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Factors Influencing the Design and Use of Performance Measurement Systems in the Malaysian Electrical and Electronics Industry

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ABSTRACT

Data from a questionnaire survey covering 149 electronics and electrical manufacturing companies in Malaysia are used to identify the factors influencing the design and use of performance measurement systems (PMSs). Factor analysis identified organizations' contextual factors as potential contingency variables that include: (1) two dimensions of organisational profile—company size and ownership types; (2) four dimensions of organisational culture—knowledge and innovation, learning culture, absorptive capability and employee's understanding and learning; (3) four dimensions of organisation strategy—stakeholder focus, pricing and distribution, marketing segmentation and growth; and (4) four dimensions of technology—information technology and customisation, volume and variety of product and process, information and technological advancement, and product complexity.

Keywords: Performance Measurement Systems; Factor Analysis; Organisational Contextual Factors; Developing Countries.

INTRODUCTION

The importance of performance measurement to the management processes in organisations has been frequently noted. Amongst others, it has been viewed as: a key role in promoting positive employee attitudes and productivity (Harper, 1983); a periodic measurement of progress toward explicit short- and long-term objectives;

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and the reporting of the results to decision makers in an attempt to improve programme performance (Poister, 1983).

As noted, performance measurement is an integral part of all management processes and traditionally has involved management accountants through the use of budgetary control and the development of purely financial indicators such as return on investment (Chenhall, 1997). However, it has been claimed that conventional financial performance measurement systems are inappropriate in today's economic settings. As a result, today's economic environment has called for a restructuring of cost accounting and cost management (Ittner and Larcker, 2001). In the face of changes such as globalisation, advancement of information technology and increased world-wide competitive pressures, companies are forced to review their performance measurement system (PMS) to align with new circumstances.

Due to global turbulence, this competitive business environment is putting pressure on all industries, particularly those in the high technology manufacturing industry, with their fast moving nature and need to constantly improve their performance. Firms continuously have to cope with changing markets that are unpredictable and diversified, increasing competition and ever changing customer needs (Sharp, Irani and Desai, 1999).

Many believe that traditional accounting and financially-oriented performance measurement systems are no longer adequate to evaluate the firm's performance (Drucker, 1993 and Johnson, 1990). Green (1993) explains that financial PMSs as applied to manufacturing, for example, are helpful in understanding performance but they may not be appropriate for other uses throughout the organisation (e.g. decision making and influencing behaviour). According to Ghalayini and Noble (1996), traditionally PMSs have been primarily based on accounting systems to control, monitor and improve their operations. They consider the traditional accounting systems and performance measurement systems no longer suitable as they may not yield sufficiently useful information. According to Kim, Chan and Yoon (1997), the traditional performance measurement system inhibits the improvement of critical dimensions such as quality, flexibility and delivery. This is because no direct measurement is made of these critical dimensions by traditional accounting based PMSs (Kaplan, 1990). In addition, traditional accounting based PMSs can be perceived as performing badly due to the fact that it costs more to be very flexible or have high quality. Many believe that to remain competitive, companies have to be dynamic and sustain an inherent ability to continuously change. Adopting an effective and successful performance measurement system closely related to a firm contextual factors such as culture, size, technology and external environment, can meet such a demand (Ghalayini and Noble, 1996).

Much of the research has focussed upon Western approaches and classifications, with a reliance upon case methods (see for example: Dixon, Nanni *et al*., 1990; Ghalayini, Noble *et al*., 1997; Medori and Steeple, 2000; Neely, Adams

et al., 2001). A common understanding has developed that there exists a 'traditional' approach which exhibits a reliance upon financial measures and a more balanced or 'contemporary' approach which acknowledges a wide range of non- and financial measures (Richardson and Gordon, 1980; Kaplan and Norton, 1992). Given recent shifts in manufacturing away from more developed countries such as the UK, towards newly industrialised and developing countries (Trade and Industry Committee, 1994) particularly located in South East Asia, this work seeks to extend our knowledge of performance measurement systems (PMSs) within a developing country setting. Malaysia was selected for the study for a number of reasons:

- it is representative of this emerging region in terms of its economy and manufacturing capability (Malaysian Industrial Development Authority, 2002).
- Although it has a reasonably high GDP it is still comparable with other developing nations within the region (Cordesman, 1997).
- Ready access to industry within the region was available through one of our authors who is a Malaysian national.

