THE EVOLUTION OF MANAGEMENT ACCOUNTING

Lokman Mia

The myth

I have come across the comment that accounting is ‘bean counting’ meaning that it is somewhat less important. Accounting should be considered as a guardian function keeping executives and others on track. As Peter Drucker so provocatively put it:

I remember when Mr Khrushchev was here twenty years ago, and there was a lot of talk about who was going to bury whom. Well, it is becoming quite clear that neither the communist nor the capitalist are going to bury the other, but that the accountants are going to bury the both of us if we are not effective (Peter Drucker, 1976, p. 14).

The importance of management accounting

Management accounting\(^1\) plays a pivotal role in organisations and the society. It is so important today that if the accountants wrapped up their systems and took them home, the whole process of producing society’s material goods and services along with the governance of the social order would grind to a standstill. Banks would close, factories would produce goods at random, supermarkets would be out of many products and overstocked on others, police would arrest and release the wrong people, and the military would not know which way to point their missiles (see also Macintosh, 1995). In this immense organism we call society, management accounting systems are its central nervous system.

\(^1\) Management accounting is defined here in a narrow sense as the “process of identification, measurement, accumulation, analysis, preparation, interpretation, and communication of information that assists executives in fulfilling organisational objectives. It is a formal mechanism for gathering and communicating data for the ends of aiding and coordinating collective decisions in light of the overall goals or objectives of an organisation” (Horngren and Sundem 1990, p.4).
Even in the early part of this century, management accounting systems were recognised as absolutely essential to the affairs of large corporations such as du Pont, and General Motors. As Alfred Sloan (1963), the chief executive officer of General Motors at that time put it in his memoirs:

> Financial method is so refined today that it may seem routine; yet this method – the financial model as some call it – by organising and presenting the significant facts about what is going on in and around a business, is one of the chief bases for strategic business decisions. At all times, and particularly in times of crisis, or of contraction or expansion from whatever cause, it is of the essence in the running of a business (1963, p. 118).

The globalisation of large corporations, along with newcomers and their counterparts in other capitalist countries, has made management accounting even more vital today. When operating a highly complex and multifaceted operation in over 150 countries around the globe, a common language is essential. That language, even more universal today than English, is accounting and finance.

Management accounting systems are the major means by which the few meganational enterprises virtually rule the world of the 1990s. Lowe (1992), for example, convincingly documents how twenty-five multinational corporations, which developed out of the reach of public control, have become the new centre of power of the world. Their combined financial resources – sales and assets – exceeds that of all but half a dozen or so nation states. The top executives of these meganationals run their vast empires with highly sophisticated management accounting systems. These goliaths could not exist without the systems (Macintosh, 1995).

**The evolution**

The crucial problems involved in designing and administering management accounting systems are no longer simply a matter of getting the technical aspects
right. Rather, the critical part is connecting the system in a valuable way with organisational participants (Macintosh, 1985). These participants (i.e., owners, managers, creditors, customers, suppliers and government) use the information provided by management accounting systems for their decision making. How strong the connection is between the systems and the organisational participants depends on the relevancy and usefulness of the information provided by the systems. Since the mid 20th century, academics and practitioners have been working on maintaining and enhancing the relevance and usefulness of management accounting information. They have been doing so by advancing management accounting theory and practice mainly in three streams: employee behaviour, organisation/environment, and technology. The advancements in the understanding of employee behaviour have resulted in the recognition of the need for consideration of factors affecting attributes of management accounting information. As accountants began to understand their organisations and operating environments more and more, they were motivated to inquire how the design and usefulness of a management accounting system is affected by the characteristics of their organisation and its operating environment. Similarly, the introduction of advanced technologies in the production of goods and services have brought about developments in management accounting theory and practice. Figure 1 presents a simplified view of these development streams (ds).

**Figure 1**

**The Evolution of Management Accounting**
Through the discussion below I have attempted to explain briefly how the recognition and advancements of organisational and behavioural theories and introduction of advanced manufacturing technology have influenced research into the design and usefulness of management accounting systems. The discussion concludes by speculating on the features of management accounting in the 21st century, and the role that management accountants then will be playing. Let me start the discussion with the developments in management accounting in recognition of employee behaviour in organisations.

