# AN EMPIRICAL STUDY OF THE RELATIONSHIPS BETWEEN STRATEGIC MANUFACTURING CAPABILITIES

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***ABSTRACT***

*Dalam kacamata manajemen operasi, kapabilitas strategik mendukung dan membentuk strategi korporat, dan, pada gilirannya, akan membantu kesuksesan perusahaan dalam persaingan. Tujuan dari artikel berikut adalah untuk menguji hubungan antara kapabilitas pemanufakturan strategik pada perusahaan-perusahaan manufaktur di Indonesia. Survei dilakukan menggunakan kuesioner berbasis internet dan uji statistik, dalam hal ini* Structural Equation Modeling *(SEM), digunakan untuk memahami konsep ini.*

*Analisis terhadap data yang diperoleh menunjukkan bahwa kapabilitas* quality *menjadi basis bagi kapabilitas* delivery, *yang juga menjadi basis bagi kapabilitas* flexibility *dan* cost. *Apakah kapabilitas tersebut dicapai secara eksklusif ataupun secara simultan, terlihat adanya keterkaitan dengan implementasi sejumlah program peningkatan tertentu. Pola umum dari akumulasi kapabilitas tersebut dapat digunakan untuk mengestimasi perilaku potensial maupun cara kerja yang lebih inovatif.*

***Keywords:*** *manufacturing capabilities, strategic manufacturing, resource-based view*

## INTRODUCTION

Corporate strategy can be deciphered as an organization tool to reach and maintain success. Taken from the Greek *strategia*, meaning the ability to use the available resources to win military conflicts, corporate strategy is often interpreted by business managers as the real focus in competitions (Mitreanu, 2006).

Considering that competition takes place exclusively on every level, every organization then fully concentrates on strategic deeds to improve products and services they promote continually to customers. The emphasis on competitions drives organizations to bring up ideas and actions which trigger sustainable success.

In operation management perspective, the corporate strategy is supported and shaped by strategic capabilities. Strategic capabilities defined as a plant's contribution to company's success factors in competition (Größler and Grübner, 2006). Wheelwright (1984) emphasized, strategic capabilities in manufacturing companies are the abilities to produce: (1) with low cost, (2) high quality, reliable and fast in delivery, also (4) flexibility concerning mix and volume of product. Thus, it is the main task of manufacturing companies to develop, nourish, and arbitrary the strategic capabilities.

This research tries to give empirical verification on the cumulative relationships of strategic capabilities elements of cost, quality, delivery, and flexibility. The model is built on the theory constructed by Ferdows and De Meyer (1990) which had been tested empirically by Größler and Grübner (2006).

## THEORETICAL FRAMEWORK

It is widely known that strategic capabilities in manufacturing industry are based on the dimensions of cost, quality, and delivery—which then became the conceptual basis and empirical foundation in operation management (Ward *et al.*, 1996, 1998; Swink and Way, 1995).

However, research development in this field is constantly made. Thun *et al.* (2000) defined delivery dimension more broadly as delivery speed and reduction of production lead times. As manufacturing technology advanced, flexibility or agility is also added as the fourth dimension (Größler and Grübner, 2006).

In present time, companies' adaptive ability on market change dynamics and the variety of customer needs is absolutely essential (Collins and Schmenner, 1993; De Meyer *et al.*, 1989). This ability also helps companies to reach competitive advantages through creations of value-added activities (Gerwin, 1993).

Regarding the strategic trend of resources availability and capability utilization, there are two difference approaches: resource-based view (RBV) and dynamic capabilities approach (Davis, 2004). Both of them have basic values and competencies as the source to reach competitive advantage, where resource-based view uses static approach, while dynamic capabilities approach tends to be more flexible.

According to resource-based view, companies are seen as single units, consist of a group of organized heterogeneous assets which are made, managed, renewed, improved, and increased as time goes by (Barney, 1991; López, 2005).

In the meanwhile, according to dynamic capabilities approach, companies are perceived as dynamic entities, which are able to integrate, build, and reconfigure their internal and external resources as well as functional competencies to cope with massive scale market changes (Teece *et al.*, 1997; Zollo and Winter, 2002).