The work focused specifically upon the electrical and electronic industry, as one of Malaysia's four key high technology (and therefore more developed) industries (Blonigen and Taylor, 2000). This industry contributes more than 10% of GDP (Malaysia Economic Planning Unit, 2001) with Malaysia among the world's leading exporters of semi-conductors, air conditioning and consumer electronics (Abdul, 1995). It can be argued that high technology industries are likely to be more receptive to adopting innovative methods such as 'contemporary' PMSs while conversely it might be advanced that emerging countries are less exposed to such developments that arise in more developed economies.

The key research question addressed within this paper is:

> *"what factors influence the design and use of PMSs in Malaysian high technology industry?"*

LITERATURE REVIEW THE CONCEPTUALISATION OF PERFORMANCE MEASUREMENT

Within the literature, performance measurement and its criteria have been subjectively and variously defined. Neely *et al*., (1995) for example viewed performance measurement as the process of quantifying the efficiency and effectiveness of action. Efficiency is a measure of how economically the firm's resources are utilised when providing a given level of customer satisfaction, while effectiveness refers to the extent to which customer requirements are met. According to Poister (1983, p. 3), performance measurement is the periodic measurement of

progress toward explicit short- and long-term objectives and the reporting of the results to decision makers in an attempt to improve programme performance. Hacker and Lang (2000) claimed that performance measurement is a method for focusing team activities on the critical few indicators of importance and ultimately improving performance. Dumond (1993) added that performance measurement involves the development of goals and related performance measures and the provision of feedback. Rather differently, Carroll and Schneier (1982) have proposed a more elaborate definition. They claimed that performance measurement is an identification of measurement factors or criteria against which to evaluate performance, the measurement of performance against such criteria, review of performance levels attained by individuals and development of subsequent performance. In addition, they seem to suggest that performance measurement is an ongoing process, involving several steps.

These definitions of performance measurement and its criteria are not only found in the literature, but rather serve to demonstrate the various ways and the differing approaches to defining it. As shown, some have seen it as merely an evaluation tool, some have emphasised the process or system and others have linked it to the purposes and benefits it serves. This seems to suggest that performance measurement's precise meaning is still vague.

For the purpose of this study, a clear conceptualisation of the terms is vital. The approach taken was to provide several crucial points that are viewed as key components for an understanding of the concept. For this reason, some important aspects, extracted from the above definitions, are underlined. Firstly, the most basic and important aspect of performance measurement is a process whereby performance of an organisation is judged against certain predetermined criteria or standards. Secondly, performance measurement needs to be associated with its importance to the organisation as a whole (as providing the basis for decisions making in organisations). Thirdly, performance measurement is an ongoing management process that requires regular reviews and revisions.

THE NATURE OF PERFORMANCE MEASUREMENT SYSTEMS

Traditionally, management theory considers performance an outcome. Performance measurements are used as surrogates for performance outcomes, implicitly assuming measurement does not influence performance (Vagneur and Peiperl, 2000). Argyris (1952) challenged this practice many years ago by positing that performance measurement systems influence organisational outcomes. Since then, a small but growing cross-disciplinary literature has explored these "unintended effects" (Vagneur and Peiperl, 2000). According to Feurer and Chaharbaghi (1995), the way in which performance measurement systems are used can differ widely

depending on their application. For example, some performance measurement systems are used as a reporting mechanism (e.g. financial reports) while other systems are employed for controlling the performance of products, employees and other resources within an organisation (e.g. costing systems, staff appraisal and reward systems). In addition, performance measurement systems can provide (quality) information to decision makers so that they can determine whether efforts are on course and help managers understand when their programs are succeeding or failing (Cook *et al*., 1995).

For the purpose of this study, a clear definition of the performance measurement system and its criteria are also crucial. A performance measurement system is defined as a set of metrics, or individual performance measures used to quantify both the efficiency and effectiveness of actions (Neely *et al*., 1995). Performance measures are established to support the achievement of goals and are provided with the intent to motivate, guide and improve an individual's decision making which can be categorised into areas such as workload, quality, operations or price (Dumond, 1993). To be regarded as a useful management process, a system (PMS) is required to act as a mechanism that enables assessment to be made, provides useful information and detects problems, allows judgement against certain predetermined criteria to be performed and more importantly, the PMS should be reviewed and updated as an ongoing process.

