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## The Application of Non-Financial Performance Measurement in Malaysian Manufacturing Firms

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### Abstract

Non-financial performance measures in recent years have been receiving growing attention among modern's organizations to provide additional information for managers. The use of non-financial performance measures in the manufacturing environment is even crucial where its normal operation is more complex than any other type of organizations. The purposes of this research are to examine the application of non-financial performance measurement system among manufacturing companies and to explore the association between size of the firm, business environment, owners/manager involvement and modern manufacturing technology and the use of non-financial performance measures. A questionnaire was sent to a random sample 500 Malaysian manufacturing firms which resulted in 102 useable returned questionnaires. The results show that non-financial performance measures related to internal processes and customers have the highest extent of use. In contrast, techniques related to quality control have a relatively low level of use. The results also reveal that there are significant relationships between size of the firm, involvement of owner/manager, and modern technology and the use of non-financial performance measures. This research provides new empirical evidences on the use of non-financial performance measures and contributes a better understanding of the contingency approach in the context of performance measurement system within a manufacturing environment.

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### 1. Introduction

In a current volatile market, financial-based performance measures are no longer relevant to supply important information to the firms. This is due to the claim that this traditional approach which mainly focuses on financial-based measures fails to respond to developments in the technological and competitive environment, with the result that internal accounting information is frequently inaccurate and misleading (Drury et al., 1993). The newly-invented performance measures which is

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based on non-financial measures were created as a consequence of the shortcomings in traditional approach. The current techniques provide more relevant, accurate and appropriate information within a proper time period to reconcile the inherent deficiencies contained in traditional performance measures (Preda and Watts, 2004). In today's practice, the use of non-financial performance measures can be mostly traced within the manufacturing environment. This is due to the nature of the daily routine for controlling manufacturing and distribution operations is best handled through the adoption of non-financial measures (Abdel-Maksoud et al., 2005). In addition the new approach in performance measurement system is able to strengthen the firm's competitiveness by providing important additional information that can be indirectly reflect the strengths and weaknesses of operations of the businesses. Therefore it is imperative for the today's manufacturing firms to implement the various techniques of non-financial performance measurement system for their overall growth and development. Despite the growing attention among organizations towards non-financial performance measures, the information about the usage of non-financial performance measures within manufacturing firms is very little. As manufacturing sector plays crucial roles for providing job employment and for the growth of most economy, empirical evidences on the current practice of non-financial performance measures is crucial for the development of this sector. In Malaysia, the manufacturing sector is responsible for an increase in Malaysian exports, contributes substantially to the economy in terms of employment and has been a key factor in sustained rapid economic growth. In 2015, Malaysian manufacturing sector contributes to 81.8% to the country's total export and provides 2.5 million job that representing approximately 18% of total employment (Economic Planning Unit, 2015). Given these contributions, the roles of manufacturing sector has become significant and studies toward assisting its growth and development is critical. Moreover the paucity of information relating to non-financial performance measurement in manufacturing firms leaves a significant gap in the body of literature especially from developing countries. Therefore this research aims to investigate the application of non-financial measures of in Malaysian manufacturing firms as well as to identify the possible factors that have significant associations with the use of non-financial performance measures. The contingency theory approach is utilized to guide the analysis of survey data. This is based on the assumptions that performance measurement in the manufacturing companies can be influenced by many circumstances. For the purpose of this research, four contingent variables are selected; size of the firm, environmental uncertainty, the use of modern technology and owner/manager's participation.

## 2. Literature Review

This section covers explanation on previous studies related to non-financial performance measures and contingency factors associated with the use of non-financial performance measures.