This research adheres to the resource-based view, which assumes that the main determinant of company's success is a set of resources and capabilities that shape and characterize companies (Wernerfelt, 1984). Resources, as defined by Größler and Grübner (2006), are:

> Resources, as distinct from capabilities, are something a firm possesses or has access to, not what a firm is able to do ... Based on such resources, capabilities are developed. For instance, flexible production systems in combination with highly skilled workers (i.e. resources) facilitate production in a flexible way (i.e. capability).

Whilst capabilities enable companies to develop and exploit resources to deliver profits through high-quality products and services (Amit and Schoemaker, 1993). However, although it is difficult to find a right definition of capabilities[1], Nanda (1996) explained capabilities as:

> A capability arises from the possession of a resource (an asset) and it is the "potential input from the resource stock to the production function."

Using organizations' capabilities, resources are transformed into products and services (Warren, 2002). Of course the balance of available resources and used capabilities must be accomplished to achieve higher level of organizational performance (Carmelli and Tishler, 2004). Even more, capabilities give strategic advantaged because it is difficult to be imitated by competitors (Dutta *et al.*, 2005).

Besides resources and capabilities, priorities also contribute to manufacture corporations' strategic success. Priorities are intended capabilities (Ward *et al.*, 1996). Priorities can be deciphered as capabilities expected by the management to be had or capabilities on which should be placed in the future (Größler and Grübner, 2006)[2]. Hayes and Wheelwright (1984), also Mintzberg and Waters (1985) identified priority and differentiated it with capabilities as follows:

> Priorities are the result of an explicit strategy process in manufacturing; capabilities are not only the result of deliberate planning, but also of emergent decisions and policies in the field of manufacturing strategy.

Although strategic capabilities allow companies to excel in competitions, it is not merely enough (Corbett and Van Wassenhove, 1993). Companies have to maintain the relationship of internal-focused manufacturing strategic capabilities and external-focused marketing strategy (Größler and Grübner, 2006).

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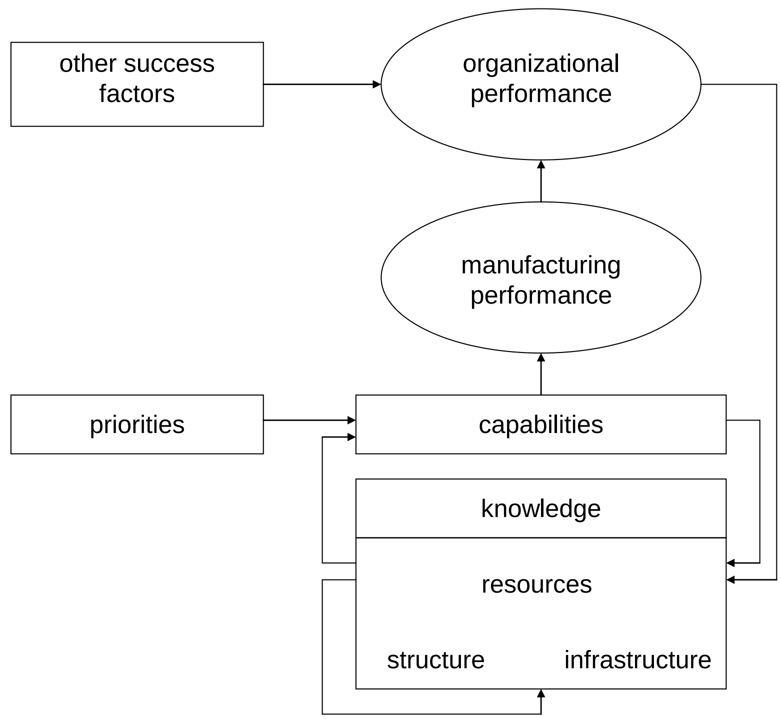
[1] A distinction is sometimes made in the literature between *capabilities* and *competencies* (e.g. Cleveland *et al.*, 1989; Koufteros *et al.*, 2002; Vickery *et al.*, 1993).

[2] The relationship between intended and realized manufacturing strategy, as well as its impact on organizational performance discussed further by Devaraj *et al.* (2004).

