Sampling and data collection procedures

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Introduction:

The sample was drawn from manufacturing industry in Malaysia. For several reasons management accounting change is likely to occur in this type of company (Sulaiman and Mitchell, ٢٠٠٥). Manufacturing companies are exposed to changes in the manufacturing environment such as changes in production cost structure (Innes and Mitchell, ١٩٩٠) and new high technology manufacturing techniques (Kaplan, ١٩٨٩). This industry is also selected as it is the most active and important contributor to the Malaysian economy.

The focus for this study is the manager of accounts/finance department from manufacturing companies in Malaysia. The head of accounting/finance department is chosen because most of the manufacturing companies in Malaysia did not have a separate management accounting unit (Smith et al., ٢٠٠٨). As highlighted by Baines and Langfield-Smith (٢٠٠٣, p. ٦٨٤), managers' perceptions were considered appropriate in this situation, compared to the use of more objective measures because:

١) It is managers' perception of the environment which are of interest, as it is these perceptions that will influence decisions with respect to the choice of strategy and changes in other organizational and management accounting variables.
(٢) It is difficult to measure objectively variables such as the extent of change in the environment, or change in strategic emphasis.
(٣) It has been argued that individuals have sufficient understanding of their decision process to be able to give relatively reliable information.

The target population for this study are those manufacturing firms which were incorporated before ٢٠٠٣. This is congruent with the objective of the survey to analyze the changes in manufacturing firms over the five-year period from ٢٠٠٣ to ٢٠٠٧ inclusively. The survey population of ٨٠٠ manufacturing firms in this study were selected using probability sampling (simple random method). The FMM directory was used as the sampling frame for this research. A sampling frame is important to make sure samples adequately represent the intended target population to which the hypotheses-testing results are generalized (Van der Stede et al., ٢٠٠٧).

Data were collected using a mail survey. To enhance the response rate, a reminder letter was sent out to the whole sample (even if they had already replied) as a follow-up procedure. The questionnaire consists of eight pages plus a cover letter explaining the purpose of the study and how to respond. Following the preparation of the instruments, ٨٠٠ questionnaires were sent out to constitute the survey. Within two months of the mailing of the questionnaire, ١٧٤ companies had replied, a ٢١.٧ percent response rate.

A follow-up letter was sent to all respondents three weeks after the initial questionnaire reminding them about the questionnaire and seeking their co-operation in completing the survey and forwarding it using the pre-paid envelope provided. All respondents that had already responded to the questionnaire were issued with an

apology and thanked for their co-operation in completing the survey. However, out of ١٧٤ questionnaires returned, three were incomplete, leaving ١٧١ (٢١.٤ percent) questionnaires useable for analysis. According to Smith (٢٠٠٣, p. ١٢٥), such a response rate (i.e. ٥٢٥ percent) is now common in accounting research, but, this rate is considered sufficient for statistical analysis and inferences.

٣.٢ Questionnaire design

The questionnaire in this study was designed to capture information on the changes in MAP and performance in Malaysia manufacturing companies. The aim is to investigate the changes over a period of five years (٢٠٠٣-٢٠٠٧). A structured questionnaire was developed from the existing instruments to enhance the validity and reliability of the measures (Askarany and Smith, ٢٠٠٨; Baines and Langfield-Smith, ٢٠٠٣; Hoque et al., ٢٠٠١; Hyvo¨nen, ٢٠٠٧; Sulaiman and Mitchell, ٢٠٠٥) (see Appendix). The questionnaire is divided into three sections. Section A was designed to seek general information about organizations. The information covered by questions ١-٤ included: industry classification, type of company, type of product, and the range of number of employees.

Section B seeks information on changes in MAP in an organization. This section aimed to identify the extent of the range of use of MAP in the organization over the past five years. The items embrace both traditional and advanced management accounting techniques using an instrument developed by Baines and Langfield-Smith (٢٠٠٣). However, the instruments used by Baines and Langfield-Smith (٢٠٠٣) only covered advanced management accounting techniques; thus, the consideration of traditional management accounting techniques is added to the instrument. To identify the extent of changes in MAP, an ١١-point Likert scale is used, ranging from "used significantly less" to "used significantly more."