Tatikonda and Tatikonda (1998) note that PMSs are an integral part of management control systems where management control is a process through which management ensures resources are obtained and used efficiently and effectively in accomplishing organisational goals. A performance measurement system should provide timely, accurate feedback on the efficiency and effectiveness of an activity or operation in any business environment (Kim *et al*., 1997). PMSs help managers understand whether their programmes are succeeding or failing by providing a signal indicating management problems (Cook *et al*., 1995).

Globerson (1985) has stated that a performance measurement system of an organisation should include: a set of well-designed and measurable criteria; standards of performance for each criteria; routines to measure each criteria; procedures to compare actual performance to that defined in the standard; and procedures for dealing with discrepancies between actual and desired performance.

Performance measurement systems are well recognised as a tool to influence behaviour (Eccles, 1991 and Neely *et al*., 1995). They can help motivate employees to work towards fulfilling the organisation's strategic objectives. By contrast, poorly designed or poorly implemented performance measurement systems can encourage dysfunctional and sub-optimal working throughout an organisation (Dhavale, 1996).

Dixon *et al*., (1990), Neely *et al*., (1995) and Waggoner *et al*., (1999) further argued that the PMS itself is typically comprised of several key elements, including: (a) a set of procedures for collecting and processing data; (b) timetables and

protocols for distributing information about performance to users within and outside the organisation; (c) an organisational learning mechanism to identify what actions can be taken to further improve performance; and (d) a review process which ensures that the PMS is regularly updated.

From another perspective, Feurer and Chaharbaghi (1995) claimed that if the goal of an organisation is to achieve long-term competitiveness, the PMS will have to be defined in such a way that it reflects the organisation's overall competitive position. As such they suggested that PMSs should comprise a balanced set of: (a) efficiency measures which gauge how well actions are performed; (b) effectiveness measures which evaluate the appropriateness of the selected measures; and (c) measures on the ability to act and react, which indicate the ability of an organisation to change its processes and offerings due to changes in its competitive environment.

Given the importance and differences of the definition by scholars, it is therefore logical that performance measurement research would advance to many areas such as management (Ghalayini and Noble, 1996), accounting (Kaplan, 1983b; Johnson and Kaplan, 1987) and human resource (Giles and Mossholder, 1990).

EVOLUTION OF PERFORMANCE MEASUREMENT SYSTEMS WITHIN ORGANISATIONS

According to Neely (1999), research in the field of business performance measurement is being undertaken by academics from a wide variety of disciplines which includes accountants, operations managers, business strategists, human resource managers and marketers. A review of published PMS literatures (Leong *et al*., 1990; Ward *et al*., 1996; Youndth *et al*., 1996; and Ahamd and Dhafr, 2002) show that, to date, the majority of research on this topic is concentrated on the critical dimensions of industrial performance. These critical dimensions were the focus of a new wave in research when the limitations of traditional financial based PMS became clear. Researchers discovered that PMS shouldn't be dominated by financially based measures and organisations should take into serious consideration other critical dimensions such as quality, flexibility and delivery (Neely, 1999). Research typically focuses on delivering quality products where customer satisfaction is measured by quality of final products, on-time delivery, and responsiveness to customer needs. Other research has concentrated upon various aspects of the value chain associated with quality of production. Some production quality measures identified include defect free production, minimum inventories, high productivity and low cost (Chenhall, 1997).