In the classic opinion of Hayes and Schmenner (1978), manufacturing strategy plays as dependent and supporting function of marketing activities. On the other side, Wheelwright and Bowen (1996) added that manufacturing strategy should either be supportive towards the marketing goals of the firm or even offer new strategic possibilities.

This brought a demand of transformation and reconciliation process between the manufacturing strategy and companies' marketing strategy (Kotler and Armstrong, 2001; Slack and Lewis, 2002).




*Source*: Adopted from Größler and Grübner (2006)

**Figure 1.** Strategic Capabilities Framework

Größler and Grübner (2006) proposed a concept of manufacturing strategy and the important roles within it (see Figure 1). Based upon a combination of structural and infrastructural strategic resources (Hayes and Wheelwright, 1984), capabilities determine the manufacturing performance. The resources combination is supported by a set of knowledge about effective and efficient resources utilizations (Jacobides and Winter, 2005).

As a strategic priority, capabilities influence utilization, development, and resource liberation in organizations. Organization's performance is influenced by the manufacturing performance, but also by other factors such as performance of other organizational functions, competitors' behaviors, customers' demand, or even luck (Größler and Grübner, 2006). The organization performance, eventually, will provide feedback to the resources composition possessed or controlled by companies (Phillips *et al.*, 1983).

It is a must for companies to improve and maximize its strategic capabilities. Unfortunately, resources limitations hinder the management to make decisions (St John and Young, 1992), resulting that not all capabilities can be fully maximized. The management has to focus on finance aspect and other aspects on some of these capabilities.

A right focus may give cumulative effects to manufacturing performance improvements. However, sometimes improvements on one capability do not always have positive consequences on other capabilities in such a way that cause trade-off between the capabilities (Größler and Grübner, 2006).

There is a polarization of views about cumulative relationship and trade-off relationship within companies' strategic capabilities. Extremely, Trade-off School argues that manufacturing capability can only be improved at the expense of other capabilities i.e. producing lower cost goods would only be possible with a decrease in quality simultaneously (Skinner 1969; 1974). On the other side, the World Class Manufacturing (WCM) regards that improvements on more than one capability can be made simultaneously (Boyer and Lewis, 2002). They argue that modern manufacturing systems allow for improvements in more than one manufacturing capability at the same time.

This research takes a middle path according to Schmenner and Swink's (1998) law of cumulative capabilities. Generally, improvements on particular strategic capabilities can strengthen other capabilities. Trade-off relations indeed happen, but only to certain directions depend on management focus and emphasis. A series of cumulative and trade-off relation that gives best influence on manufacturing performance is referred as performance improvement paths (Clark, 1996; Hayes and Pisano, 1996).

## HYPOTHETICAL MODEL

The hypothesis modeling is divided into three sections. First of all is the capabilities to produce with high quality. Quality capabilities are firmly related with product and process characteristics, also with consistency in manufacturing process and product performance. Thus, quality is significantly influenced by design and production of a product to fulfill customers' expectations (Hall *et al.*, 1991).

Improvements in quality capabilities are the basis of other strategic capabilities (Noble, 1995; Ferdows and De Meyer, 1990). When companies are able to improve quality capabilities, other strategic capabilities will be 'beneficial'. Product processing will be more stable and reliable, while the needed time and cost will be falling into a minimum. Improvement in quality dimension will also boost other capabilities, especially cost capabilities, significantly (Skinner, 1986; Philips *et al.*, 1983).

*H1.* Improvements in quality capabilities have direct positive influence on delivery capabilities.
*H2a.* Improvements in quality capabilities have indirect positive influence on flexibility capabilities.
*H2b.* Improvements in quality capabilities have indirect positive influence on cost capabilities.

Furthermore, delivery capabilities are time capabilities that show the companies' ability to accomplish their tasks smartly without sacrificing quality (Blackburn, 1990; Stalk and Hout, 1990). The important factors in these capabilities are delivery speed and manufacturing lead-time.

The ability to run manufacturing process in high speed increases operational flexibility because of the decrease of the time needed to respond external stimulus and to adapt on different needs (Milling *et al.*, 2000). Moreover, time reduction in production process helps to costs reduction through higher productivity and lower inventory level (Harbour, 1996; Carter *et al.*, 1995)

*H3.* Improvements in delivery capabilities have direct positive influence on flexibility capabilities.

