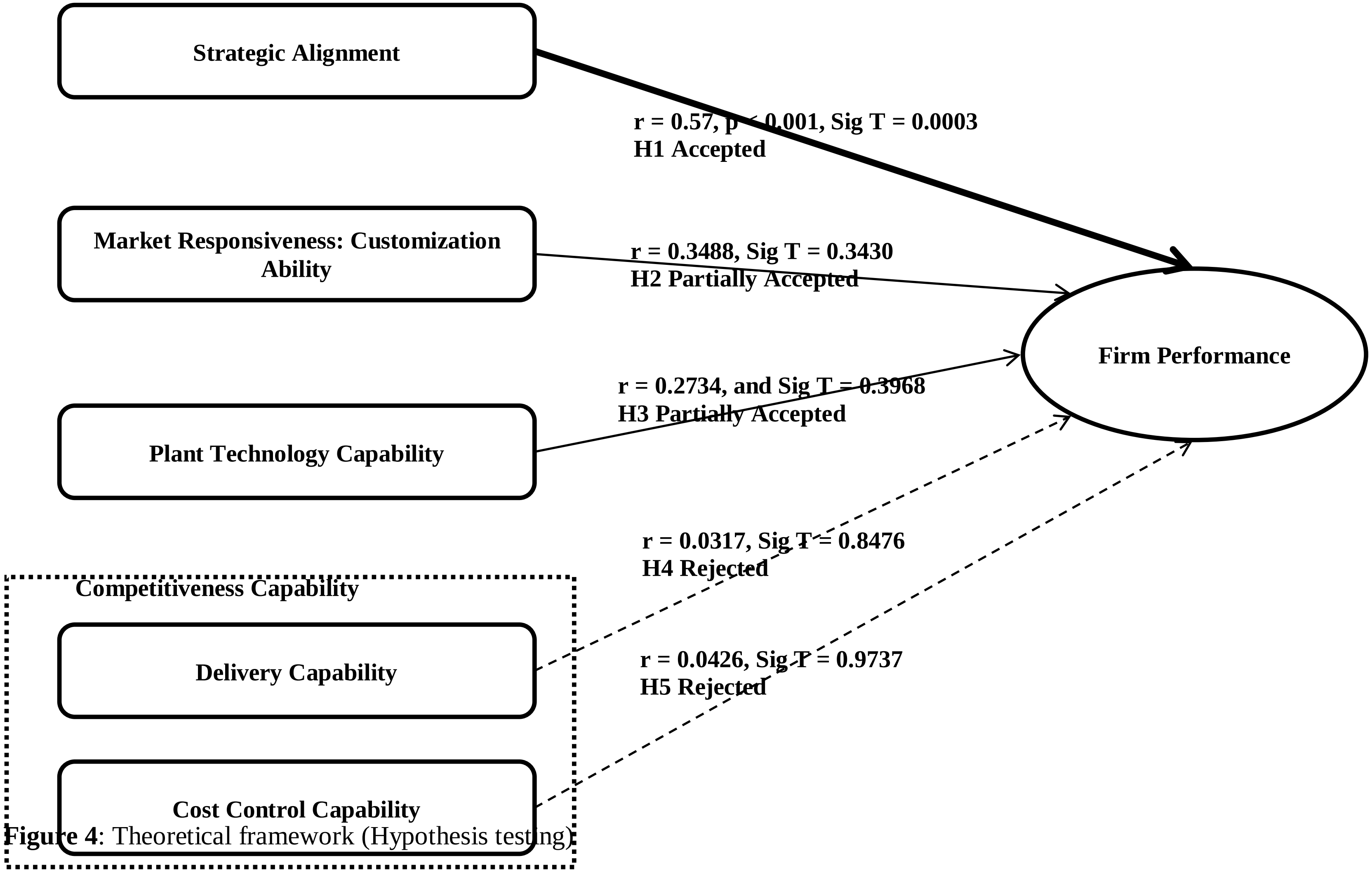

Figure 4: Theoretical framework (Hypothesis testing)

5. Discussion

Our results support the idea that dynamic capabilities of manufacturing operations in a firm lead to better firm performance. Strategic alignment of the manufacturing operations makes a significant contribution to firm performance. This supports Skinner's (1974) suggestion that there should be "strategic consensus" or "alignment" among different functions in a manufacturing organization. Given that operations are of primary importance to a manufacturing organization (Skinner, 1969; Swamidass, 1986; Wheelwright, 1984), it is vital that operational capabilities are aligned with other functions in the firm.