**Employee behaviour and management accounting**

Recently the organisational behavioural ramifications of management accounting have come under the scrutiny of both practitioners and academics in this field. There is evidence to suggest that management accounting information within organisations often has unintended effects. One such effect is the less than enthusiastic acceptance of management accounting reports and statements by organisational participants such as managers (Macintosh, 1985). One of the earliest and probably the most important study that highlighted the behavioural implications of management accounting information is Argyris (1952). This study revealed that budgets, the dominant aspect of management accounting in an organisation, were viewed differently by different people within the organisation. The frontline supervisors and workers viewed budgets as the ‘eyes and ears’ of the organisation, a pressure device to continuously improve performance. For the senior managers in the organisation, budgets represented a tool for maintaining and enhancing authorities.

These observations led to speculations about the underlying behavioural dynamics of budgeting in particular, and management accounting in general. Workers in the organisation (Argyris’s study site) appeared to form cohesive groups to counteract and combat the pressure management exert through the arbitrary impositions of budgets.
This, in consequence, left the top management in a quandary. When the top management relaxed the pressure, the groups did not disintegrate. Rather unreal conditions were created and existing ones were exaggerated, so that the groups continued to ‘do battle’ with management. Yet if further pressure was then applied, the result was head-on ‘do or die’ battles. As a way out of this dilemma, the study recommended that supervisors genuinely participate in the budgeting process.

Argyris’s study triggered research on the behavioural implications of budgeting and management accounting over the last five decades. In the process, academics and practitioners have been able to recognise and appreciate the human aspects of accounting. Hopwood (1974), for example, concludes that management accounting is about people. The accountants always have to make working assumptions about the way in which people are motivated, and how they interpret and use the information.

Accounting academics realised that social and behavioural sciences, such as psychology and sociology, offered a way to explaining the relationship between accounting systems and human behaviour, or in other words, the human response to accounting systems and information. By systematically analysing the relationship between accounting information, human attitudes and decisions, the social and behavioural sciences allow us to focus our attention on the underlying conflicts and contradictions, which characterise many accounting problems.

As is illustrated in Figure 2, the management accounting information in an organisation both influences and is influenced by the employees’ individual attitudes and needs, the often subtle process of group pressures and controls, and the organisation’s structure and controls. In addition, as a social artefact, accounting is shaped by the prevailing pressures in the wider social and economic environment.

Much of accounting as we know it today reflects the economic rationale, but with the
changing social and political pressures we can expect the forms and philosophies of accounting to change. Increasing demands are now being made for sharing of accounting information with employees. We are also witnessing the emergence of a significant debate on the means of conducting and audit of the social and environmental impacts of today’s business enterprises (Bauer and Fenn, 1972).

Figure 2
The Human and Social Aspects of Management Accounting
(Adapted from Hopwood, 1974)

In the process of budgeting or planning, managers and employees try to achieve a greater degree of control over both organisational resources and their own rewards and earnings. Each party enters the situation with different needs, experiences and expectations, and these give personal meanings to the budgets: they are not neutral.
Accountants and other members of the management team must therefore see the budgeting process in its entirety and respond to it as a complex human and technical problem rather than one standing in technical isolation.

Managers are human: they cannot and do not divorce their own interest from that of the organisation they work for and therefore both personal and organisational factors enter into the decision process. Projects may be formulated and proposed in such a way as to increase a manager's interest. For example, potentially beneficial projects, quite acceptable within the bounds of the financial criteria in use, may be withheld if the benefits from the projects are unlikely to be recognised in the performance evaluations, which determine the rewards for managers.

The above suggests that behavioural and social aspects of accounting information are as important as the technical aspects. Since accounting systems operate in human organisations, serve human purposes and ultimately have behavioural objectives, their behavioural and social aspects should be considered as important as their technical aspects (Hopwood, 1974). When viewed in this context, accounting is about human behaviour, and its behavioural and social aspects are just as much an indispensable part of the whole as its more traditional technical aspects. Accordingly, in order to let accounting systems operate most effectively; accountants must understand human motivation, decision behaviour, and the factors, which influence the organisational and social climate. These factors collectively form the context in which the systems operate.