*H4.* Improvements in delivery capabilities have direct positive influence on cost capabilities.

The last part is cost and flexibility strategic capabilities. Cost capabilities have direct influence on pricing policy which is built on components such as factory overhead cost and employees' productivity (Miller *et al.*, 1992). Inventory turnover and capacity utilization are also included in cost capabilities (Größler and Grübner, 2006). In the mean time, flexibility capabilities consist of companies' ability to offer high flexibility concerning the possible mix and volume of customer orders.

The relationships between cost and flexibility capabilities are slightly different than other strategic capabilities. Simultaneously, companies are considered only able to do cost efficiency or flexible in operations (Hill and Portioli-Straudacher, 2003). Companies' flexibility has to be limited because it is related to trade-off with the cost emerged to deliver the flexibility (Anand and Ward, 2004). Therefore a trade-off relationship appears between efficiency and resource slack (Mishina *et al.*, 2004).

*H5.* Improvements in flexibility capabilities have direct negative influence on cost capabilities.

In general, this hypothesis model is consistent with the meta-analysis done by White (1996). Quality capabilities provide cumulative effects on delivery capabilities, which give basis to other capabilities, i.e. flexibility capabilities and cost capabilities. However, Größler and Grübner (2006) suggested seeing the relationship between flexibility capabilities and cost capabilities not as cumulative relationship, but a trade-off relationship. Figure 2 shows the conceptual framework incorporates the hypothesis stated above.

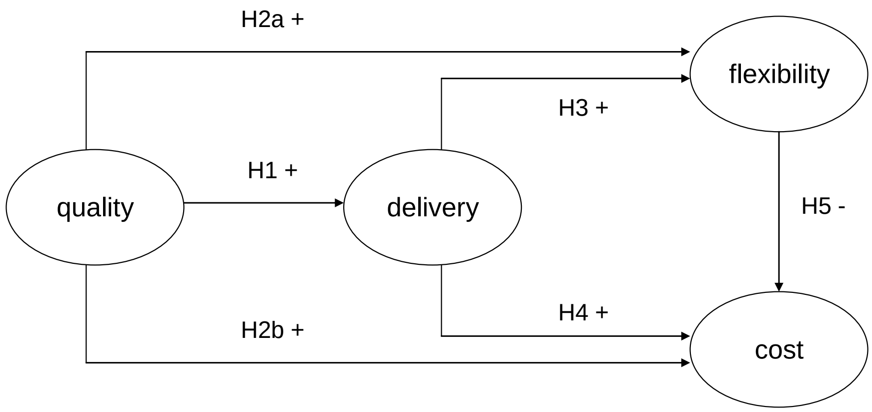



**Figure 2.** Framework of Hypothesis

## RESEARCH METHODOLOGY

The scope of this study in this research is limited to manufacturing companies in Indonesia. Empirical data is acquired through questionnaires, which were developed based on literature and previous research. Convenience sampling and snowball sampling methods were applied in this study. Two rounds of pretests were conducted before using the survey instrument for data collection.

There are 186 e-mail invitations sent, resulting in 67 respondents. Respondents from companies staffed by less than 50 workers are then excluded from the samples. Two incomplete questionnaires are also excluded from the samples. Therefore there are 61 samples available to be used and processed (see Table 1).

Those 61 respondents can be divided into a various scale of company. The highest percentage (57.38%) came from big company with more than 1,000 employee, followed by respondents from company which employs 500-999 workers (26.23%). Respondents from companies which staffed by 100-499 workers and 50-99 workers are 8.20% respectively.

Those respondents are also came from a wide range of subsector industry. The largest percentage came from automotive & parts sub-industry (9.84%). The following larger percentage came from computers & electronics and pharmaceutical & biotech sub-industry—8.20% respectively. Another sub-industry grouped and spreaded into a smaller percentage.

