The Roles of Market Competition and Advanced Manufacturing Technology in Predicting Management Accounting and Control Systems Change

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Abstract

This study replicates and extends Libby and Waterhouse’s (1996) study on changes of management accounting and control systems (MACS) in business organizations. Using a sample of 110 Malaysian manufacturing firms, this study investigates the roles of perceived market competition, advanced manufacturing technology adoption and employee attitude toward change in predicting MACS change. It is hypothesized that changes in perceived market competition and changes in advanced manufacturing technology adoption directly affect changes in MACS. Since attitude toward change reflects managers’ perceptions on change, it is conjectured that attitude toward change also influences MACS change. The results indicate that changes in competition and advanced technology adoption significantly affect MACS change but attitude towards change has no effect on MACS change.

Keywords: Management Accounting and Control Systems (MACS); Advanced Manufacturing Technology (AMT); Attitude toward change

1. Introduction

Dynamic business environments, as a consequence of trade liberalization and advancements in manufacturing and information technologies, have significantly intensified competition, both in the domestic and the international markets. With increasing participation from multinational companies through foreign direct investments (FDI), the Malaysian economy grew rapidly and has transformed itself from a raw material producer to an emerging multi-sector economy (Wu et al., 2004). These multinationals have contributed significantly to increasing competition in Malaysia’s business environment. In response to the escalation in market competition, manufacturing firms are constantly reviewing and revising their manufacturing strategies, and they typically achieve this through adoption of advanced manufacturing technology (AMT) (Khandwalla, 1977; Lee, 1996).

The changes in the manufacturing processes and strategies necessitate appropriate changes in the Management Accounting and Control Systems (MACS) in firms (Burns and Vaivio, 2001; Kaplan, 1984; Libby and Waterhouse, 1996). The issue of management accounting change has generated a considerable amount of interest among scholars for decades. Numerous debates were carried out questioning the capability of the traditional MACS to continually provide relevant, timely and accurate information to management for planning, control and decision-making purposes in a new manufacturing environment (Cooper and Kaplan, 1988; Drury and Tayles, 1995, Johnson and Kaplan, 1987; Kaplan, 1984). Besides the economic factors, behavioral factors such as managers’ attitude toward change are argued to influence their perceptions on change and those may inhibit or promote changes in MACS (Elizur and Guttman, 1976).

The remainder of this paper is organized in the following manner. Section 2 provides development of the theoretical framework that depicts the relationships under investigation. Section 3 presents the sample description and measures. The descriptive statistics and results of the data analysis follow in Section 4. Finally, discussion and conclusions are presented in Section 5.

2. Model Development, Theory and Hypotheses

2.1 Developing the Theoretical Framework

Market competition has become more global-based as a result of trade liberalization under World Trade Organization (WTO) through the multilateral trading system. Advances in Information and Communications Technology (ICT) have changed the manner in which data and information are being collected, measured, analyzed and disseminated within and between organizations. To deal with the turbulence and uncertainty in the marketplace, it
has been argued that organizations need to equip themselves with appropriate responses to the threats and opportunities, and ensure that they design and use appropriate control systems for this purpose (Haque and Hopper, 1994; Simons, 1990). This has led to an increasing need for management accounting change (Burns and Vaivio, 2001). Change is conceptualized by Damanpour (1987) as the extent of changes adopted in a given period or as the extent to which changes are integrated in the operations.

Management accounting systems play a vital role in monitoring the strategic progress of a firm through a feedback information system. The growing concern among accounting professionals and academics on the adequacy of the traditional MACS in meeting the current needs of information in firms, has led to a number of “new or claimed to be new” management accounting systems, such as new product costing systems, strategic cost analysis methods, quality management and others (Libby and Waterhouse, 1996). The traditional volume-based approach of allocation of production costs to products and services is criticized for not reflecting the current production processes and unsuitable because overhead costs are no longer moved by production volume but by complexity of production processes (Johnson and Kaplan, 1987). However, empirical research has shown that the traditional MACS approach is still widely used in practice due to lack of knowledge of other alternatives and high financial switching costs to new costing systems (Drury and Tayles, 1995).