In an attempt to overcome the criticisms of conventional financially-based performance measurement, a number of contemporary PMSs have been developed that encourage a more balanced view (Bourne *et al*., 2000) and that resolve some

issues of manufacturing industry which stem from its complex, multidimensional nature (Neely *et al*., 1996). These contemporary PMSs have been investigated, but studies on PMS adoption in business tend to examine the design or characteristics of PMS with little empirical research on the correlation between a firm's contextual factors and the characteristics of the PMS adopted. Additionally, the PMS literature indicates that most empirical evidence has been collected in developed countries such as the US and UK. Therefore, there is a need to identify a firm contextual factors that are pertinent to the determination of different Performance management research has focused historically on the West for its context and concerns, i.e. on more developed economies and frequently on whether the PMS in question is of a traditional or more contemporary nature (Ong, 2005). Such a past focus on the West reflects a number of aspects including the higher level of industry development and consequent management control when contrasted with more recently emerging economies. The recognition of the categories 'traditional' and 'contemporary' was essentially borne out of the need to move away from a reliance upon financial measures and upon financial control as typified by the work of Kaplan and Norton (1992) and toward the concept of 'balance' where financial and non-financial metrics are used in harmony. Quite what balance means depends on who the author is and therefore a plethora of balanced PMS frameworks has appeared in recent years (see for example: Cross and Richard, 1988; Dixon, Nanni *et al*., 1990; Bititci, Carrie *et al*., 1997; Neely, Adams *et al.*, 2001).

Many authors agree about a range of characteristics which enhance PMS comprehensiveness, relevance and, ultimately therefore, effectiveness, such as:

- Linking to the business strategy (Keegan, Eiler *et al*., 1989; Dixon, Nanni *et al*., 1990)
- Linking measures hierarchically from strategy through to operational detail (Dixon, Nanni *et al*., 1990; Lynch and Cross, 1991)
- Balanced measures such as financial and non-financial (Feurer and Chaharbaghi, 1995) and internal and external (Waggoner, Neely *et al*., 1999)
- The system should be easy to understand, be simple to use and provide timely information (Dixon, Nanni *et al*., 1990; Lynch and Cross, 1991).

It is also the case, however, that no single design of PMS would serve all organisations and that organisations should adapt and update their PMS in the light of changes in the internal and external business environments (Neely and Bourne, 2000). Typical external factors affecting organisations and thus potentially driving the need for such adaptation could include changed levels of competition, new IT and other technologies, the changing nature of work and changing demands such as deregulation. In addition, different organisational factors may influence the nature of PMS (re)design and use, such as size, age, ownership, culture and strategy. The latter fall squarely in the domain of contingency theory with key

authors in the field, e.g. Lawrence and Lorsch (1967), suggesting such factors affect the way organisations design and use their management systems. This present study attempts to fill the gap by investigating the relationship between contextual factors surrounding organisations and the characteristics of PMSs.

THEORETICAL BACKGROUND — CONTINGENCY THEORY

Contingency theory means that one thing depends on other things, and for organisations to be effective, there must be a "goodness of fit" between their structure and the conditions in their external environment. As such the correct management approach is contingent on the organisation's situation (Daft 2001, p. 24). This study accepts the notion of contingency theory, which suggests that the selected PMS design and use must conform to its contextual factors. However, for the purpose of this study, contingency theory is used and reviewed in a narrower focus as follows. Contingency theory represents a rich blend of organisational theory such as organisational decision making perspectives and organisational structure (Lawrence and Lorsch, 1969; Pugh, 1998 and Donaldson, 2001). The essence of the contingency theory paradigm is that organisational effectiveness results from fitting characteristics of the organisation, (such as its cultures) to contingencies that reflect the situation of the organisation (Burn and Stalker, 1961; Woodward, 1965; Lawrence and Lorsch 1967). According to Donaldson (2001), organisations seek to attain the fit of organisational characteristics to contingencies which leads to high performance. Therefore the organisation becomes shaped by the contingencies (fit) to avoid loss of performance. Thus, there is an alignment betweenorganisation and its contingencies, creating an association between contingencies and organisational contextual characteristics (Burn and Stalker, 1961, Woodward, 1965). Contingency theory is based on the premise that there is no universally appropriate or perfect measurement system which applies equally to all organisations in all circumstances. In fact, it is suggested that particular features of an appropriate measurement system will depend upon the specific circumstances in which an organisation finds itself (Otley, 1980).

Among the principal contingency variables identified are orgnisation size (Pugh *et al*., 1968; Hickson *et al*., 1969), technology (Woodward, 1965), organisation strategy/goal (Child, 1972) and environment (Burn and Stalker, 1961; Lawrence and Lorsch 1967). The study position is that contingenvy theory offers a useful way of conceptualising the relationship between certain "contingency" variables and organisation structure (PMS design and use).