### 2.1 Non-financial performance measures

Performance measurement system (PMS) is a group of techniques developed by the organizations to evaluate the performance of business activities. Neely et al. (1995) defined PMS as a set of metrics used to quantify both the efficiency and effectiveness of activities. Business organizations have sought to develop a suitable PMS in order to provide managers and employees with necessary information comprising all aspects of main activities at both operational and organizational level. Hall (2008) stated the examples of the popular techniques for delivering a wider set of performance measures are the balanced scorecard (Kaplan and Norton, 1996), tableau de bord (Epstein and Manzoni, 1998) and performance hierarchies (Lynch and Cross, 1992). However the choice of metrics to guide and measures the performance is one of the most critical challenges facing organizations as the measures itself is not a generic independent process that applicable for all type of organizations. Nevertheless, PMS is perceived as a system designed to specific organizational characteristics.

The previous literature categorized performance measures in terms of financial and non-financial or qualitative and quantitative criterion. In this regards, the latter category is seen as a contemporary approach as the former criterion have long been criticised due to its failure to respond to current developments. Previous researches claimed that conventional PMSs tend to be inward-looking and lack of qualitative factors. As a result, the information produced by the traditional approach is frequently inaccurate and misleading (Drury et al., 1993). In response to these concerns, a range of remarkable innovations in management accounting has emerged. The newly-innovated performance measurement which covering non-financial aspects of operational performance are introduced to provide additional information which could not been provided by the traditional approach. Similarly the extensive research of PMS covering the use of non-financial performances measures can be seen in early 2000s. Newer performance measures based on non-financial measures have been more widely applied by organizations over time (Drury and Tayles, 1993; Gomes et al., 2004; Ismail, 2007). These multidimensional PMS is important for enhancing the likelihood that all relevant performance dimensions are considered (Ittner et al., 2003). Such system is capable of providing signals and motivating improvement in crucial activities (Hoque and Adams, 2008). Similarly, Van der Stede et al. (2006) argued that regardless of strategy, organizations with more extensive PMSs, especially those that included

objective and subjective non-financial measures, have better overall performance. The newly-innovated measures also take an explicit strategic focus and provide more relevant, accurate and appropriate information for management. Banker et al. (2000) argued that the primary reasons suggested for the use of non-financial performance measures are that these measures are better indicators of future financial performance than accounting measures, and they are valuable in evaluating and motivating managerial performance. This development is in response to the considerable criticisms of excessive emphasis and concern on the targeting of financial indicators. For example, critics argued that stressing financial indicators may lead to short-term thinking (Gomes et al., 2004). Van der Stede et al. (2006) also demonstrated that non-financial performance measures are better than financial measures in helping organizations implement and manage new initiatives.

Within the family of non-financial performance measures (NFPMS), those related to customers have a higher adoption rate compared to the other non-financial measures. Drury and Tayles (1993) surveyed MAPs in 260 UK SMEs and the results supported the importance of non-financial measures, especially measures of customer satisfaction, product quality, delivery and supplier reliability. A study conducted by Mohamed Basheikh and Abdel-Maksoud (2005), reveals that measures of 'on-time delivery' and 'efficiency and utilisation' are considered as highly important by the majority of Saudi manufacturing firms. In a latter study, Abdel-Maksoud et al. (2008) found that customer related measures are widely reported and are perceived to be crucial - a number of other measures related to quality, timeliness and efficiency and utilisation are also widely monitored and considered very important. Other studies have focused on the Balanced Score Card BSC. Speckbacher (2003) showed that only a minority of German firms in his sample (26%) used BSCs and most of these appeared to use only a limited or incomplete version. Ismail (2007) reported that the BSC has wide spread use in the Egyptian companies surveyed, but the extent of use of multi-dimensional indicators is low. The survey provided a number of insights into obstacles inhibiting the adoption of the BSC in a developing country - the most significant obstacle being the inadequacy of existing information systems.