**Table 1.** Respondent Data

| No of employee | n | % |
|---|---|---|
| 50 - 99 | 5 | 8.20 |
| 100 - 499 | 5 | 8.20 |
| 500 - 999 | 16 | 26.23 |
| 1000 or above | 35 | 57.38 |
| Total | 61 | 100 |

| sub-industry | n | % |
|---|---|---|
| Automotive & Parts | 6 | 9.84 |
| Ceramics & Porcelain | 3 | 4.92 |
| Chemicals | 4 | 6.56 |
| Computers & Electronics | 5 | 8.20 |
| Consumer Durables | 4 | 6.56 |
| Electrical Equipment | 2 | 3.28 |
| Fast Moving Consumer Goods | 2 | 3.28 |

| | | |
|---|---|---|
| Food & Beverages | 6 | 9.84 |
| Housewares | 2 | 3.28 |
| Industrial Equipment | 3 | 4.92 |
| Machinery | 2 | 3.28 |
| Medical Devicess | 2 | 3.28 |
| Pharmaceutical & Biotech | 5 | 8.20 |
| Plastics & Packaging | 1 | 1.64 |
| Process Industries | 4 | 6.56 |
| Pulp & Paper | 1 | 1.64 |
| Textile & Garment | 4 | 6.56 |
| Woodworking | 2 | 3.28 |
| Other | 3 | 4.92 |
| Total | 61 | 100 |

The relationships of quality, delivery, flexibility, and cost strategic capabilities are examined using structural equation modeling (SEM), which consists of measurement model and structural model. Measurement model relates theoretical constructs to empirical variables that are indicators of the underlying theoretical construct, while structural model represents the relationships between the theoretical construct (Jöreskog and Sörbom, 1982).

A number of questions about performance dimensions in the last three years were asked to respondents using five-point Likert scales. There are also several questions asked related to companies' program initiatives to see the best practice in manufacturing industry. The list of questions can be seen in the Appendix.

## RESULT AND ANALYSIS

Having the structural model tested, all factors loading are statistically significant with less than 1 percent error probability. All factors in models show strong relationships with their attributes (see Table 2). This illustrates that the factors considered sufficiently represent the capabilities in the examinations.

Cronbach's alpha is used to measure the reliability of measurement model (Table 2). There is no absolute threshold that has to be fulfilled, but the value is suggested to be more than 0.6 (Sakakibara *et al.*, 1997) or reaching 0.7 (Nunnally, 1978). On the other hand, measurement model validity is obtained by convergent and discriminant validities. All factors are statistically significant with $p < 0.01$, showing that convergent validity is accomplished. Discriminant validity requires high correlations between examined factors, (Bagozzi *et al.*, 1991), in this case the correlation is not too intense (less than 0.07).

**Table 2.** Statistical Test Result

| Manufacturing capability | Parameter | Factor loading | Cronbach's alpha |
|---|---|---|---|
| quality | Manufacturing conformance | .643 | .6902 |
| | Product quality and reliability | .699 | |
| delivery | Delivery speed | .703 | .6444 |
| | Delivery reliability | .703 | |
| | Manufacturing lead-time | .738 | |
| flexibility | Volume flexibility | .703 | .6579 |
| | Mix flexibility | .800 | |
| cost | Labor flexibility | .637 | .6822 |
| | Inventory turnover | .704 | |
| | Capacity utilization | .740 | |
| | Overhead costs | .710 | |

All parameter estimations are statistically significant with $p < 0,01$

Testing model fit can be done by seeing its *chi-square* value, which in this case failed to fulfill the suggested minimum threshold. This indicator is not really accounted for model complexity because *chi-square* only tests compatibility of empirical and model data, although theoretical model is only used as approximation of the real condition (Cudeck and Browne, 1983). *Chi-square* is also sensitive to sample size effects, which is prone to refusal of the proposed model (Jöreskog and Sörbom, 1982; Bearden *et al.*, 1982).

To measure the empirical variance, Jöreskog and Sörbom (1982) recommended the usage of *chi-square* value divided by *degree of freedom* (*df*), should be 3.0 or less (Homburg and Giering, 1996). This criterion is fulfilled by the model with *chi-square/df* value 1.234 (see Table 3).

Another criterion is GFI, used to measure the share of empirical variance captured by model. In this case, GFI and AGFI is a bit below the suggested minimum threshold (0.90). Therefore can be assumed that model is not too capable to capture the large share of variance in the samples.