In the view of contingency theorists, the design of accounting information and control systems, i.e. one particular type of PMS, is based upon specific characteristics of the organisation and its environment (Birnberg, Turopolec and

Young, 1983). Contingency theory is essentially a theoretical perspective within organisational theory that emphasises how contingent characteristics or contextual factors (Daft, 2001) such as technology, size, environment, culture and strategy affect the design and functioning of organisations (Covaleski, Dirsmith and Samuel, 1996). According to Khandwalla (1972), in applying contingency theories to control systems design such as a PMS, some researchers have sought to uncover a direct relation between these contextual factors and the management control system. In contrast, some of the researchers (Waterhouse and Tiessen, 1978) have articulated a more obvious relationship between contextual factors (such as technology, size, environment, culture and strategy), structural characteristics (such as formalisation, specialisation, hierarchy of authority and contralisation) and control system design (such as PMS). Gordon and Millar (1976) agree that a management control system such as a PMS should be designed in light of the organisation's contextual factors that characterise the whole organisation. Birnberg *et al*., (1983) and Covaleski *et al*., (1996) have been trying to establish the point that a contingency approach must be taken in designing an organisation's control system. From a total organisational perspective, the linkage between the control system and the wider organisational context must be ascertained and studied in order to capture a valid and reliable view (Birnberg *et al*., 1983).

Even though researchers tried to relate the organisation's contextual factors to its management control system, more empirical researches on this area are needed to better understand their relationship on this particular issue. As a result, the research model developed in this study has been constructed by extracting the organisations contextual factors from the literature. Furthermore, this study is aimed at establishing the relationship between factors influencing the design and use of PMSs (contextual factors) and the characteristics of PMSs' design and use by using an empirical approach.

THE DATA AND METHODOLOGY

The contingency literature was used to inform the conceptual framework, with an existing group of contingency factors (Daft, 1998) adopted as potentially influencing PMS design and use. These factors are size, technology, environment, culture and strategy. The key question addressed in this paper is "what factors influence the design and use of PMSs in Malaysian high technology industry?" The conceptual framework selected views a PMS as an information system with their organisational contextual factors that determined from a contingency perspective.

The decision was taken to focus on a single industry sector; otherwise a more complex situation involving inter-sector differences would need to be highlighted by a more complex research design and a larger sample. In addition, focusing on a single sector enabled one of the key contingency factors, the uncertain environment,

to be effectively controlled and its impact removed from the research. To enhance the data collection, efforts were also made to collect secondary data from all companies and from several government agencies. The survey focused on the electrical and electronics industry in Malaysia, which is a substantial contributor to the national economy at 10 per cent of gross domestic product (GDP). In Malaysia, the electronics and electrical industry can be divided into three categories that are manufacturing, trading and marketing. The major use of the secondary data in this instance was to ensure that only those companies involve in manufacturing are selected to participate in this study. As the sample was selected from the databases provided by both The Electrical and Electronics Association of Malaysia (TEEAM) and Malaysia Industrial Development Authority (MIDA), preliminary search via these websites was carried out to retrieve information such as general profiles of all companies. Efforts were also made to gather information from those companies with their own websites via internet. These are particularly useful in providing additional information on the companies surveyed.

The sample was selected from the databases of all electronics and electrical companies provided by The Electrical and Electronics Association of Malaysia (TEEAM) and Malaysia Industrial Development Authority (MIDA). TEEAM is a representative body of the electronics and electrical industries in Malaysia that was established in 1952. TEEAM is the government appointed agency overseeing the promotion of electronics and electrical industries of the Malaysia economy. Its aim is to work with all government departments, statutory bodies and the private sector to ensure and promote orderly growth and development of the electronics and electrical industries. TEEAM is officially represented in the relevant government bodies such as the National Vocational Training Council, the Electricity and Gas Supply Department and Technical Committees of SIRIM Berhad. In addition, TEEAM is an appointed Standards Writing Organisation (SWO) for electronics and electrical products or services. Membership of TEEAM is drawn from companies, individuals as well as state associations engaged in the electronics and electrical industries in Peninsular and East Malaysia.

