

# Manufacturing Strategy-Environmental Dynamism-Performance Relationship: An Empirical Amongst Indonesian Large Manufacturers

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## Abstract

*This research was conducted to identify the strategies adopted by Indonesian large manufacturing firms as well as to examine the relationship between manufacturing strategy, business environment, and firms' performance (in term of financial performance and manufacturing performance). Companies listed in the statistic of centre bureau were used as the sampling frame in this study. The companies selected from the list are those that are involved in manufacturing activities and run their operation in East Java. A Total of 500 manufacturing firms fulfilled the criteria. The questionnaires were sent to the chief executive officer of each firm requesting them to respond to the questionnaire. Out of 500 questionnaires sent out, 104 usable responses were received giving approximately a return rate 21%. It was found that the Indonesian manufacturing firm that adopts flexibility and delivery strategies can achieve better performance (financial and manufacturing) than the other two strategies. This finding does confirm the fact that manufacturing firms that practice flexibility and delivery strategy, can compete successfully. The findings of the study support the fact that the manufacturing strategy developed in the west can be practiced by firms in developing countries such as Indonesian. The finding of this study also implies that a proper fit between strategy and environment is required to ensure high performance.*

## Keywords

Manufacturing Strategy;  
Environmental Dynamism;  
Financial Performance;  
Manufacturing Performance;  
Indonesian Large Manufacturers.

## I. INTRODUCTION

Turbulent and uncertain marketplaces throughout the world are the result of intense competition changes in

manufacturing technology, environmental changes, rapid advances in information technology, development of new processes and materials, opening up of economies and shortening product life cycles. The transition of production systems to new organizational forms and managerial practices under the pressure of radical changes in competition, market places, technology and social economic has attracted much research attention. It is becoming increasingly important for a manufacturing organization to articulate clear and coherent manufacturing strategies that support long term business objectives.

The company which is less able to accommodate its business environment and face such changes will experience problems in competitive environment. Conversely, companies that successfully accommodate competitive business environment changes will tend to succeed in the face of competition. Companies that ignore changes in the business environment, implemented strategies, cause the structure and system of the company to be ineffective and not working. In today's global competition, the development and success of implementing strategy becomes very important.

Research conducted by Swamidass and Newell found that high performing firms have clearly defined strategies[1]. In addition, Badri found that differences in strategy would lead to the two differences in performance between firms. Research studying the relationship between manufacturing strategy and performance has gained much attention in management [2].

Most of the research on manufacturing strategy, environment, competition and performance is conducted in developed countries; only a limited number of researches have been done in developing countries such as Indonesia. This study aims to narrow the knowledge gap in developing countries, especially Indonesia. It is intended to provide strategic direction

that should be done by Indonesian manufacturing companies as well as investigate the relationship between manufacturing strategy, business environment and performance. The research question of this research is formulated as follows:

- A. What are manufacturing strategies adopted by Indonesian large manufacturing firms?
- B. What is the relationship between manufacturing strategy, environment and performance?

## II. LITERATURE REVIEW

### A. Manufacturing Strategy

In essence, a manufacturing strategy is a consistent decision-making strategy in the manufacturing function associated with a firm's business strategy. A manufacturing strategy is the development of a comprehensive manufacturing capability that is aligned with company goals and strategies. Manufacturing strategy provides a vision for the company and directs the company in formulating business strategy. Karajewsky and Ritzman define manufacturing strategies as the dimensions required of a company's production system to meet market demand and compete with competing firms [3]. The manufacturing strategy is seen as an effective manufacturing force as a competitive weapon for - achievement of business and corporate objectives.

The manufacturing strategy reflects the business goals and strategies that enable the manufacturing function to contribute to the long-term competitiveness and performance of the company's business [4]. Heizer and Render argue that for successful implementation of a manufacturing strategy then the strategy must be consistent with the demands of the business environment, the company's business strategy, competitive demand, and product life cycle. Companies need to analyze customers, suppliers, locations, facilities and competitors in a global perspective [5]. The philosophy of 'continuous improvement' should be adopted to improve manufacturing operations. Operation strategy becomes very important emphasize on quality, time and technological advantage especially in global market. Thus, a manufacturing strategy becomes a priority in building a competitive advantage [6]. Competitive priorities are described to include cost strategy, quality, delivery and flexibility.