Scholars such as Morgan et al. (2009) and Newbert (2007) have emphasized firms' market-relating capabilities and consider these to be one of the dynamic capabilities that are vital to firm performance. Likewise, the alignment of manufacturing operations and marketing has been emphasized in the extant literature (e.g. Calantone et al., 2002; Hausman et al., 2002). Yet, surprisingly, little attention has been paid to manufacturing firms developing operational capabilities to respond to market needs. Our research findings fill this crucial gap. We demonstrate that if manufacturing operations develop market responsiveness capabilities to meet the customization demand of the customers, this will positively impact firm performance.

Our interpretation of the results of multiple-regression analysis shows that, when aligned with other functions of the firm, manufacturing operations are likely to be influenced by the prevailing market needs. Since market demand for customization and variety in products have been increasing (Kotha, 1995; Pine, 1993; Fogliatto et al., 2012), it is expected that firms that pay attention to this growing market need will benefit. Building the competencies required to cater to customization demand is a multi-function task and therefore needs firm-level alignment (Pine, 1993). Only when manufacturing operations are aligned to the strategic requirements of a firm that have arisen out of a market need will the delivery of customized products be possible. Furthermore, manufacturing operations must have customization capabilities and technical competence to implement this market need at firm-level. Our results validate this, as firm performance is seen to be affected by manufacturing operations' customization capabilities and plant's technical capabilities.

While scholars have suggested that customization will be valued by customers if firms deliver it reliably and at an affordable cost (Avella et al., 1999; Hill, 1995; Ketokivi and Schroeder, 2004; Pine, 1993), our results do not seem to support this. Even though cost and delivery capabilities of manufacturing operations positively correlate to firm performance, they do not seem to significantly affect it. One reason for this could be that manufacturing operations' customization capability and plants' technical competence are likely to significantly influence cost and deliverability, and hence these two factors are not prominent in the regression results.

In this research we make two substantive contributions to the extant literature on operations and strategy. First, our research demonstrates that the strategic alignment of manufacturing operations at the firm level helps to realize the potential value of manufacturing operations and the competitive advantage that these can bestow to the company. Theoretically, it lends support to the pioneering work of Skinner (1969) and others such as Swamidass (1986) and Wheelwright (1984), who argue that manufacturing operations must not be simply seen as an organizational resource to be used to achieve high efficiency and low costs.

It is this strategic alignment that gives the dynamic capability of manufacturing operations an important role in contributing to firm's competitive advantage and performance. This latter aspect is ascertained as we show that manufacturing operations' technical competence is a key resource that contributes to the firm performance. This technical competence is embodied in a manufacturing plant's technology and the know-how of the people contributing to the operational function.

Second, our findings suggest that market responsiveness to customization needs strongly contributes to firm performance. However, we note that the customization capability of manufacturing operations is distinct from the simplistic continuous improvement capability of the operations. Effectively building customization capability not only requires a distinctive style of managing, organizational structure, learning methods and marketing capabilities, but most importantly it requires a dynamic operational capability (Pine et al., 1993).

Overall, this research affirms that the dynamic capabilities of manufacturing operations area contributing factor to firm performance (Teece, 2007). More particularly, strategic alignment and market responsiveness (i.e. the ability to accommodate to market's customization needs) are the two dynamic capabilities of manufacturing operations that best complement its technical competence resource to improve firm performance.

6. Conclusion

The findings of this study are particularly important and timely for the Indian context. Indian manufacturing is nascent and, through its 'Make in India' campaign, the new Indian government is formulating and seeking to apply policies that will boost Indian manufacturing (cf. Government of India's website www.makeinindia.com). These findings could benefit Indian firms seeking to either establish or modify their manufacturing operations to cater to local and global demands.