MIDA is the Malaysian Government's principal agency for the promotion and co-ordination of industrial development in Malaysia. The major functions of MIDA are to promote foreign and local investment in the manufacturing and related services sectors, to undertake planning for industrial development, to facilitate new and existing companies in the implementation and operation of their projects and offer assistance through direct consultation and co-operation with the relevant authorities at the both federal and state levels and to facilitate the exchange of information and co-ordination among institutions engaged in or connected with industrial development.

After cross-checking both databases and eliminating duplicates a single database was created containing the whole population of electronics and electrical manufacturing companies registered with TEEM and MIDA in Malaysia, this

comprised 982 firms. The sampling technique applied to obtain the study sample, is discussed in the next section.

In order to avoid problems such as companies that may have moved or gone out of business or changed address, the sample list was checked against the updated telephone directory supplied from TELEKOM Berhad (Malaysian pioneer telecommunications provider).

A questionnaire survey approach was adopted given the empirical nature of the investigation, the desire to reach a wide range of respondents located within a large geographic area and cost and time constraints (Easterby-Smith, Thorpe *et al*., 2002). It is also the most common method of data collection in business and management studies (Pervez, Kjell *et al*., 1995). A sample frame was constructed from industry databases (above) and the questionnaire targeted at Managing Directors and Production Directors with personal knowledge of their organisation's PMS. Information was gathered regarding each company's profile, the respondent's profile, organisational contextual factors influencing PMS design and use and the respondent's own opinion of the factors affecting PMS design and use (to cross-check against the factors derived from the literature). The questionnaire took approximately 20 minutes to complete and comprised predominantly of five-point Likert-scale questions. The questionnaire was piloted with 10 Malaysian managers and minor modifications were made following feedback.

A sample size of 556 was determined based on assuming a reasonable rate (20 per cent). The questionnaire was administered in March/April 2004. A total of 149 useable responses were obtained, representing a 27% response rate from the sample and a 15% proportion of the target population. Follow-up contact with a random sample of non-response organisations provided descriptive statistics of organisation demographics that when tested yielded no evidence for non-response bias. Using SPSS, a range of analyses was carried out including descriptive statistics, correlations, ANOVAs, factor analyses, regressions, canonical correlations and cluster analyses. This paper focuses on the factor analysis used to identify the factors influencing the design and use of PMSs.

RESULTS

Profiles of company size, ownership, age and product manufactured are indicated below in Tables 1-4 respectively.

The arithmetic mean size of the 149 responding companies was 282 employees with roughly a 50/50 split between SMEs and large firms. The sample was divided reasonably evenly between three main ownership types (local-owned; joint-owned; and foreign-owned). The median company age lay between 11 to 20 years and most firms (85%) manufactured electronics as part of their production portfolio. In terms of total revenue, the mean is 15 million ringgit Malaysia for 2001 and just

Table 1: Company Size (Number of Full Time Employees)

Company Size	No. of Companies	Percentage (%)
Small	18	12
Medium	55	37
Large	76	51
Total	149	100

Table 2: Company Ownership

Ownership Type	No. of Companies	Percentage (%)
Foreign-owned Companies	51	34
Joint-venture Companies	36	24
Local-owned Companies	62	42
Total	149	100

Table 3: Company Age (No. of Years in Operation)

Company Age	No. of Companies	Percentage (%)
Newly Established (10 yrs or less)	62	42
Moderately Established (11 – 20 yrs)	57	38
Established (more than 20 yrs)	30	20
Total	149	100

Table 4: Product Type Manufactured

Product Type	No. of Companies	Percentage (%)
Electrical Products	23	15
Electronics Products	58	39
Electrical and Electronics Products	68	46
Total	149	100

under 14 million ringgit Malaysia for 2002. The univariate descriptive statistics of responding companies is shown in Table 5.