The same items were used in measuring the form of changes in MAS, the respondents were asked to indicate the technical level changes occurring in their organization from the past five years, using the instrument developed by Sulaiman and Mitchell (٢٠٠٥). Five different categories were used to measure the changes, which include addition of new components, replacement of components and modification of information outputs, ranging over a scale from ١ to ٥. A scale value of ٠ is used if no changes occurred and "not applicable" if the items were not practiced (indicated as N/A). The sum of the scores assigned to each of the MAP on the list was used to indicate the degree of changes in MAP. The internal reliability (Cronbach a) for the MAP measure was ٠.٨٨, indicating a satisfactory scale.

The final section seeks information on changes in performance over the past five years. Items are measured using a two-part measurement instrument adopted from Baines and Langfield-Smith (٢٠٠٣). Items include both financial and non-financial measures (Hoque et al., ٢٠٠١). The first part of the measure asks respondents to compare the change in their business unit's performance relative to their competitors, over the past five years. An ١١-point Likert scale is used, ranging from "significantly lower performance than competitors" (score _٥) to "significantly

higher performance than competitors (scored þ٥).” The second part of the measure requires respondents to assess the same items in terms of their importance to the business unit, on a five-point Likert scale ranging from “no importance” (score ١) to “extremely important” (score ٥). The final score is determined by multiplying the respective “performance” and “importance” scores following Baines and Langfield-Smith (٢٠٠٣).

٤. Results
٤.١ Profile of responding companies
A profile of the participating organizations is presented in Tables I and II. As can be seen from Table I, the majority of the respondents are from the electrical and electronics industry (٢٨.٧ percent); followed by food processing (١٠.٥ percent), basic metal products (٩.٤ percent), machinery and equipment (٧.٦ percent), automotive and petrochemical (٥.٣ and ٤.٧ percent, respectively). Companies from other industries ranged from ٠.٦ to ٤.١ percent in terms of their level of responses.

Out of ١٧١ companies participating in this research, ٤٦.٢ percent of them produce their products mainly for industrial supply, ٤٥.٦ percent produce consumer products, and another ٨.٢ percent of the respondents produce their products for both consumer and industry supplies. The sample in this study embraces both small and large companies. The Small and Medium Enterprise Corporation Malaysia defines small companies as those companies having employee numbers r٥٠, whereas companies which have between ٥١ and ١٥٠ employees are designated as medium size. Companies having more than ١٥٠ employees are considered as big companies.

According to Table II, the number of employees for these participating companies ranged from as low as “less than ٥٠” to “in excess of ١,٠٠٠” employees. The majority (٤٨.٥ percent) indicated that the total number of employees ranged from ٥٠ to ١٥٠, and so designated as medium-sized organizations. A total of ١٢.٣ percent of responding companies were small companies (o٥٠ employees), and the balance considered as big companies, with ١٢.٩ percent of them having more than ١,٠٠٠ employees. Out of the various industries engaged in this study, ٦٠.٢ percent of them are local companies, only ٣٩.٨ percent of the respondents are foreign companies.

٤.٢ Hypotheses testing
٤.٢.١ MAP. Table III summarizes ١٥ measures for changes in MAP from ٢٠٠٣ to ٢٠٠٧. The results from the descriptive statistics showed high mean scores for all of the items (٤٧.٠). This result indicated that the sample companies have similar changes in both traditional and advanced MAP during the specified period. Both “product profitability analysis” and “budgetary control” have the highest increased usage in the

studied companies. These results indicate that manufacturing companies in Malaysia have increasingly changed their MAP and have significantly used advanced MAP in parallel with traditional practices. These results support H١ and H٢ of the study.

those for small and medium companies. Results in Table IV do not support this hypothesis. Mean values for both categories show similar levels of change in MAP (٨.٢٩ and ٨.٤٥, respectively). Mean values for traditional and advanced MAP also show similar levels of changes. Independent groups t-tests in Table IV provide insignificant results. Levene's test has a probability ٤٠.٠٥, therefore it indicates that the population variances are equal. The p-value for overall MAP indicates that p٤٠.٠٥ and thus is not significant. Therefore H٣ is rejected (t¼٠.٨٩, p¼٠.٤٩). Similar results are derived for traditional and advanced MAP. Thus it can be concluded that small and medium companies have increasingly changed their MAP, as have large companies, in order to remain competitive.