It is important to highlight some of the limitations of the study. One is the small number of sample firms from which data were collected. Collecting data from a larger sample would require more resources and more time. Second, the generalizability of the study is limited: it applies to the Indian and not global context. Similar studies in different countries would enhance our understanding. Finally, we have relied on a survey instrument based on a Likert-scale, which leaves the study open to the criticism of self-serving bias in our data (Morgan et al., 2009).

Several avenues for future research have emerged from this study. Firstly, we identified that strategic alignment capabilities of manufacturing operations are important for firm performance. Identifying which factors contribute to these capabilities and determining how best the capabilities can be developed could be a fruitful area of future research. Secondly, we found that manufacturing operations' responsiveness to market customization is a significant contributor to firms' performance. It would be useful to systematically identify other complementary market responsiveness capabilities that manufacturing operations could develop, as potential contributors to firm performance. Finally, a third area for potential research would be to examine the *quality* and *extent* of strategic alignment with market responsiveness capabilities of a firm and how these relate to firm performance.

References

Ahmed, M. U., Kristal, M. M., Pagell, M., 2014. Impact of operational and marketing capabilities on firm performance: Evidence from economic growth and downturns. International Journal of Production Economics154, 59-71.

Amoako-Gyampah, K., Acquaah, M., 2008. Manufacturing strategy, competitive strategy and firm performance: An empirical study in a developing economy environment. International Journal of Production Economics 111(2), 575-592.

Ang, J. S. K., Shimada, T., Quek, S-A, Lim, E., 2015.Manufacturing strategy and competitive performance – An ACE analysis. International Journal of Production Economics169, 240-252.

Avella, L., Fernández, E., Vázquez, C. J., 2001. Analysis of manufacturing strategy as an explanatory factor of competitiveness in the large Spanish industrial firm. International Journal of Production Economics 72, 139-157.

Blois, K. J., 1991. Trends in marketing and their implication for manufacturing. International Journal of Technical Management, 6(3/4), 385-394.

Calantone, R., Dröge, C., Vickery, S., 2002. Investigating the manufacturing-marketing interface in new product development: does context affect the strength of relationships? Journal of Operations Management20, 273-287.

Cepeda, G., Vera, D., 2007. Dynamic capabilities and operational capabilities: A knowledge management perspective. Journal of Business Research60, 426-437.

Chakrabarty, S., Wang, L., 2012. The long term sustenance of sustainability practices in MNCs: A dynamic capabilities perspective of the role of R&D and internationalization. Journal of Business Ethics 110, 205-217.

Cronbach, L. J., 1951. Coefficient alpha and the internal structure of tests. Psychometrika 31, 93-96.

Churchill, G. A., 1979. A paradigm for developing better measures of marketing constructs. Journal of Marketing Research 16 (February), 64-73.

Clark, K. B., Fujimoto, T., 1991. Product development performance. Harvard Business School Press, Cambridge, MA.

Da Silveria, G., Borenstein, D., Fogliatto, F. S., 2001. Mass customization: Literature review and research directions. International Journal of Production Economics72, 1-13.

Day, G. S., 1992. Marketing’s contribution to the strategy dialogue. Journal of the Academy of Marketing Science 20 (4), 323-329.

Eisenhardt, K. M., Martin, J., 2000. Dynamic capabilities: What are they? Strategic Management Journal21, 1105-1021.

Ettlie, J. E., 1997. Integrated design and new product success. Journal of Operations Management 15 (1), 33-55.

Fogliatto, F. S., Silveria, G. J. C., Borenstein, D., 2012. The mass customization decade: An updated review of the literature. International Journal of Production Economics 138, 14-25.

Garud, R., Kotha, S., 1994. Using the brain as a metaphor to model flexible productive units. Academy of Management Review 19 (4), 671-198.

Hair Jr, J. F., Anderson, R. E., Tatham, C. L., Black, W. C., 1992. Multivariate Data Analysis, Macmillan, New York.

Hair, J. F. J., Black, W. C., Babin, B. J., Anderson, R. E., 2010. Multivariate Data Analysis, Seventh Edition. Prentice Hall, USA.