The final result of factor reliability tests is shown in Table 6 below. There are twelve factors or components for organisational contextual variables. Each factor

Table 5: Univariate Descriptive Statistics of Responding Companies

Variables	Minimum	Maximum	Mean	Median	Standard Deviation
No. of Full time Employees	25.0	3800	281.7	155	470.0
Total Revenue (2001) in (RM Million)	25.0	150.0	15.0	12.5	17.5
Total Revenue (2002) in (RM Million)	33.0	135.0	13.9	10.0	16.5
No. of Years in Operation	3.0	43.0	14.2	12.0	7.7

is labelled based on the suggestion by Hair *et al*., (1998). As such, individual variables with larger factor loadings are considered more important and more suitable to represent a factor. The findings indicate that organisational culture, from the aspect of learning, obtained the highest score. This shows that organisation with high level of learning and knowledge is more likely to influence its PMS. This finding is consistent with the study by Calantone, Cavusgil and Zhao (2002) that learning organisations will emphasise on their information system. The result reveals that technology is also an important contextual variable that highly influence the adoption of a PMS within an organisation. Surprisingly, organisational strategy is the less important variables that will influence the use of a PMS in this study. This could be the fact that other important strategies are not included in this study which might affect the result.

RESULTS AND DISCUSSION

In this study, hierarchical cluster procedures (which is also a commonly used method for forming clusters) based on the guideline by Hair *et al.* (1998) were followed. In the procedures (agglomerative methods), firstly, all cases (companies) are considered separate clusters (as such, there were 149 clusters at this initial stage). Secondly, two of the cases are merged into a single cluster. Next, either individual case is added to create a new cluster or to combine existing clusters. In this case, the largest percentage increase occurs in going from two to one cluster (see Table 7). As a result, the two-cluster solution is examined.

The distribution of the clusters based on general profiles (company size, ownership types and company age). The results indicate that the majority of the companies in Cluster 1 (contemporary PMSs) are large in size, foreign-owned and newly established. On the other hand, companies categorised under Cluster 2 (traditional PMSs) are mostly medium in size, local-owned and newly to moderately established companies. This finding is consistent with the earlier suggestion that

Table 6: Results of Factor Reliability Analysis

Label	Components	Cronbach Alpha	K-M-O
(1) Organisation Culture			
Knowledge & Innovation	(1) Frequently try new ideas		
	(2) Try new approaches in performing task		
	(3) High understanding of PMS	0.91	0.67
Learning Orientation	(1) Learning is key to improvement		
	(2) Learning is investment	0.76	
Absorptive Capability	(1) Enough expertise to cope with changes		
	(2) Spare capacity available	0.72	
Employees Understanding & Learning	(1) Ensure employees understand PMS		
	(2) Opportunity to learn PMS	0.66	
(2) Organisational Strategy			
Stakeholder Focus	(1) Enhance employee welfare		
	(2) Strengthen strategy objectives		
	(3) Enhance customer satisfaction	0.81	0.60
Pricing & Distribution	(1) Product pricing		
	(2) Distribution channels	0.81	
Marketing Segmentation	(1) Product differentiation		
	(2) Promotion strategy	0.75	
Growth	(1) Increase shareholder wealth		
	(2) Enlarge market share	0.64	
(3) Technology			
Information Technology & Customisation	(1) Jobbing production		
	(2) Batch production		
	(3) IT is important element	0.97	0.65
Volume & Variety	(1) Wide range of products		
	(2) Mass/line production		
	(3) Capital intensive	0.80	
Information & Technological Advancement	(1) Product are complex in nature		
	(2) Moving towards e-communication		
	(3) Hugh capital investment in IT		0.62
Product Complexity	(1) High number of standardized products		
	(2) High number of parts/components	0.65	

Table 7: Analysis of Agglomeration Coefficient for Hierarchical Cluster Analysis

Number of Clusters	Agglomeration Coefficient	Percentage Change in Coefficient to Next Level
10	159.4	13.4
9	180.8	12.8
8	203.9	12.2
7	228.7	11.9
6	255.9	12.6
5	288.2	13.8
4	327.9	14.4
3	375.2	15.2
2	432.2	29.6
1	560.2	-

foreign-owned companies more likely to adopt contemporary PMS than local-owned companies (see Table 8).