**Style of budgeting in organisations**

Budgets in an organisation may be set autocratically or democratically. In organisations where budgets are set autocratically top management unilaterally set the operating budget targets and then issues them to managers for implementation.
Alternatively, budgets can be set in a manner whereby the managers who are responsible for budget implementation can participate in the budgeting process. The idea of participative budgeting originates from the human relations school where it is believed that participation has great potential for curing many of our organisational problems. The school advocates the idea that a leader's (manager's) role is to create a climate that allows all members of an organisation to participate fully in the decision process. In turn, participating employees appreciate the responsibility entrusted to them, morale is high and motivation is increased. Participation implies a process that is democratic, and employee centred, in which sound human relations are given priority. Few managers would deny that such a working climate has greater value than an autocratic system, dominated by bureaucracy (Macintosh, 1985).

Because of the high potential benefits of the participative process of decision making, accounting researchers have devoted considerable efforts to understanding the effects of participative budgeting on employee behaviour. They have investigated the relationship between participative budgeting and employee behaviour using the insights gained from psychology, sociology, political science and organisation theory. Participative budgeting refers to the extent to which managers are allowed to participate in establishing budget targets to be used for evaluating and measuring their performance.

The researchers have investigated the relationship by incorporating in their studies variables such as employee attitude, personality characteristic, and motivation. Milani (1975) is an example of such studies (see Figure 3). Milani predicted that employees' participation in budgeting should positively influence their budgetary performance directly as well as indirectly through their attitude as they: become ego-involved with the budgets, internalise the established goals, feel personal responsibility for the budgets, better understand the task, and make a public commitment to the budgets.
Milani's results supported his prediction on the indirect relationship between employees' budgetary participation and their performance through their attitudes toward job and employer (company). However, the prediction on the direct relationship between budgetary participation and performance was not supported. Milani's failure to support the direct relationship led to a number of later studies in the area. Brownell (1981), for example, investigated the influence of personality characteristic on the expected relation between employees' participation in budgeting and their budgetary performance. The personality variable included in the study was locus of control defined as the degree to which individuals accept personal responsibility for what happens to them. On the locus of control dimension of personality, individuals are classified as 'externals' or 'internals'. Individuals who are 'externals' tend to perceive events, both good and bad, as unrelated to their own behaviour and thus beyond their control. Those individuals who are 'internals' do the opposite (Macintosh, 1985). Figure 4 illustrates Brownell's (1981) results.
When personality type and level of participation in budgeting were congruent as in cells 1 and 4, the budget related performance was high. By contrast, when these factors were incongruent, as in cells 2 and 3, the performance was low. Brownell’s (1981) results support the idea that employee’s personality characteristics and their participation in budgeting together (in an interactive manner) influence their budgetary performance.

**Figure 4**  
**Locus of Control, Participation and Performance**  
(Adapted from Brownell (1981))

<table>
<thead>
<tr>
<th>Locus of control</th>
<th>Internal</th>
<th>External</th>
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<tbody>
<tr>
<td>High participation</td>
<td>High performance</td>
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<td>Low participation</td>
<td>Low performance</td>
<td>High performance</td>
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Turning to yet another study, Mia (1988) took a contingency theory perspective in examining the role of employees’ attitude and motivation in the relationship between their budgetary participation and their performance. Following the theory of cognitive dissonance (Festinger, 1957), Mia argued that employees who have a more favourable (high) attitude or motivation develop a cognitive dissonance or psychological uneasiness if their performance is low (below expected level). To reduce this dissonance, they attempt to improve their performance. Participation in budgeting as a mechanism for information exchange (Hopwood, 1974) enables employees to obtain a clearer understanding of their jobs, thereby helping them to improve their performance. So, Mia predicted that employees having more favourable attitude or motivation would perform better when they have a high budgetary participation.
By contrast, employees who have a less favourable (low) attitude or motivation may not develop such a cognitive dissonance due to their low performance. Consequently, these employees are less likely to voluntarily attempt to improve their performance through budget participation. These employees may require close supervision and instruction for getting their job done. Following the argument, Mia predicted that employees with a low attitude or motivation may perform better under a low participation condition. As presented in Figure-5, the results supported Mia’s (1988) predictions.