Table V presents the analysis of independent groups t-tests for H٤. The results show similar mean values of advanced MAP for both Local and foreign companies (٨.٦٦ and ٨.٦٤, respectively). It shows that the levels of changes in advanced MAP for both local and foreign companies are almost identical. Levene's test for equality of variance proved that the population variances are relatively equal (p٤٠.٠٥). A t-value of ١.٤٣, with a p-value of ٤٠.٠٥ (p¼٠.١٦), for equal variance estimates indicate that there is no significant difference exists between these two types of companies. Therefore, it can be concluded that both local and foreign companies increasingly used advanced MAP, and H٤ cannot be accepted.

Table VI below summarizes the different type of changes occurring in the sample companies. The respondents had been asked to identify the changes that occurred in their MAP into three dimensions, namely the introduction of the new MAP in parallel with the existing practices; replacement of the existing practices with the new one and; modification of the use of the existing practices.

The results show that overall the majority of the responding companies have not changed in their use of management accounting techniques (٤٣.٧ percent). Excluding this group, the most commonly occurring change is modification of information (٢٦ percent). This result is consistent with Sulaiman and Mitchell (٢٠٠٥). This is followed by the introduction of new techniques and replacement (١٥ and ١٥.٣ percent, respectively). Modification of the use of traditional MAP shows a higher percentage (٣٢.٨ percent). This result implies that traditional MAP is still valid, if its application is modified to suit the changes in the manufacturing process. The result also shows that only ١٣.٤ percent of traditional MAP is newly introduced to these companies, compared to ١٥ percent of advanced MAP. It shows the increased use of advanced MAP in manufacturing companies. These findings suggest that manufacturing companies in Malaysia have introduced MAP in parallel with their existing practices; replaced the existing practices with new ones and; modified the use of existing practices. Therefore H٥, H٦, and H٧ cannot be rejected.

٤.٢.٢ MAP and performance. As explained earlier, the score for organizational performance was calculated by multiplying the respective "organizational performance" (١١-point Likert scale) and "importance" scores (five-point Likert scale). Therefore, the maximum final score is ٥٥. Since the final score of this variable was not derived directly from the observed measure, Cronbach's a is not applicable. However, the Cronbach's a for the measurement of "changes in organizational performance" was obtained in order to test the reliability of the measures for organizational performance. The value of ٠.٩٣ for Cronbach's a indicated reliable measures.

The results of Table VII show that, the mean score for all of the items in organizational performance was more than ٣٠. This result indicated that the sample organizations exhibited a positive change in their performance and they perceived their performance as an important aspect of the organization. H٦-H٨ examined the impact of changes in competitive environment and AMT with changes in organizational factors (MAP, structure, and strategy) on performance. All of these hypotheses were supported at po٠.٠٥. The changes in organizational factors indicated a positive impact on performance. Therefore it can be concluded that the organizations reacted to changes in competitive environment and technological advancement in a positive direction, which in turn impacted the performance in positive direction.

Table VIII presents the results of Pearson's correlation coefficients between MAP and performance. The literature has identified that a company which changed its MAP, to cope with the changes in business environment, has improved performance. Thus this study tends to investigate this relationship in Malaysian manufacturing companies. H٨ of this study posits that increased changes in MAP have a positive relationship with an increase in performance. This hypothesis is supported by the results in the above table. The results confirm that a significant positive relationship exists between changes in MAP and performance (r¼٠.٥٥٢, po٠.٠١). Correlation between performance and changes in traditional and advanced MAP also show significant positive relationships. Therefore it indicates that improvement of performance in Malaysian manufacturing companies is positively related with the increased changes in MAP. Thus H٨ is supported.