Contrary to the view that MACS are rarely changed due to the resistance to change, Libby and Waterhouse (1996, hereafter L&W), and subsequently, Williams and Seaman (2001, hereafter W&S) provided empirical evidence on the extent and determinants of changes in MACS, specifically the five sub-systems for planning, controlling, costing, directing and decision-making. Based on the contingency theory, these two studies (Libby and Waterhouse, 1996; Williams and Seaman, 2001) argue that changes in MACS are dependent on the firm’s context and structure, both of which may promote or inhibit change. Using a sample of 24 Canadian firms, L&W found that on average, 31 percent of the MACS in the sample firms changed during the period 1991-1992. The greatest number of changes occurred in the decision-making sub-system and fewest changes occurred in the directing sub-system. The change was best predicted by organizational capacity to change, which in turn was positively related to the number of MACS sub-systems in use, Organizational size, structure (decentralization) and intensity of competition did not predict changes in MACS.

W&S replicated L&W’s study by examining firms from the manufacturing, industrial and service sectors in Singapore. They found an overall 22.1% rate of MACS change in their sample. Regression results for all the sectors indicated that centralization (replacing decentralization) was the only significant predictor of MACS change, while size and capacity to change variables exhibited mixed results. Similar to L&W’s findings, decision-making sub-system exhibited the highest number of changes while the lowest number of changes occurred in the costing sub-system. Regression results indicated that increasing centralization, decreasing intensity in competition and greater organizational capacity were significantly associated with the number of changes in MACS while size effect was insignificant.

Using a sample of Malaysian manufacturing firms, this study seeks to provide further insights to the impact of perceived market competition, AMT adoption and attitude toward change on MACS change. In this study, the standard components for planning, controlling, costing, directing and decision-making of a management accounting system are utilized in formulating the research framework. These five components of the management accounting system encompass the critical functions of a MACS to aid managerial decision-making and enhance organizational performance.

2.2 Market Competition and MACS Change

One of the first studies on the effect of competition on management control system and organizational performance is by Khandwalla (1972). He found a strong positive relationship between intensity of competition and reliance on the formal accounting systems, as well as a negative relationship between the firm’s profitability and the intensity of price, product and marketing channel competition. On the contrary, Mia and Clarke (1999) found that the profitability of a group of Australian firms improved with increased competition during the period 1993 to 1995. Their findings suggest that increasing market competition has significantly enhanced the use of management accounting information for improving business performance.

In this study, the relationship between change in the level of perceived intensity of market competition and MACS change is investigated. Increasing the intensity of market competition induces firms to re-evaluate their existing competitive strategies. Among the objectives of establishing MACS are to provide information that would facilitate planning, costing, performance measurement and decision-making. Firms operating in a competitive environment need to constantly review their MACS to ensure that the appropriate costing and performance measurement systems are instituted for sustained competitiveness (Libby and Waterhouse, 1996). Thus, it is hypothesized that a greater change in the intensity of market competition will lead to more extensive changes in MACS. Hypothesis 1 ensues:

H1: There is a positive relationship between the extent of MACS change and the change in intensity of market competition.
2.3 Advanced Manufacturing Technology and MACS Change

As part of the strategic responses to escalating market competition and trade liberalization, manufacturing firms have been making significant changes to their manufacturing process through the adoption of Advanced Manufacturing Technology (AMT) and the use of different managerial techniques and practices, such as Just-in-Time (JIT) and Total Quality Management. In addition, low-cost and flexible factory layout in the production systems is necessary for enhancing competitiveness (Kreng and Tsai, 2002). AMT adoption leads to changes in manufacturing operations and information needs. Since a MACS plays a vital role in scanning the environment through a number of complex systems to gather and report information relating to changes in the manufacturing processes, managers are expected to make greater use of MACS information when the level of AMT adoption increases. Thus, it is conjectured that higher level of adoption of AMT will lead to higher extent of change in MACS to accommodate the changing demand for relevant and timely information. This relationship is stated in the following hypothesis:

H2: There is a positive relationship between the extent of MACS change and the extent of change in AMT adoption.