Hausman, W. H., Montogomery, D. B., Roth, A. V., 2002. Why should marketing and manufacturing work together? Some exploratory empirical results. Journal of Operations Management 20, 241-257.

Hayes, R. H., Wheelwright, S. C., 1984. Restoring our competitive edge. Wiley Publishing, New York, USA.

Hayes, R. H., Pisano, G. P., 1994. Beyond world class manufacturing: The new manufacturing strategy. Harvard Business Review 71 (2), 77-87.

Hill, T. 1995. Manufacturing strategy: Text and cases. Macmillan Business, UK.

Joshi, M. P., Kathuria, R., Porth, S. J., 2003. Alignment of strategic priorities and performance: an integration of operations and strategic management perspectives. Journal of Operations Management 21, 353-369.

Jusoh, R., Ibrahim, D. N., Zainuddin, Y., 2008. The performance consequence of multiple performance measures usage: Evidence from the Malaysian manufacturers. International Journal of Productivity and Performance Management 57(2), 119-136.

Karmarkar, U. S., 1996. Integrative research in marketing and operations management. Journal of Marketing Research 33 (2)125-133.

Ketokivi, M., Schroeder, R., 2004. Manufacturing practices, strategic fit, and performance. International Journal of Operations & Production Management 24 (2), 171-191.

Kotha, S., 1995. Mass customization: Implementing the emerging paradigm for competitive advantage. Strategic Management Journal 16, 21-42.

Laugen, B. T., Acur, N., Boer, H., Frick, J., 2005. Best manufacturing practices: What do the best-performing companies do? International Journal of Operations and Production Management 25 (2), 131-150.

Lawson, B., Samson, D., 2001. Developing Innovation capability in organisations: A dynamic capabilities approach. International Journal of Innovation Management 5 (3), 377-400.

Lii, P., Kuo, F-I., 2016. Innovation-oriented supply chain integration for combined competitiveness and firm performance. International Journal of Production Economics 174, 142-155.

Makadok, R., 2001. Toward a synthesis of the resource-based and dynamic-capability views of rent creation. Strategic Management Journal, 22 (5), 387-401.

Marques, A., Lacerda, D. P., Camargo, L. F. R., Teixeira, R., 2014.Exploring the relationship between marketing and operations: Neural network analysis of marketing decision impacts on delivery performance. International Journal of Production Economics153, 178-190.

McKeena, R., 1991. Marketing is everything. Harvard Business Review 69 (1), 65-79.

Morgan, N.A., Vorhies, D.W., Mason, C.H., 2009. Market orientation, marketing capabilities, and firm performance. Strategic Management Journal 30, 909-920.

Morris, L. J., Morris, J. S., 1992. The changing manufacturing environment: Implications for marketing. The Journal of Business and Industrial Marketing 7(2), 21-29.

Newbert, S. L., 2007. Empirical research on the resource-based view of the firm: an assessment and suggestions for future research. Strategic Management Journal 28 (2), 21-146.

Nonaka, I., 1994. A dynamic theory of organizational knowledge creation. Organization Science 5, 14-37.

Nunnally, J., 1978. Psychometric Theory. McGraw-Hill Publishing, New York, USA.

O’ Leary-Kelly, S.W., Flores, B.E. 2002. The integration of manufacturing and marketing/sales decisions: impact on organizational performance. Journal of Operations Management 20, 221-240.

Paiva, E. L., 2010. Manufacturing and marketing integration from a cumulative capabilities perspective. International Journal of Production Economics, 126, 379-386.

Peter, J. P., 1979. Reliability: A review of psychometric basics and recent marketing practices. Journal of Marketing Research 16 (February), 6-17.

Pine II, B. J., 1993. Mass customization: The new frontier in business competition. Harvard Business School Press, Boston, USA.

Pine II, B. J., Victor, B., Boynton, A. C., 1993. Making mass customization work. Harvard Business Review 71, 108-119.

Prajogo, D. I., 2016.The strategic fit between innovation strategies and business environment in delivering business performance. International Journal of Production Economics 17, 241-249.

Robinson, J. P., Shanver, P. R., Wrightsman, L. S., 1991. Criteria for scale selection and evaluation, in Measures of personality and social psychological attitudes, J. P. Robinson, P.R. Shanver, and L. S. Wrightsman (eds.). Academic Press, San Diego, USA.