٥. Discussion

The findings from this study confirm that there have been significant changes in the MAPs. Both traditional and advanced MAP in Malaysia manufacturing companies has changed tremendously in the five-year period from ٢٠٠٣ to ٢٠٠٧. This increased in changes might be due to the changes in business environment especially changes in competitive environment and manufacturing technology. Tuan Mat et al. (٢٠١٠) have identified competition and advanced manufacturing technology as important predictors of management accounting change in Malaysia. The Malaysian government has also has encouraged manufacturing companies in Malaysia to be globally competitive[٢]. This factor might also encourage manufacturing companies to use MAS that can cope with the current changes.

Literature also identified that several incentives, for example tax and financial incentives, have been introduced, especially for small- and medium–sized companies.

Therefore, small and medium companies are viewed as living in a "comfort zone." However, the findings in this study found that the level of changes of MAP in small and medium companies is similar to those in large companies. Results from t-tests found no significant difference in MAP change in both large and small and medium companies. The challenges for small and medium companies are bigger compared to large companies, as they are forced not only to compete among themselves, but also with other larger companies, both locally and internationally. Therefore, their business management must be on a par with that in larger companies in order to remain competitive.

It is also argued that manufacturing industry in Malaysia has not been based on strong domestic producers but has instead relied on foreign multinationals producing for export. Globalization not only makes this country open to greater competition, but also acts as a medium to "transfer" MAS through companies establishing operations in Malaysia. Abdul-Rahman et al. (٢٠٠٢) identified that foreign companies often use more advanced MAP and local companies are still largely using traditional methods. However, the findings of this study do not support such a position. Results from the t-tests show that both local and foreign manufacturing companies in Malaysia increasingly used advanced MAP. This result is interesting because local companies need to be more aggressive in managing their business in order to compete globally.

Globalization has brought new technologies to Malaysia; with the introduction of new technologies, the structure of manufacturing costs will change; hence it requires MAP to be designed to support, not restrain the introduction of innovative processes and technologies (Abdel-Kader and Luther, ٢٠٠٨). The contemporary manufacturing technologies such as CAD, CAM, and robotics have significant implications for MAP because traditional system cannot effectively help managers to manage resources as well as identifying relevant costs (Askarany and Smith, ٢٠٠٨; Hoque, ٢٠٠٠). Thus, changes in MAP are important to better align with adopted technology, and help facilitate manufacturing operations to be more successful (Baines and Langfield-Smith, ٢٠٠٣).

This study has also demonstrated that there is a significant increase in the use of MAP in manufacturing companies in Malaysia. Results show that introduction of new MAP in parallel with the existing techniques, replacement of existing practices with a new one, and modification of the use of existing MAP have frequently taken place. As technology becomes more advanced, existing MAP need to be replaced with new techniques that can cope with the change in production processes as well as cost structure. As many of the local companies still rely on traditional techniques, adoption of new technology requires companies to introduce new techniques to deal with the new changes. This conclusion is supported by Granlund (٢٠٠١), Burns et al. (١٩٩٩), and Sulaiman and Mitchell (٢٠٠٥). Findings in this study show that manufacturing companies in Malaysia largely changed both traditional and advanced MAP either as a replacement, a new introduction or a modification of the use of an existing system.

This means that advanced and traditional MAPs can potentially be perceived as both complements and substitutes for each other.

There is well-established empirical evidence for an association between MAP and performance. Baines and Langfield-Smith (٢٠٠٣) found that firms with a greater reliance on non-financial accounting information improved their performance. Ittner and Larcker (١٩٩٥), Mia and Clarke (١٩٩٩), and Sim and Killough (١٩٩٨) similarly found a positive interaction between management accounting information and performance. Thus, findings in this study support the suggestion that changes in MAP are associated with good financial performance (Laitinen, ٢٠٠٦).

٦. Conclusions

It has been found that changes in MAP in Malaysia manufacturing were increased in the inclusive five-year period from ٢٠٠٣ to ٢٠٠٧. Both traditional and advanced MAS appeared to be equally important. These findings show that manufacturing companies in Malaysia rely on both techniques in order to cope with significant changes in business environment. The main role of MAS is to provide useful information in helping managers make effective decisions. Failure to provide appropriate information may contribute to ineffective resource management and decline in performance. Changes in MAP are needed to act as a platform for managing changes in the business environment. Therefore, the design of MAS should depend on the context of the organizational setting. MAS, that is tailored to support business operation will lead to competitive advantage and superior performance. This is because the use of effective MAP can assist employees to focus more easily on achieving differentiation priorities, which could help in maintaining and improving customer expectations, especially in terms of quality and functionality.