2.4 Attitude Toward Change and MACS Change

Attitude toward change generally consists of a person’s cognition about change, affective reactions to change and behavioral tendency to change (Dunham et al., 1989). Affective responses are a greater or lesser feeling of being linked to, satisfied with, or anxious about change. Cognitive responses reflect the opinion one has about the advantages and disadvantages, usefulness, necessity, and knowledge required to handle the change. Instrumental responses are the actions already taken or which will be taken in the future for or against change. Responses to a particular change may vary from one individual to another and the process of MACS change may depend on managers’ attitude to change. Thus, the following hypothesis is formulated:

H3: There is a positive relationship between the extent of MACS change and the attitude toward change.

2.5 Research Framework

Based on the discussion in previous sections on the relationships between the various contingent factors, namely change in market competition, change in AMT, and attitude toward change, the following research framework is proposed. In this study, the dependent variable (DV) is MACS change; the independent variables (IDV) are the extent of change in intensity of market competition, the extent of change in AMT adoption, and attitude toward change.

The following is the regression equation related to the above model:

\[ Y = b0 + b1X1 + b2X2 + b3X3 + e \]

Where \( Y \) = the extent of change in MACS; \( X1 \) = the extent of change in intensity of market competition; \( X2 \) = the extent of change in AMT adoption; and \( X3 \) = attitude toward change.

3. Method

3.1 Sample

A total of 1000 questionnaires were mailed to firms listed in the 2001/2002 Federation of Malaysian Manufacturers (FMM). Out of the total mailed, 122 responses were received, representing a response rate of 12.2%. However, 10 responses were from employees with less than 1 year of working experience and they were excluded from the analysis since these employees were relatively new in the organizations; they might not be familiar with the changes that had taken place within the last three years in their respective MACS. Two incomplete responses were also excluded from the analysis. Finally, a total of 110 responses were chosen for the final data analysis.

Accountants or managers, who represented the middle-level management, constituted 51.8% of the total respondents. The rest of the respondents were general managers/financial controllers (25.8%), managing directors/CEOs (6.4%), engineers (7.4%) and others (11.8%), who did not clearly specify their job designations.

3.2 Measures

MACS was measured using the 23 items identified in L&W. These items were sub-divided into five main system components: planning, controlling, costing, directing and decision-making (see Appendix A). The planning subsystem covers activities such as budgeting, operations planning, capital budgeting and strategic planning. Performance measures for individuals, work teams and organization, are dealt with in the controlling sub-system. The costing sub-system deals with product costing that includes allocations of manufacturing overhead, marketing costs and other overhead costs. Rewards and incentives plans are under the directing sub-system and the manner of information usage within organizations is under the decision-making sub-system. MACS change was measured using a 5-point Likert-type scale ranging from 0 (no change) to 5 (great extent of change) for the three-year period from January 2000 to December 2002.

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1 L&W included technology in their study. The variable was excluded from the analysis because the reliability of the measure was below the acceptable level.
The instrument for measuring intensity in competition was a modified version of the composite scale for measuring competitive pressure in Khandwalla (1972), as well as in L&W. This measure consisted of eight items for rating the intensity of competition in price, product range, quality, new product introduction, advertising and promotion, technological change, marketing distribution and changes in government regulation or policy on a scale ranging from 1 (very low) to 7 (very high). The importance of each type of competition to the organization’s long-term profitability and growth was also measured on a scale ranging from 1 (least important) to 7 (extremely important). An index of the competitive pressure for each organization was computed by taking the average of the sum of the square root of the product of the intensity and importance of each type of competition. The extent of change in market competition was the difference between the current and the past indices of perceived intensity of competition. The instrument consisting of 22 items for measuring AMT adoption was adapted from Snell and Dean (1992). The respondents were required to rate the extent of adoption of each AMT application and the perceived importance of that AMT application on a five-point Likert-type scale ranging from 1 (very low or least important) to 5 (very high or very important). An index of AMT adoption for the current period and one for the past period were computed by taking the average of the sum of the square root of the product of the rating score on the level of AMT application and the rating score on its importance. The extent of change in AMT adoption was the difference between the current and the past indices of AMT adoption. Cognitive, affective and behavioral dimensions of attitude toward change were measured using an 18-item instrument developed by Dunham, et al., (1989). Each dimension was measured by six items, on a seven-point scale ranging from 1 (strongly disagree) to 7 (strongly agree). Scores for each of the 18 items were totaled and averaged to yield a mean score for the overall measure of attitude toward change.