Sanchez, R., 1995. Strategic flexibility in product competition: An options perspective on resource-based competition. Strategic Management Journal 16 (Summer Special Issue), 135-159.

Sawhney, R., Piper, C., 2002. Value creation through enriched marketing-operations interfaces: An empirical study in the printed circuit board industry. Journal of Operations Management 20, 259-272.

Schroeder, R. G., Anderson, J. C., Cleveland, G., 1986. The content of manufacturing strategy: An empirical study. Journal of Operations Management 6, 405-415.

Shin, H., Lee, J-N, Kim, D., Rhim, H, 2015.Strategic agility of Korean small and medium enterprises and its influence of firm and operational performance. International Journal of Production Economics 168, 181-196.

Skinner, W., 1969. Manufacturing: The missing link in corporate strategy. Harvard Business Review, 136-145.

Skinner, W., 1974.The focused factory. Harvard Business Review 3,113-119.

Slater, S. F., Narver, J. C., 1995. Market orientation and learning organization. Journal of Marketing59 (3), 63-74.

Sohal A. S., Gordon, J., Fuller, G., and Simon, A., 1999. Manufacturing practices and competitive capability: an Australian study. Technovation, 19 (5), 295-304.

St. John, C. H., Hall Jr., E. H., 1991. The interdependence between marketing and manufacturing. Industrial Marketing Management 20(3), 223-229.

Sun, H., Hong, C., 2002. The alignment between manufacturing and business strategies: its influence on business performance. Technovation22, 699-705.

Swahney, R., Piper, C., 2002. Value creation through enriched marketing-operations interfaces: An empirical study in the printed circuit board industry. Journal of Operations Management 20, 259-272.

Swamidass, P. M., 1986. Manufacturing strategy: Its assessment and practice. Journal of Operations Management 6 (4), 471-484.

Swink, M., Song, M., 2007.Effects of marketing-manufacturing integration on new product development time and competitive advantage. Journal of Operations Management 25, 203-217.

Tatikonda, M. V., Montoya-Weiss, M. M. 2001. Integrating operations and marketing perspectives of product innovation: The influence of organizational process factors and capabilities on development performance. Management Science 47 (1), 151-172.

Teece, D. J., 2007.Explicating dynamic capabilities: The nature and micro foundations of (sustainable) enterprise performance. Strategic Management Journal 28, 1319-1350.

Terziovski, M., Samson, D., 1999.The link between total quality management practice and organisational performance. International Journal of Quality and Reliability Management 16 (3), 226-237.

Terziovski, M., Sohal, A., Howell, A., 2002. Best practice in product innovation at Varian Australia. Technovation 22 (9), pp 561-569.

Terziovski, M., 2010. Innovation practice and its performance implications in small and medium enterprises (SMEs) in the manufacturing sector: A resource-based view. Strategic Management Journal 31, 892-902.

Tseng, F-M., Chiu, Y-J., Chen, J-S, 2009. Measuring business performance in the high-tech manufacturing industry: A case study of Taiwan's large-sized TFT-LCD panel companies. Omega: The International Journal of Management Science 37, 686-697.

Tu, Q., Vonderembse, M. A., Ragu-Nathan, T. S., 2001. The impact of time-based manufacturing practices on mass customization and value to customer. Journal of Operations Management. 19, 201-217.

Wang, Q., Zhao, X., Voss, C., 2016. Customer orientation and innovation: A comparative study of manufacturing and service firms. International Journal of Production Economics 171, 221-230.

Wernerfelt, B., 1984. A resource based view of the firm. Strategic Management Journal 5(5), 405-425.

Wheelwright, S. C., 1984. Manufacturing strategy: Defining the missing link. Strategic Management Journal 5, 77-91.

Zahra, S., Das, S., 1993. Building competitive advantage on manufacturing resources. Long Range Planning 26 (2), 90-100.

Zhang, M., Zhao, X., Qi, Y., 2014.The effects of organizational flatness, coordination, and product modularity on mass customization capability. International Journal of Production Economics 158, 145-155.