Stonebaker and Leong define cost strategies as production processes and product distribution with minimum cost and eliminate activities that do not provide added value to the company. [7]. In order to

compete on the basis of cost leadership, the company must offer products and services at a lower cost with the same quality of products and service quality as competitors. The company should also handle the costs of labor, materials, defective products, and other overhead costs. Quality strategy is done by the company to meet customer needs by producing products and services that match the specifications and customer needs. Improved quality in the long term will reduce costs. Quality improvement is one way for organizations to improve their competitiveness. There is some empirical evidence that improving quality leads to improved business performance [8]. The flexibility strategy is the ability to respond to the rapid changes of products, services, and processes. The flexibility strategy is a company's ability to use its resources effectively in response to changes in the environment and internal conditions [9]. Gerwin points out that flexibility can be achieved by increasing the ability to switch from one product to another, or one part to another almost instantly. Braglia et al., Points out that flexibility includes machinery, routing, processes, products, volumes, extensions, and layout [10]. Delivery strategy includes dependence on responding to customer orders. Stonebaker and Leong define delivery strategies as delivery precision and delivery speed [7]. Measurement of delivery performance includes capability in improving delivery reliability or speed of delivery.

### A. Environment

The organizational environment is a very important variable to the success of business strategy [11]. The industrial macro environment has a major impact on creating opportunities and facing threats in competition. In the context of contingency, many writers [12] [13] regard the environment as one of the contingency factors. Parnel defines that the environment is a force that includes suppliers, customers, competitors, governing bodies, and public pressure. The environment is an external aspect, nevertheless the company has little power in controlling the environment and that this power can affect organizational performance [15].

The strengths of the sifatkan are difficult to control should be monitored more intensely and addressed more quickly by the organization [16]. Drucker, stressed that environmental influences are a source of economic power that can limit corporate management, but on the other hand can also create opportunities for

Lena Ellitan, "Manufacturing Strategy-Environmental Dynamism-Performance Relationship: An Empirical Amongst Indonesian Large Manufacturers," *International Journal of Advanced Engineering and Management*, Vol. 2, No. 10, pp. 227-234, 2017.

DOI: <https://doi.org/10.24999/IJOAEM/02100051>

management action [17]. Business companies are advised to not only identify these forces but also to manage them and adapt to the strength of the environment.

Several empirical studies have provided evidence that the environment shows the key determinants of performance in large enterprises. Stanwick and Pleshko [18], Manu and Sriram [19] found that the environment had a strong influence on performance. At the same time [20], Venkrataman and Prescott [12], found that organizational performance was influenced by the contingent relationship between business and environmental strategies.

As business environment changes, individuals, groups and organizations must cope with change in order to survive and remain competitive [21]. The company is an open system that survives through sustainable activities and successful interaction with the external environment. The company lives because of the flow of resources from the company to the environment and vice versa. The external environment of an organization is seen as a source of change, creating opportunities and threats to the organization [22]. This is the reason why organizations need to scan the environment in order to stay competitive and this process of scanning must be done on an ongoing basis for organizational survival [23]. O'Connell & Zimmerman identifies five environmental domains including social, political, ecological, economic and technological [24].

Miller and Friesen [25] present three environmental dimensions: (1). Dynamism in the environment that indicates the degree of certainty or uncertainty of changes in taste, production, or customer service and competition mode in the company's main industries. (2) Competition in the business environment is related to competition level of price competition, product, technology, and distribution. Competition in business is also due to restrictive regulation and limitation of labor and raw material and unfavorable demographic trend. (3). Environmental heterogeneity refers to differences in environmental tactics, customer tastes, product timing, distribution channels, as well as competition in supplier selection.

### **B. Performance**

The accuracy in the use of performance measures depends on the circumstances and circumstances of the study. Some previous literature shows that the most common measure of organizational performance is profitability and financial growth include: Profit

margin, return on asset, return on equity, return on sales, taking into account the general measure of financial profitability. On the other hand, for the manufacturing industry, performance measurement of operations is considered very important. Manufacturing performance can be measured with dimensions such as productivity, product cost per unit, quality, and delivery capability.