4. Results

4.1 Descriptive Statistics

Table 1 summarizes the descriptive statistics for the dependent and independent variables, and the correlations of these variables are shown in Table 2. The theoretical range for changes in MACS was from 0 (no change) to 5 (great extent of change). The extent of MACS change was moderate, with a mean of 2.20. The highest level of change occurred in the decision-making sub-system, while the lowest level of change was observed in the costing sub-system. This study measured the extent of change, whereas L&W and W&S’s studies used the rate of change. Nonetheless, the overall results of this study are fairly consistent with the reported 31% and 22.1% changes in MACS in L&W and W&S, respectively. Both of these studies also found the highest level of changes in the decision-making sub-system. W&S reported the lowest level of changes in the costing sub-system, while L&W found the directing sub-system experienced the least change.

The extent of change in intensity of competition and that for AMT adoption were low, with means of 0.23 and 0.23, respectively. Attitude towards change was fairly high with a mean of 5.23, suggesting that the respondents were quite receptive to changes. The Cronbach alpha coefficients ranged from 0.70 to 0.91 that indicate acceptable levels of scale reliability (Nunnally, 1967) for the variables concerned. The Pearson correlation between MACS change and change in competition ($r = -0.233, p = 0.015$) was positive and significant, but in a direction opposite to that hypothesized. The correlation between MACS change and change in AMT application ($r = 0.235, p = 0.015$) was also positive and significant. However the correlation between MACS change and attitude toward change was not significant. The correlation between change in AMT adoption and attitude toward change ($r = 0.189, p = 0.050$), on the other hand, was significant. The lack of a significant and positive association between attitude toward change and MACS change might be due to the specialized domain of the accounting function and the perceived expertise required to execute any MACS change.

4.2 Regression Results

Regression runs were separately carried out using the extent of change in each of the five sub-systems of MACS, as well as the overall MACS change, as the dependent variable. The independent variables were extent of change in competition, change in AMT adoption and attitude toward change. The regression results, which are summarized in Table 3, show that significant relationships existed for the overall change in MACS, as well as for change in each of the five sub-systems of MACS. Extent of MACS change was significantly associated with decreasing competition ($p = 0.011$), but with increasing change in AMT adoption ($p = 0.016$). There was a positive but insignificant association between MACS change and attitude toward change. Thus, hypotheses H2 is supported, while hypotheses H1 and H3 are not supported.

The extent of changes in the overall MACS ($p = 0.011$), as well as its sub-systems for controlling ($p = 0.011$), costing ($p = 0.001$), directing ($p = 0.000$) and decision-making ($p = 0.056$) were all significantly associated with decreasing competition. The extent of changes in AMT adoption was significantly and positively associated with the changes in the overall MACS ($p = 0.016$), the planning sub-system ($p = 0.004$) and the costing sub-system ($p = 0.013$). Attitude toward change, on the other hand, was significantly and positively associated only with the directing sub-system ($p = 0.049$) and its association.
Table 1. Descriptive Statistics of Variables (n=110)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Observed Range</th>
<th>Theoretical range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall extent of change in MACS</td>
<td>2.20</td>
<td>1.30</td>
<td>0 – 4.73</td>
<td>0 – 5</td>
</tr>
<tr>
<td>Planning</td>
<td>2.11</td>
<td>1.43</td>
<td>0 – 5</td>
<td>0 – 5</td>
</tr>
<tr>
<td>Controlling</td>
<td>2.40</td>
<td>1.50</td>
<td>0 – 5</td>
<td>0 – 5</td>
</tr>
<tr>
<td>Costing</td>
<td>1.85</td>
<td>1.44</td>
<td>0 – 5</td>
<td>0 – 5</td>
</tr>
<tr>
<td>Directing</td>
<td>1.20</td>
<td>1.65</td>
<td>0 – 5</td>
<td>0 – 5</td>
</tr>
<tr>
<td>Decision Making</td>
<td>2.53</td>
<td>1.50</td>
<td>0 – 5</td>
<td>0 – 5</td>
</tr>
<tr>
<td>Overall change in intensity of competition</td>
<td>0.23</td>
<td>0.52</td>
<td>-0.84 – 1.81</td>
<td>-6 – 6</td>
</tr>
<tr>
<td>Overall change in AMT adoption</td>
<td>0.23</td>
<td>0.46</td>
<td>-0.41 – 2.82</td>
<td>-5 – 5</td>
</tr>
<tr>
<td>Overall attitude toward change</td>
<td>5.23</td>
<td>0.80</td>
<td>3.25 – 7</td>
<td>1 – 7</td>
</tr>
</tbody>
</table>