## *2.2 Contingency factors associated with the use of non-financial performance measures*

Researchers to date have attempted to explain the development or change of PMS by examining variables including the nature of the environment, technology, size, structure, and strategy. For example, Halma and Laats (2002) use contingency theory to determine external and internal factors that affect the use of management accounting system. While internal contingencies are determined as technology, organizational aspects, and strategy; external factors indicate the features of external environment at the level of business and accounting that shape internal systems. Another popular contingent factor; supportive managers are very crucial for any successful organizations. Managers are the organization's key player for influencing a development of a good practice of management system as they are the one who determine the type of information needed by the organisations in order to carry out their responsibilities in planning, directing, monitoring and controlling. Therefore the commitment of managers or owners of the business is crucial to the development of contemporary performance measurement in the organizations. The role of managers in the use of performance measurement systems has long been recognized by many studies (see for example Tung et al. 2011; Chan, 2004; Kennerley and Neely, 2002). Bourne et al. (2002) found that top management support was influential in the successful implementation and on-going usage of the new PMS. This study further argued that the continuous involvement by top management was invaluable in resolving problems when crises and conflicts arose. The result is supported by other earlier studies such as Chan (2004) and Kennerley and Neely (2002). These studies claimed that that top management commitment and leadership are key factors for PMS design, implementation and effectiveness. Kennerley and Neely (2002) added that the availability of management time to reflect on measures was a major contributor to the effectiveness of PMSs. In a later study, Cheng et al. (2007) argued that barriers to implementing new performance solutions stemmed from a lack of senior management commitment and support, ingrained working practices and an absence of appropriate training interventions. This finding is supported by Garengo and Bititci (2007) who argued that the need for an authoritative management style for the successful adoption of formal performance measurement systems in the small firm setting. A more recent study conducted by Tung et al. (2011) also revealed that top management support was found to be associated with the effectiveness of PMSs in respect to the performance related outcomes.

Next, technology has been long recognised as the contingency factor influencing the use of management system including PMS. Current literature indicated that differences in PMS are significantly explained by the use of modern techniques and technology. For example, Ahmad (2012a) found that the manufacturing firms with more use of AMT are more likely to have a system for performance measurement. Similarly, researches in the area of management accounting practices (MAPs) provided a consistent results. For example, Szycha (2002) revealed that technology is one of driving forces behind the shift in use of MAPs in Poland. Similarly, Abdel-Maksoud et al. (2005) found that relatively sophisticated MAPs exist in firms that have made significant investment in AMT, Total Quality Management (TQM) and Just in Time (JIT). Their findings were supported by Al-Omiri and Drury (2007), who reported that higher levels of cost system sophistication are positively

associated with the extent of the use of JIT and lean production techniques. Similarly, Abdel-Kader and Luther (2008) concluded that differences in management accounting sophistication are explained by the adoption of AMT, TQM and JIT systems. A study conducted by Mohamed Basheikh and Abdel-Maksoud (2005) concluded that performance measures of 'on-time delivery' and 'efficiency and utilisation' seem to be positively and significantly correlated with the levels advanced manufacturing technologies and the level of importance of aspects of competition.

Environmental uncertainty is an important factor that has been reported to affect the adoption of PMS. Earlier studies by Chenhall and Morris (1986) and Ahmad (2012b) proposed that environmental uncertainty has significant associations with the use of PMS. It is argued that when environmental uncertainty levels are relatively high, organizations tend to use non-financial information to a greater extent in order to cope with external environmental uncertainty more effectively (Chenhall and Morris, 1986). Haldma and Laats (2002) argued that environmental uncertainty had an impact on performance evaluation and is associated with more open and externally focused financial accounting systems. Therefore this system is vital to survival for business organisations operating in a competitive environment. Mohamed Basheikh and Abdel-Maksoud (2005) found that certain non-financial performance measures appear to be positively and significantly correlated with the level of competition. This study is consistent with a study by Ahmad (2012b) who suggested that performance evaluation system are consistently associated with market competition.