Table 8: General Profiles of the Two-Cluster Solutions

Items	Cluster 1		Cluster 2		Total Cases
(1) Company Size					
Small	14	(12%)	4	(14%)	18
Medium	37	(30%)	18	(65%)	55
Large	70	(58%)	6	(21%)	76
Total Cases	121	(100%)	28	(100%)	149
(2) Ownership Types					
Foreign-owned	49	(41%)	2	(7%)	51
Joint-venture	32	(27%)	4	(14%)	36
Local-owned	40	(33%)	22	(79%)	62
Total Cases	121	(100%)	28	(100%)	149
(3) Company Age					
Newly Established	49	(41%)	13	(46%)	62
Moderately Established	44	(36%)	13	(46%)	57
Established	28	(23%)	2	(8%)	30
Total Cases	121	(100%)	28	(100%)	149

As shown in Table 9, the Chi-square results suggest a significant difference between the two clusters in terms of company size and ownership types. However, with regard to company age, no significant difference was found for both clusters.

Table 9: Chi-square and Contingency Coefficient Tests for Cluster 1 and 2

Items	Pearson Chi-square	df	Contingency Coefficient	Asymp. Sig. (2-sided)
(1) Company Size	13.05#	2	.28	.001**
(2) Ownership Types	20.10##	2	.35	.000***
(3) Company Age	3.68###	2	.16	.158(NS)

Note:
Total Valid cases is 149 (Cluster 1=121; Cluster 2 = 28)
= 1 cell (16.7%) has expected count less than 5. The minimum expected count is 3.38
= 0 cells (0%) have expected count less than 5. The minimum expected count is 6.77
= 0 cells (0%) have expected count less than 5. The minimum expected count is 5.64
*** = Significant at 0%
** = Significant at 5%NS = Not Significant

CONCLUSION

The research findings covered here make a valuable contribution to the literature for two reasons. First, whilst often discussed, there is rarely much empirical rigour associated with the discussed categories of traditional versus contemporary, or 'balanced', PMSs. This research uses multivariate analysis of questionnaire data to rigorously establish the existence of two types of PMS with characteristics that reflect those expected by analysing the theoretical literature. Second, this research identifies that the position on PMSs in a high technology industry of a developing country appears similar to that discussed in the literature for industries in Western, developed economies. Namely, that the two PMS categories are found in practice and that contemporary PMSs predominate over traditional ones as described in the literature on developed economies.

The findings also contribute to the academic literature by providing empirical evidence that the division between traditional vs. balanced or 'contemporary' types of PMS is associated with (i) company size and with (ii) organisational ownership. The finding that larger companies are more likely to use a contemporary PMS than SMEs is not that surprising given that larger companies have more resources to respond to the need for a deeper and more sophisticated pool of knowledge and expertise to implement the more innovative, 'contemporary' PMS. Locally-owned firms were found to be more likely to rely on a more traditional, financially-oriented PMS than foreign-owned companies (typically Japanese or Western) which were more likely to rely on balanced approaches. It might be argued that such countries are typically developed and therefore they could be expected to import more innovative PMS approaches to an emerging country such as Malaysia. It might also be expected that the kind of company venturing abroad would tend to be the more successful company and therefore more likely to promote innovative

approaches. Somewhat counter-intuitively the findings suggest that newer companies are more likely to rely on traditional PMSs that contemporary ones but this is a weak, and not significant, result.

The existence of two categories of PMS is of practical interest to PMS designers and users generally in confirming theory but will be of particular interest to the Malaysian Government at both national and local levels. The results indicate that locally-owned companies may benefit from guidance on the adoption of more balanced performance metrics, deviating from an apparent reliance upon the more financially-oriented. Government policy may thus be developed to better support local businesses. The findings will equally be of interest to other developing countries within Asia, of which Malaysia is typical.

LIMITATIONS & FUTURE RESEARCH

The normal challenges to validity that arise in multivariate analysis of questionnaire survey are relevant but not laboured here. On the analysis side one particular issue that could be raised is a-theoretical nature of the method used, namely cluster analysis. A number of specific issues could be raised such as the sample size of 149 which is just about acceptable for multivariate analysis. More specifically, this initial study adopted a survey approach of one respondent per company. Future research could expand this to gain two or three responses across different functional roles and / or within the organisational hierarchy. The use of qualitative interviews may provide additional insight into PMS characteristics within a developing country setting and in particular allow pursuit of the connection with ownership type. Follow up work of a longitudinal nature could be useful in exploring the influences on the process of switching from traditional to contemporary PMSs. The research does not attempt to link firm performance to type of PMS but this could be pursued in future research.

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