Table 2. Correlations (p values) and Reliability Measures for Variables (n=110)

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Cronbach alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. MACS Change</td>
<td>1</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Change in Competition</td>
<td>-0.233*</td>
<td>0.70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(0.015)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Change in AMT</td>
<td>0.235*</td>
<td>0.047</td>
<td>0.90</td>
<td>0.626</td>
<td></td>
</tr>
<tr>
<td>(0.015)</td>
<td>(0.626)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Attitude Toward Change</td>
<td>0.121</td>
<td>-0.015</td>
<td>0.189*</td>
<td>0.05</td>
<td>0.91</td>
</tr>
<tr>
<td>(0.212)</td>
<td>(0.876)</td>
<td>(0.05)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p ≤ 0.05

with the costing sub-system (p = 0.097) was only weakly significant. Only the costing sub-system was significantly associated with all the three independent variables.

The findings of this study are consistent with the findings by W&S, even though they only found significant association between the overall MACS change, changes in controlling and decision making sub-systems and decreasing competition. L&W, on the other hand reported a positive but insignificant relationship between MACS change and market competition.

5. Discussion and Conclusions

The objective of the study is to investigate the relationships between changes in market competition, AMT adoption and attitude toward change and changes in MACS. The results indicated a significant direct relationship between change in AMT adoption and the overall MACS change. This is consistent with our expectation that changes in the extent of AMT adoption should result in changes in the management accounting and control systems. However, the results pertaining to the relationship between change in perceived competition and MACS change are contrary to our earlier expectation. This negative relationship between change in market competition and MACS change, however, is consistent with W&S’s, but contrary to L&W’s. The mix findings might be due to economic and/or cultural factors. Malaysia and Singapore (W&S’s study) belong to the developing and emerging economies with Asian cultural values, while L&W’s study was based on a sample of Canadian manufacturing firms, which were of Anglo-American cultural value and in an advanced economy. W&S had in fact argued that the inconsistent effects of competition on MACS change found in their and L&W’s studies could be due to the differences in the economic condition in Canada (severe recession) and Singapore (booming economy) that existed during the test periods. The inconsistent and inconclusive results suggest that more studies may need to be carried out to investigate the role of market competition in predicting MACS change. In this study, change in competition was measured as the difference between the current and the past levels of perceived competition, whereas in the earlier two studies, only the current level of perceived competition was used. This might also contribute to the difference between the findings of this study and those reported in L&W and W&S.

Attitude toward change was found to be positively associated with the overall MACS change, as well as with each of the sub-systems of MACS, but the relationships were significant only for the costing and the directing sub-systems. The lack of a significant association between attitude toward change and the overall MACS change suggests a mere positive attitude toward change is insufficient to bring about MACS change because the process of any accounting change may be difficult, costly and time consuming. There are barriers that inhibit changes in MACS, such as lack of immediate tangible benefits arising from the change to justify the switching costs, lack of in-house expertise and lack of management support possibly due to inadequate knowledge. Furthermore, the introduction of any change initiatives frequently requires a change in organizational culture and management style (Chang and Sinclair, 2002).

Overall, the results provide some empirical evidence on MACS changes among Malaysian manufacturing firms...
role of competition in predicting MACS change in a developing economy, this study provides insights to the roles of other variables, namely, change in AMT adoption and attitude toward change, in the predicting MACS change.