One of the most frequently cited driver of change of PMS is the size of firm. Blau (1970), for instance, argued that the expanding size of organizations gives rise to the increasing subdivision of responsibilities, facilitates supervision, widens the span of control of supervisors, and, simultaneously, creates structural differentiation and problems of coordination that require supervisory attention. Merchant (1981) added that the larger the business, the more likely it is that management will want formal, rather than informal, information systems. Larger firms tend to make greater use of more formal administrative controls, as opposed to informal procedures. It is possible that larger enterprises adopt a contemporary PMS more frequently than smaller firms as they have sufficient resources for the adoption and use of PMS. Chenhall (2003) and Hoque and James (2000) are examples of studies investigated the impact of size on PMS. In a recent study, Micheli et al. (2011) who focused on strategy implication found that the lack of a comprehensive PMS appeared to have negative effects on both the formulation and implementation of strategy. Similarly, Gosselin (2011) revealed that there is a significant association between strategy, organizational structure and environmental uncertainty and the use of non-financial and process measures.

The review has therefore identified a significant gap in research about the non-financial performance measures usage among manufacturing firms and the availability of researches related to contingency factor that are very limited especially from developing countries. This study endeavours to close this gap and add to existing knowledge about the usage of non-financial performance measures among the manufacturing firms in developing countries.

### 3. Research Methodology

The target population identified for gathering information regarding this concern is Malaysian manufacturing firms. A questionnaire survey was employed and the sample were drawn from the Federation of Malaysian Manufacturers (FMM). This questionnaire requested details relating to size, business sector and the extent of the use of non-financial performance measures of the organizations. Replies to the initial questionnaire were received from 53 respondents. After two follow-ups the total replies gathered increased to 102 respondents giving a response rate of 20.4%. The Mann-Whitney and chi-square non-parametric tests were used to compare early and late responses and there was no evidence of non-response bias found. NFPMS was measured using 16 items (based on scale 1=Rarely used to 5=Very frequent) which can be categorized into three components (efficiency-oriented measures; customer-oriented measures and employees-oriented measures). The measurements used as proxies for the contingent factors are detailed below.

- Size of the firms

Previous studies have demonstrated consistently that a firm's size has significant effect on the use of PMS in business organizations. A larger firm has greater total resources, and require more control of, and information on, their business activities and, therefore, need more comprehensive non-financial PMS. Thus it is essential to test whether the size of the firms will be associated with a greater use of NFPMS. The following general hypothesis was developed in order to guide the analysis.

*H<sub>1</sub>: There is significant relationship between size of the firm and the use of NFPMS.*

- Business environment

It has been argued that the intensity of uncertainties of business environment can play a major role in encouraging the use of PMS. As competition increases, a more reliable management information is likely to be needed by the firms to compete effectively and avoid planning based on inaccurate information when making decisions. The following general hypothesis was developed in order to guide the analysis.

*H<sub>2</sub>: There is significant relationship between business environment and the use of NFPMS.*

- Involvement of owners/directors of firms

Since the owner/managers are closely involved in the management of the firm, the involvement of the owner/managers of the firm might directly influence the extent of use of NFPMS. The following general hypothesis was developed in order to guide the analysis.

*H<sub>3</sub>: There is significant relationship between commitment of owner/manager of firm and the use of NFPMS.*

- Modern manufacturing technology

The use of modern technology in production activities has been shown to impact on the extent of use of PMS in many populations. Even though advanced production techniques may be limited to smaller firms, it is assumed that manufacturing firms employ technology of some form in assisting their production activities. The following general hypotheses were developed in order to guide the analysis.

*H<sub>4</sub>: There is significant relationship between modern manufacturing technology and the use of NFPMS.*

The next section discusses results and discussion of the findings.

#### 4. Results and Discussion

Information relating to the respondents' organizational background is presented in Table 1. Because the sample selection aimed to include only organizations with established NFPMS, many smaller companies that are not likely to have well-established systems were omitted.

##### 4.1 Demographic of respondents

Profile information relating to the respondents was collected to gain an overall overview of respondents. Table 1 presents the information for the 102 responding firms.