### **C. Hypotheses**

Two hypotheses were tested in this study, they are:

1. **They are differences manufacturing strategy adopted by Indonesian manufacturing firms.**
2. **There is a relationship between business strategy, environment, and performance.**

### **D. Research Method**

The study uses firms listed in the statistics bureau as a sampling frame. The company has a criterion as a manufacturing company that has a workforce of more than 250 permanent workers and runs its operations in East Java. A total of 500 manufacturing companies meet these criteria. Questionnaires were sent through mail surveys to collect data needed for this study. The questionnaires were sent to the respective chief executive officers of the company asking them to return the questionnaire within one month after the questionnaire was received. Of the 500 questionnaires sent, 104 acceptable responses provide approximately a 21% return rate. Table 1 presents the distribution of the questionnaires distributed to the respondent, along with the rate of return.

**Table 1. The Questionnaires Distribution**

Questionnaires were sent	500
Returned and usable questionnaires	104
Returned but unusable questionnaires	6
Not returned questionnaires	490
Response rate	25.40 %
Rate of usable response	21.05%

**Table 2. Non-Response Bias Test**

Variable	Mean Early N = 74	Mean Late N = 30	t - value	p - value
Cost Strategy (std. Deviation)	4.1486 .7979	4.2222 .6628	-.483	.631
Quality Strategy (std. Deviation)	3.8351 .8225	4.0533 .6257	-1.465	.147
Flexibility Strategy (std. Deviation)	3.5473 .7294	3.6042 .6623	-.385	.702
Delivery Strategy (std. Deviation)	3.9054 .7419	3.9667 .8239	-.353	.725
Environmental Dynamism (std. Deviation)	3.3946 .5596	3.2833 .7465	.737	.465
Financial Performance (std. Deviation)	2.9662 .7028	3.2111 .7681	-1.509	.138
Manufacturing Performance (std. Deviation)	3.3301 .6138	3.5476 .7333	-1.434	.158
Financial Performance Growth (std. Deviation)	3.8694 1.2619	3.8167 1.2696	.192	.848
Manufacturing Performance Growth (std. Deviation)	4.3514 1.0362	4.4857 .9562	-.634	.529

Test of non-response bias was undertaken to ensure that non-response bias was not a problem in this study. Because of unavailability secondary data to compare company characteristics, a comparison of firm's characteristics was made between late responses (45) and early responses (138).

Responses received after cut-off date and the second reminder letters were mailed were classified as late responses. No variable turn out differ to significantly, indicating that there is no serious non-response bias in our sample.

Strategies are defined using Swamidas and Newell [1] and Badri, et al. [2] classifies manufacturing strategies into four strategies including: cost, quality, flexibility and delivery. Four questions are used to measure cost strategies, six questions are used to measure quality strategies, and five questions for each flexibility and delivery strategy. All questions are measured on a five-point Likert scale. Respondents

were asked to measure the level of importance of their respective strategic statements.

The business environment is visible from the perspective of dynamism in the business environment. Environmental dynamics refers to the uncertainty of environmental change (Dess & Beard, 1984; Permana, Laksmana and Ellitan, 2017). Badri, et al. (2000) measuring the environment modified, adapted and used for this study. Environmental questions are measured on a five-point Likert scale that indicates predictability - the uncertainty of each statement.

Financial performance is measured using Return on Investment (ROI), return on assets (ROA), return on sales (ROS), and Growth in sales. Manufacturing performance is measured using overall productivity, product cost per unit, process quality and product quality, product volume and flexibility, as well as on-demand delivery and delivery capability before customer demand. The performance is measured by comparing company performance with average industry performance.

### III. FINDINGS

As noted earlier, 104 manufacturing companies participated in the study. The company's 104 profile is shown in Table 3.

One hundred four companies participating in this research engaged in food and beverages, tobacco, textiles, garments, plywood, rattan, chemicals, metals, factories and equipment, as well as the machinery industry. All companies are private companies that have been in operation for over ten years. Their size ranges from 500 to 3000 full-time employees, with assets ranging from 25 billion to 100 billion rupiah or more. Given the data collected in 2014, it is surprising that 50% of them show stagnant or declining financial performance in the last three years.