One other criterion to measure model quality in general is root mean square error of approximation (RMSEA), which is achieved by model (0.062 < 0.08). Other indications are root mean residual (RMR) and comparative fit index (CFI), both below recommended minimum threshold. The RMR is 0.055 (should be less than 0.05), while the CFI is 0.678 (ought to be above 0.9).

**Table 3.** Statistical Test Result

| Factor correlations | delivery | flexibility | cost |
|---|---|---|---|
| quality | .668 | .057 | .514 |
| delivery | | .283 | .031 |
| flexibility | | | .049 |
| All correlations are significant with $p < 0{,}01$ | | | |
| Model fit indicators | *Chi-square* = 46,9 (*df* = 38); *chi-square/df* = 1,234; *RMSEA* = 0,062; *RMR* = 0,055; *GFI* = 0,874; *AGFI* = 0,781; *CFI* = 0,678 | | |

The research finding supports the proposed hypothesis. The strength and direction of the tested relationships between the four manufacturing capabilities are shown in Figure 3. Besides direct effect that can be drawn from the path coefficient of the model, indirect relationships are also calculated in the path analysis.

Quality capabilities is directly influencing delivery (0.668) and indirectly influencing flexibility (0.057) and cost capabilities (0.514). Delivery capabilities are also directly supporting flexibility capabilities (0.283) and cost capabilities (0.031). Although relatively diminutive (-0.006), relationships of cost and flexibility capabilities shows the existence of trade-off between them (see also Table 3).

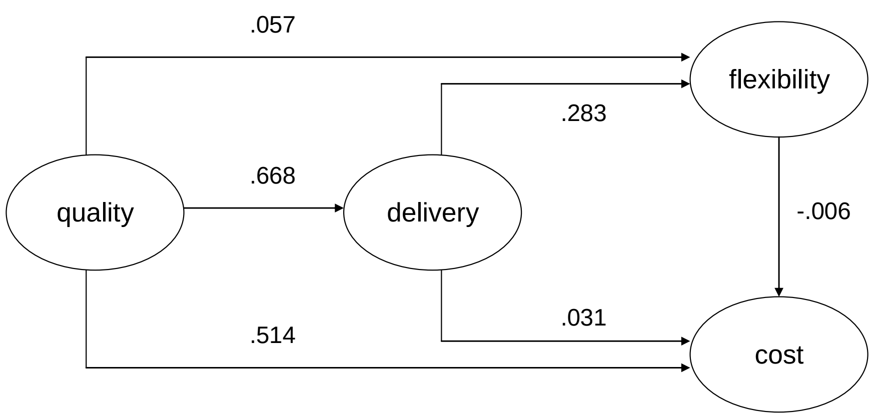



**Figure 3.** Hypothetical test result

Using *t* test ($p < 0.05$) of a number of operated manufacturing program initiatives (see Table AII), it is visible that reconfiguring supply strategy and supply portfolio management will increase strategic capabilities (0.454). Implementations of information and communication system such as enterprise resource planning (ERP), and tool empowerment programs i.e. total productive maintenance program are other dominant factors (each 0.338 and 0.331). Layout restructuring to stay focus and to shorten manufacturing process is the next dominant factor (0.299).

## CONCLUDING REMARKS

The cumulative nature and supportive relationships among different manufacturing capabilities—which are quality, delivery, flexibility, and cost—can be supported. This research found that quality capabilities are the supportive basis of other strategic manufacturing capabilities, which are delivery capabilities. Improvements on this dimensions are to be considered first before other capabilities are addressed. The delivery capabilities, in turn, also boost higher increases on other capabilities, which are flexibility and cost capabilities.

Findings in this research is similar with Koufteros *et al.* (2002) who discovered framework relationships of the capabilities of flexible product innovations, quality, delivery dependence, competitive price, and premium price. This research's findings amplify the research of Größler and Grübner (2006) on European manufacturing companies as well.

Größler and Grübner (2006) also learned that dominant program initiatives are: (1) manufacturing capacity expansion, (2) information and communication system implementation, (3) new product development acceleration, and (4) sustainable environmental improvement through better workplace setting. From the mentioned programs above, only information and communication system implementation is accord with the findings in this research. The contrast differences show that there is no absolute formula to answer the whole phenomenon. One size cannot certainly fit all.