Table 1: Demographic of respondents

<b>Company background</b>	<b>%</b>
<i>Business duration</i>	
2-5 years	22
5-10 years	31
More than 10 years	47
Total	100
<i>Company subsector</i>	
Basic metals	15
Chemicals and chemical products	4
Food and beverages	26
Electric and Electronics	28
Various manufacturing sector	23
Total	100
<i>Number of employee</i>	
5-50	32.65
51-150	24.49
More than 150	42.86

Total	100
<i>Annual sales turnover</i>	
0- RM250,000	8
RM250,000-RM10,000,000	23
RM10,000,000-RM25,000,000	51
More than RM25,000,000	18
Total	100
<i>Use of performance measurement system</i>	
Yes	100
No	0
Total	100

The results indicate that the majority of the respondents have been in business for more than 10 years, which implies the experienced organizations. This can also be seen from the average number of employees that is dominated by firms with more than 150. This concentration of respondents in larger firms is also indicated by the information gathered on the annual sales turnover of the respondents. Almost half of the responding firms reported annual sales from RM10 to RM25 million. In contrast, less than 10 percent of the total respondents indicated average annual sales turnover below RM250,000. The results also show that the manufacturing activities of responding firms are concentrated in electric and electronics and food and beverages. Respondents were also asked to indicate if their organization use any performance measures. All respondents indicated the use of performance measurement system.

#### 4.2 Non-financial performance measures

The respondents were asked to indicate the degree of usage of various operational non-financial performance measures that were adopted in their companies. Table 2 presents descriptive results of NFPMS adoption.

Table 2: Descriptive results for NFPMS in manufacturing firms

No	NFPMS	Mean	Standard deviation
<i>Quality control-based measures</i>			
1	Percent of scrap	3.12	.871
2	Percent of defects rate	3.04	.878
3	Percent of returned orders	2.88	.937
4	Rework	2.91	.945
<i>Internal efficiency-based measures</i>			
5	Inventory turnover	3.54	.840
6	On-time production	3.90	.711
7	Manufacturing cycle efficiency	3.68	.810
8	Product development time	3.82	.883
9	Capacity utilization	3.81	.864
<i>Customers-based measures</i>			
10	No. of warranty claims	2.87	.779
11	No. of complaints from customers	3.44	.827
12	Customer satisfaction	4.00	.731
13	On time delivery to customers	4.00	.867
<i>Employees-based measures</i>			
14	Absenteeism	3.58	.884
15	Staff turnover	3.43	.751
16	Lateness	3.41	.883

Table 2 presents NFPMS used in the manufacturing firms. The results show that customers-based measures particularly for *on-time delivery* and *customer satisfaction* appear to be the most frequent NFPMS applied by the manufacturing firms. Clearly these two items are measurements that are closely related to fulfilling customers' orders mainly for generating sales for the companies. This finding also indicates that both measures are important in ensuring customer's loyalty and



satisfaction to the firms' product. Moreover the predominance of the use of these measures indicates the importance for the manufacturing firms to assure the performance of their main operations. Meanwhile the NFPMS related to quality control has a relatively low adoption as opposed to other type of non-financial measures. This might indicate the quality management policy of the responding firms. NFPMS related to internal efficiency have a range from low to high use. The majority of the respondents indicated high use of *on-time production*, followed by *product development time* and *capacity utilization*. In contrast *number of warranty claims* has the least used. Lastly the results show that employees-based measures are moderately adopted by the respondents. This result is inconsistent with previous findings such as by Ahmad (2012b) who found that measures relating to customers and employees respectively have a lower frequency of use.

#### 4.3 The relationship between contingent factors and the use of NFPMS

This section provides bivariate analysis results for testing the relationship between selected contingency factors (size of the firm; involvement of owner/managers; business environment; and modern manufacturing technology). Table 3 presents Pearson correlation coefficients results for the relationship between and selected contingent factors. There are significant and positive relationships between size of firms (based on no. of employees and annual sales turnover), owner/manager involvement and modern manufacturing technology and the use of NFPMS. Thus, all hypotheses except  $H_2$  are accepted.