The findings of this study indicate that the extent of changes in MACS of Malaysian manufacturers was relatively small despite the increasingly competitive business environment. Interestingly, even though the costing sub-system was significantly related to changes in the market competition (negatively), extent of AMT adoption and attitude toward change, this sub-system experienced the least overall change for the past three years. One explanation could be that changes in the costing sub-systems were not as wide spread as changes in the other sub-systems and the changes were only undertaken when firms perceived the needs to change their costing approaches.

The study is subject to the usual limitations associated with survey research but there are at least two limitations to the study that need to be addressed. Firstly, this study covers only manufacturing firms. It is possible that predictors of and their effects on MACS change may be different for other sectors, such as services sector. Secondly, a majority of the respondents in the survey were middle-level managers and were not the senior or top-level managers as initially planned. Thus there may be differences in perceptions of MACS change between the two groups of managers. In addition, as indicated by the $R^2$ and adjusted $R^2$ in the regression models. There may be other important predicting variables that could be added to model to improve its explanatory power.

References


Table 3. Summary of Results of Regression Analyses

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Overall MACS</th>
<th>Planning</th>
<th>Controlling</th>
<th>Costing</th>
<th>Directing</th>
<th>Decision-Making</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in Competition</td>
<td>-0.239</td>
<td>-0.060</td>
<td>-0.227</td>
<td>-0.317</td>
<td>-0.354</td>
<td>-0.185</td>
</tr>
<tr>
<td>(0.011)**</td>
<td>(0.524)</td>
<td>(0.011)**</td>
<td>(0.001)**</td>
<td>(0.000)**</td>
<td>(0.056)*</td>
<td></td>
</tr>
<tr>
<td>Change in AMT</td>
<td>0.230</td>
<td>0.287</td>
<td>0.140</td>
<td>0.231</td>
<td>0.059</td>
<td>0.160</td>
</tr>
<tr>
<td>(0.016)**</td>
<td>(0.004)**</td>
<td>(0.156)</td>
<td>(0.013)**</td>
<td>(0.543)</td>
<td>(0.104)</td>
<td></td>
</tr>
<tr>
<td>Attitude Toward Change</td>
<td>0.092</td>
<td>0.031</td>
<td>0.068</td>
<td>0.153</td>
<td>0.192</td>
<td>0.072</td>
</tr>
<tr>
<td>(0.331)</td>
<td>(0.747)</td>
<td>(0.487)</td>
<td>(0.097)*</td>
<td>(0.461)</td>
<td>(0.461)</td>
<td></td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.121</td>
<td>0.089</td>
<td>0.076</td>
<td>0.185</td>
<td>0.169</td>
<td>0.066</td>
</tr>
<tr>
<td>Adj. $R^2$</td>
<td>0.096</td>
<td>0.062</td>
<td>0.049</td>
<td>0.161</td>
<td>0.142</td>
<td>0.039</td>
</tr>
<tr>
<td>F</td>
<td>4.740</td>
<td>3.315</td>
<td>2.760</td>
<td>7.737</td>
<td>6.313</td>
<td>2.408</td>
</tr>
<tr>
<td>(0.004)</td>
<td>(0.023)</td>
<td>(0.046)</td>
<td>(0.000)</td>
<td>(0.001)</td>
<td>(0.071)</td>
<td></td>
</tr>
</tbody>
</table>

*p-values in brackets, ***p≤0.01, **p≤0.05, *p≤0.10


### Appendix A: Measures used for MACS Change

**Planning systems**
1. Budgeting
2. Operation planning (production)
3. Capital budgeting
4. Strategic planning
5. Other planning systems

**Controlling systems**
6. Individual or team-based performance measurement
7. Organizational performance measurement
8. Measurement of performance in terms of quality
9. Measurement of performance in terms of customer satisfaction
10. Other performance measures

**Costing systems**
11. Direct allocation of manufacturing overhead
12. Direct allocation of marketing costs
13. Direct allocation of other overhead
14. Internal (department or divisional) product transfers
15. Other costing systems;

**Directing systems**
16. Reward systems – bonuses
17. Reward systems – pay for performance plans
18. Other reward systems

**Decision-making systems**
19. Information reported more frequently
20. Use of more non-financial measures
21. Information reported more broadly
22. Other changes to reporting systems
23. Other changes to systems that do not appear on this list