Although not perfect, this model is statistically proved valid and reliable enough, and the proposed hypothesis is confirmed. Nevertheless, this paper does not intend to capture the big picture of such complex hypothetical constructs as manufacturing capabilities. The structural equation modeling (SEM) does not examine the trade-off exists between the two; rather it implies that the improvement in one of these capabilities has no significant effect on the other. We do not conduct further investigations to deepen the understanding of trade-off relationship between cost and flexibility as suggested by Noble (1995). Further refinement of this underlying structure is still needed to sharpen the concepts.

Further researches are needed to sharpen concept separation and to clarify the relationships in strategic capabilities from different point of views. Next researches are also expected to include other factors that influence the structure and performance of measured manufacturing (i.e. ROI or EVA), or to include contingency factors as recommended by Swink and Way (1995).

It should also be noted that we have only a limited database of data from 61 firms that either might be biased or can lead to misleading conclusion. Therefore, we consider these to be initial results on this highly-debated issue. Future researches should also utilize larger set of data to obtain better understanding and grab the big picture of this emerging concept.

Last but not least, it is the task of the management to reorganize desired strategic capabilities focus. Findings in this research are expected to be assumption basis to assess competitors behavior related with manufacturing strategic capabilities. As Gratton and Ghoshal (2005) proposed, the highest advantages that companies may earn is not by following what most competitors do—but by paying full attention on a set of unique and specific strategic capabilities structures.

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**APPENDIX**

Table AI.

| Please indicate whether there are plans and budgeted activities to undertake the program below. | | | | | |
|---|---|---|---|---|---|
| Manufacturing conformance | 1 | 2 | 3 | 4 | 5 |
| Product quality and reliability | 1 | 2 | 3 | 4 | 5 |
| Volume flexibility | 1 | 2 | 3 | 4 | 5 |
| Mix flexibility | 1 | 2 | 3 | 4 | 5 |
| Delivery speed | 1 | 2 | 3 | 4 | 5 |
| Delivery reliability | 1 | 2 | 3 | 4 | 5 |
| Manufacturing lead time | 1 | 2 | 3 | 4 | 5 |
| Labor productivity | 1 | 2 | 3 | 4 | 5 |
| Inventory turnover | 1 | 2 | 3 | 4 | 5 |
| Capacity utilization | 1 | 2 | 3 | 4 | 5 |
| Overhead costs | 1 | 2 | 3 | 4 | 5 |

*) 1= Strongly deteriorated, 5 = Strongly improved

Table AII.

| Please indicate whether there are plans and budgeted activities to undertake the program below. | Degree of use last 3 years** | | | | | Relative payoff** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Updating your process equipment to industry standard or better | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| Expanding manufacturing capacity (e.g. buying new machines, hiring new people, building facilities, etc.) | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| Engaging in process automation programs | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| Implementing information and communication technologies and/or enterprise resource planning software | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| Reorganizing your company towards e-commerce and/or e-business configurations | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| Rethinking and restructuring your supply strategy and the organization and management of your suppliers portfolio | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| Concentrating on your core activities and outsourcing support processes and activities (e.g. IS management, maintenance, material handling, etc.) | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| Restructuring your manufacturing processes and layout to obtain process focus and streamlining (e.g. reorganize plant-within-a-plant, cellular layout, etc.) | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| Undertaking actions to implement pull production batches, set-up time, using kanban systems, etc.) | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| Undertaking programs for quality improvement and control (e.g. TQM programs, six sigma projects, quality circles, etc.) | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| Undertaking programs for the improvement of your equipment productivity (e.g. total productive maintenance programs) | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| Implementing actions to increase the level of delegation and knowledge of your workforce (e.g. empowerment, training improvement or autonomous teams, etc.) | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| Implementing actions to improve or sped-up your process of new product development through e.g. platform design, products modularization, components standardization, concurrent engineering, quality function deployment, etc. | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| Putting efforts and commitment on the improvement of our company's environmental compatibility and workplace safety or healthy | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |

**) 1= None, 5 = High