Table 3. Pearson correlation coefficient test results for the relationship between and selected contingent factors

	Correlation coefficient	Sig. value
No. of employees	0.298*	0.048
Annual sales turnover	0.309*	0.035
Business environment	0.182	0.410
Owner/manager involvement	0.402**	0.002
Modern technology	0.334*	0.018

\*Correlation is significant at the 0.05 level (2-tailed)

\*\*Correlation is significant at the 0.01 level (2-tailed).

## 5. Summary

This study investigated the specific extent of use by the Malaysian manufacturing firms of a range of specific non-financial performance techniques. Responses detailed the extent of use of 16 non-financial performance measures grouped under the four broad headings for NFPMS (quality control, internal efficiency, customer and employee-based measures). The results shows that on-time delivery and customer satisfaction are the most widely used non-financial performance measures. This finding suggests that the manufacturing firms, who use non-financial performance measures, are more internal-process and customer focused rather than employee focused. The results is consistent with findings by Abdel-Kader and Luther (2006); and Abdel-Maksoud et al. (2005) and Ahmad and Mohamed Zabri (2012). The least used of number of warranty claims is consistent with a finding by Ahmad (2012b) who reported that, number of warranty claims is the least considered by the majority of Malaysian manufacturing firms.

The results of the bivariate analysis of the relationships between selected contingent variables and the use of NFPMS find that the firm's size which is measured by annual sales turnover and number of employees are the most likely to increase the extent of use of NFPMS. These results provide evidence that the application of non-financial performance measures tends to increase in line with company size. This is perhaps in response to increased complexity and the need for more formalized control procedures. Further in a more complex manufacturing environment, there will need to be greater control over business routine operations. This result is consistent with previous studies that argued the effect of size on the use of contemporary performance measures (see Chenhall, 2003 and Hoque and James, 2000). Meanwhile, the application of NFPMS is also significant when owner/managers have a greater participation and involvement for the use of this system. This result might be driven by the nature of the owner/manager responsibilities that need additional information for monitoring and controlling. Therefore, this situation may drive pressure for improved information using non-financial performance measure. Likewise, the greater use of modern technology has been positively and significantly associated with the use of NPMS which indicates that the improved information for performance measurement is crucial in response to increased complexity in firm operations. This perhaps shows the importance of firms having comprehensive records on operation and production performance so that firms are able to act wisely and competitively. The association between modern technology with the use of performance measurement system is consistent with several previous findings (see Al-Omiri and Drury, 2007; Abdel-Kader and Luther, 2008; and Ahmad, 2012b).

Overall, this study shows that the involvement of owner/manager, size of firms and the use of modern technology have been identified as significant factors that have significant relationship with the adoption of NFPMS among Malaysian manufacturing firms.

## 6. Conclusion

The manufacturing firms have a crucial contribution to the business activities and remain as an important sector for economic development of most countries. The purpose of this article is to investigate the application of NFPMS among Malaysian firms from the manufacturing sector as well as to explore factors that have significant relationship with the use of NFPMS. A quantitative data from a survey on 102 firms in manufacturing sector was used to facilitate the analysis. The descriptive results indicate non-financial performance measures related to fulfilling customers order have the highest use. The findings also provide indication of an increased use of non-financial measures relating to customers and employees among manufacturing firms. Furthermore the results regarding the associations of the selected contingency factors and the use of NFPMS suggest that three variables; owner/manager involvement; size of the firms; and use of modern manufacturing technology appear to be the most significant factors associated with the wider use of NFPMS. This result supports the argument and findings of the previous studies that an owner/manager's commitment plays a critical role in the effectiveness of the development of performance measurement system. Furthermore, the results also suggest that modern technology can be an important driver that leads to the higher use of NFPMS. Overall, the findings imply that the manufacturing firms make more use of NFPMS when their firms encounter operational complexity as a results of business expansion, growth in the use of modern technology and when the owner/manager is committed to their use. This research has several limitations. The number of measurement of the use of the NFPMS and contingency factors used could be enhanced to strengthen the findings related to the association between contingency factors and NFPMS. Further the associations of these factors in a sample is viewed as a distinctive element of the Malaysian context, which requires further investigation in this environment.

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