Reliability associated with the degree to which a trial, test, or measurement procedure produces the same results in repeated experiments. Reliability is a statistical measure of how data can be reproduced from a survey instrument. Internal consistency reliability is the most commonly used psychometric measure in assessing survey instruments and the scale used.

Internal consistency testing is an indicator of how well different items measure the same concept. This is important because a group of items that measure one variable must be



completely focused on one variable. In other words, the questionnaire should be able to measure what will be measured consistently. Internal consistency is measured by calculating the statistic known as the cronbach alpha coefficient.

**Table 3. Respondents' Profiles**

Dimension	Categories	Number of respondents	Percentage
Length of operations	Less than 5 years	4	3.8
	5-10 years	15	14.4
	>10-20 years	36	34.6
	>20-30 years	25	24.0
	More than 15 years	24	23.1
Operation area	Food, beverage and tobacco	18	17.3
	Textile, garment, leather	24	23.1
	Rattan, bamboo, furniture and handicraft.	14	13.5
	Chemical, oil, coal, and plastic	13	12.5
	Non metallic and mineral	7	6.7
	Metal, machinery, and electronic.	28	26.9
Owners	Local	88	84.6
	Foreign	14	13.5
	Joint venture	2	1.9
Cooperation	No cooperation	41	39.4
	Japan	29	27.9
	Hong Kong, Taiwan and Korea	12	11.5
	ASEAN	4	3.8
	USA, UK, Australia	10	9.6
	Others	8	7.7
Number of employees	500 – 999	28	26.9
	1000 – 1999	9	8.7
	2000 – 2999	16	15.4
	More than 3000 employees	51	49.0
Performance in the last three years	Decrease > 15%	18	17.3
	Decrease <15 %	16	15.4
	Not change	18	17.3
	Increase < 15%	36	34.6
	Increase > 15%	16	15.4
Asset (Billion Rupiah)	< 25	5	4.8
	>25-100	30	28.8
	> 100 –500	39	37.5
	> 500 – 1000	12	11.5
	>1000	18	17.3

The alpha coefficient measures internal consistency reliability among a group of merged items forming a scale. These are statistics that reflect the homogeneity of the scale. Alpha Cronbach for the size used in this study ranged from 0.66 (quality strategy) to 0.88 (delivery strategy). The results of reliability testing or internal consistency testing are presented in Table 4.

**Table 4. Combat's Alpha for Multiple Item Measures**

Variable	Number of Item	Combat's Alpha
Cost strategy	3	.8054
Quality strategy	5	.8250
Flexibility strategy	4	.8287
Delivery strategy	5	.8840
Environment dynamism	10	.7697

Table 5 provides the mean values of the extent of emphasis companies place on each of the strategies. They are all given moderate level, with the highest is going to cost strategy, whilst the least emphasis is places on flexibility strategy. Greater emphasis on cost strategy reflects that Indonesian manufacturing firms are based on short-term orientation. Short-term orientation will be dangerous when it leads to (1) sacrificing long term goal for short-terms results (2) allocating resources into the wrong area 93) taking management's concern off both short-term and long-term goal. Further, the mean value for the environmental dynamism falls on the positive end, indicating that Indonesian manufacturing firms are operating in a dynamic environment.

**Table 5. Descriptive Statistics**

	Mean	Minimum	Maximum	SD
Cost strategy	4.1699	1.00	5.00	.7590
Quality strategy	3.8981	1.20	5.00	.7743
Flexibility Strategy	3.6346	1.00	5.00	.8065
Delivery Strategy	3.9231	1.00	5.00	.7629
Environmental Dynamism	3.3625	1.60	4.60	.6176

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DOI: <https://doi.org/10.24999/IJOAEM/02100051>

The Friedman's test with k samples was used to test hypothesis 1. From the result in Table 4, it was found that there is a significant difference in the usage of the three strategies between the manufacturing firms  $\chi^2 = 38.381$ ,  $p = 0.01$ . Therefore, hypothesis 1 is accepted. The mean in Table 6 shows that the cost strategy is used more dominantly than the other three strategies.