Another issue in the management accounting literature is the scope of changes in MAS. It has been questioned whether advanced MAP should be used to complement or substitute for traditional practices. This issue is important as firms have to make suitable changes in their MAP to maintain effectiveness. Findings show three different types of changes of MAP in manufacturing companies in Malaysia. The changes include both introduction of new management accounting techniques, in addition to existing techniques; replacement of the existing techniques with new ones; and modification of the use of existing MAP. These results provide evidence that advanced and traditional MAS should be used both to complement and substitute for each other. Where the traditional system is inadequate in providing sufficient information, but still able to provide useful information, an advanced system should be adopted in order to assist in providing more information for decision-making purposes. However, once the traditional systems are no longer able to cope with changes in information requirements, and fail to provide useful information, then it should be replaced with a more advanced system.

The business environment has changed and will continuously changing. Thus, it is critical to ensure that an appropriate MAS is practiced in organizations. This is

important because effective MAS can help to better coordinate business activities as well as to provide useful information for managers to make decisions. This process will ultimately improve organizational performance. If the MAP does not properly match with business operation the managers might have been provided with inaccurate information, which consequently might jeopardize the firm's performance. Therefore, results in this study provide helpful insights and useful guidelines to organizations facing these changes, especially those managers who are responsible for making sure that their companies move in an appropriate direction.

As with any research, the current study is subject to a number of limitations. First, the sample may not be fully representative of the population of manufacturing industry in Malaysia. Due to the relatively small sample size, any generalization of the study's results to non-manufacturing organizations or beyond cannot be made without considerable caution. The relatively low response rate is consistently a major limitation in accounting research. In addition, data were collected at one point in time rather than longitudinally. Thus, the research could not account for time-lag effects of changes in MAP on performance, as the changes in MAP may not influence firm performance directly after the changes took place.

References :

The textbook by Groves et alia provides an overview of survey methodology, including recent literature on questionnaire development (informed by cognitive psychology) :

Robert Groves, et alia. Survey methodology (٢٠١٠) Second edition of the (٢٠٠٤) first edition ISBN ٠-٤٧١-٤٨٣٤٨-٦.

The other books focus on the statistical theory of survey sampling and require some knowledge of basic statistics, as discussed in the following textbooks:

David S. Moore and George P. McCabe (February ٢٠٠٥). "Introduction to the practice of statistics" (٥th edition). W.H. Freeman & Company. ISBN ٠-٧١٦٧-٦٢٨٢-X.

Freedman, David; Pisani, Robert; Purves, Roger (٢٠٠٧). Statistics (٤th ed.). New York: Norton. ISBN ٠-٣٩٣-٩٢٩٧٢-٨. http://www.wwnorton.com/college/titles/math/stat٤/comment.htm.

The elementary book by Scheaffer et alia uses quadratic equations from high-school algebra:

Scheaffer, Richard L., William Mendenhal and R. Lyman Ott. Elementary survey sampling, Fifth Edition. Belmont: Duxbury Press, ١٩٩٦.

More mathematical statistics is required for Lohr, for Särndal et alia, and for Cochran (classic):

Cochran, William G. (١٩٧٧). Sampling techniques (Third ed.). Wiley. ISBN ٠-٤٧١-١٦٢٤٠-X.

Lohr, Sharon L. (١٩٩٩). Sampling: Design and analysis. Duxbury. ISBN ٠-٥٣٤-٣٥٣٦١-٤.

Särndal, Carl-Erik, and Swensson, Bengt, and Wretman, Jan (١٩٩٢). Model assisted survey sampling. Springer-Verlag. ISBN ٠-٣٨٧-٤٠٦٢٠-٤.

The historically important books by Deming and Kish remain valuable for insights for social scientists (particularly about the U.S. census and the Institute for Social Research at the University of Michigan):

Deming, W. Edwards (١٩٦٦). Some Theory of Sampling. Dover Publications. ISBN ٠-٤٨٦-٦٤٦٨٤-X. OCLC ١٦٦٥٢٦.