**Table 6. Manufacturing Strategy Differences between Manufacturing Firm**

Manufacturing strategy	Mean rank	N	Chi Square	Df	Significance
Cost Strategy	2.98				
Quality Strategy	2.57				
Flexibility Strategy	1.92				
Delivery Strategy	2.52	104	38.831*	3	.000

\* = significant at  $\alpha = 0.01$

A correlation analysis was conducted to test the relationship between manufacturing strategy, environment, and performance.

**Table 7. Relationship between Strategy and Environment**

Variable	Environment	Cost strategy	Quality strategy	Flexibility Strategy	Delivery Strategy
Environment	1.000				
Cost strategy	.198* P = .044	1.000			
Quality strategy	.214* P = .029	.328** .001	1.000		
Flexibility strategy	-.048 P = .627	.513** .000	.425** .000	1.000	
Delivery strategy	.129 P = .193	.385** .000	.522** .000	.596** .000	1.000

\* : significant at  $\alpha = 0.05$

\*\* : significant  $\alpha = 0.01$

From the result in Tables 7 and 8, it can be seen that a significant relationship was found between manufacturing strategy and performance but not

strategy and environment. The quality strategy was found to be significantly related to manufacturing performance and its growth.

Manufacturing performance was measured in terms of product cost per unit, productivity, process and product quality, volume and product flexibility, on time delivery, and delivery capability with positively relationship, except product cost per unit. Flexibility and delivery strategies are proved have positive relationship to all performance indicators. However, cost strategy seems to have no relationship to all performance indicators.

**Table 8. Manufacturing Strategy Environment-Performance Relationship**

Vary	FP	MP	FPGR	MPGR
Cs	.098	.139	.004	.103
P =	.322	.160	.970	.309
Qs	.141	.214*	.031	.323**
P =	.154	.029	.751	.001
Fs	.420**	.439**	.208*	.416**
P =	.000	.000	.034	.000
Ds	.234*	.338**	.401**	.341**
P =	.017	.000	.000	.000
Ed	-.204*	-.150	-.230	-.014
P =	.038	.130	.019	.889

Here,

Cs: Cost strategy

Qs: Quality strategy

Fs: Flexibility strategy

Ds: Delivery strategy.

FP: Financial Performance

MP: Manufacturing Performance

FPGR: Growth in Financial Performance

MPGR: Growth in Manufacturing Performance

Ed: Environment dynamism.

\* : significant at  $\alpha = 0.05$

\*\* : significant at  $\alpha = 0.01$

Significant relationship was found between environment dynamism and financial performance. However, environment dynamism has a positive relationship with cost and quality strategies. This indicates that in the dynamic business environment, cost and quality strategies play an importance role, so that higher performance can be achieved.

#### IV. CONCLUSION

The findings of this study indicate that large manufacturing companies in Indonesia are found to practice manufacturing strategies (cost, quality, flexibility, and delivery) to compete in the Indonesian business environment. The most widely adopted strategy among the Indonesian Manufacturing

companies surveyed is the cost strategy, followed by quality strategy, delivery strategy and flexibility strategy. There is a significant relationship between strategy and manufacturing performance and the fact that the right strategy can improve the performance of an organization. The research also found that Indonesian manufacturing firms that implement flexibility and delivery strategies can achieve better performance (financial and manufacturing) than the other two strategies. This shows the tendency that manufacturing companies that implement flexibility and delivery strategies have greater competitiveness.

The findings of this study support the fact that manufacturing strategies developed in the west or developed countries can be practiced by companies in developing countries such as Indonesia. The findings of this study also imply that accuracy in aligning strategies and environments is necessary to maximize the achievement of company performance. From the perspective of manufacturing companies in Indonesia, manufacturing strategies are needed in (1) responding to the business strategies implemented and achieving the objectives of the company (2) identifying and addressing existing weaknesses or harnessing the company's strengths (3) accommodating environmental changes and changing market demands (4) gaining unique competencies that currently do not yet have (5) making the manufacturing function stronger, and (6) achieving the goal of optimizing company performance. Some possible limitations of this study are the number of companies involved is still considered very limited so it needs to be considered in the generalization of the adoption of research models. In addition, data on manufacturing and environmental strategies are perceptual data obtained from the CEO's manufacturing firms, which still need to be confirmed to the relevant parties directly involved in the company's manufacturing activities.

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