**Figure 5**

*Attitude, Motivation, Participation and Performance (Adapted from Mia, 1988)*

<table>
<thead>
<tr>
<th>Budgetary Participation</th>
<th>Attitude Motivation</th>
<th>Budgetary Performance</th>
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<tr>
<td>High</td>
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Mia’s results demonstrate that the direct relationship between budgetary participation and performance (as predicted by Milani, 1975) is not universal; it is rather dependent on other factors. One of such factors identified by Mia (1988) is employees’ attitude or motivation as the study suggests that budgetary participation is positively associated with budgetary performance in the case of employees who have a more favourable attitude or motivation. In other words, there is an interaction between budgetary participation and attitude or motivation, which is positively associated with budgetary performance. Thus, Mia (1988) offers an explanation for Milani’s (1975) failure to support the direct relationship between budgetary participation and
performance. Milani (1975) did not consider the interaction.

Let me now move on to the second development stream, i.e., organisation/environment and management accounting.

**Organisation/environment and management accounting**

While recognising the role played by personal/psychological factors in the design of accounting systems and their impact on employee behaviour, accounting researchers also recognised that there are impersonal factors at work and the impact of these factors need to be understood. One way to do this is to follow the approach taken by organisational sociologists (Macintosh, 1985). Investigations of this nature focus on social interaction and decision making in organisations within the broad framework of impersonal forces such as uncertainty, interdependencies amongst organisational components, organisational structure, functional differentiation and market conditions. It is recognised that the environmental/contextual variables influence the design of organisations and thereby also influence the design and use of accounting systems. The milestone study by Burns and Stalker (1961) is an example of the recognition.

Burns and Stalker (1961) studied two groups of firms - one operated in relatively stable environments and the other in relatively unstable or more fluid environments. They observed that the firms that operated in relatively stable environments had tasks and problems divided into distinct slots, duties for each functions defined, authorities and responsibilities unambiguously allocated among managers, and top management coordinating the operation. Burns and Stalker labelled these organisations’ structure centralised and management system ‘mechanistic’. The other group of firms, which operated in relatively fluid environments, was found to have a different type of management system. Burns and Stalker observed that because of the fluid nature of
the operating environment, these firms could not precisely define problems and actions, nor could they be assigned to distinct functional departments. Performance of a particular task required knowledge of the goal and tasks of the entire organisation. So a manager’s methods, duties, and power arrangements had to be continually negotiated and redefined through frequent and interactive interaction with other managers in the organisation. Lateral, rather than vertical, relationships dominated, formal hierarchy was weak, and knowledge of the organisation rested with the entire, rather than just the top, management. Burns and Stalker called this type of organisations decentralised and management system organic.

Based on their observations, Burns and Stalker (1961) argued that the most essential part of a top manager’s job is to interpret correctly the nature of the environment, stable or fluid, in which the organisation operates. Only then the manager can decide on the appropriate management system. The conclusion that is drawn from Burns and Stalker (1961) is that there is no one best management system for all organisations. The study is especially important for accounting systems design and use, because Burns and Stalker also theorise about the appropriate type of accounting system for organisations following mechanistic or organic management systems. According to Burns and Stalker, environmental factors, which influence organisational design and management systems also, influence the design and use of the appropriate accounting systems. The design of the accounting system and the organisation of the accounting department in an organisation should be consistent with the organisation’s management system, mechanistic or organic. In a centralised organisation having a mechanistic management system, accounting system should be centralised and act as a vehicle of communicating unilateral (mostly top down) flow of information and instructions. By contrast, in decentralised organisations where the management system is organic, a horizontal flow of information is a feature. A great deal more participation (discussion) with the line managers is required at all levels and the decentralisation of responsibilities to accounting offices down the hierarchy is a
necessary aspect of a successful design in organic management situations. Accounting systems need to match both the operating environment and the internal organisational structure.

The sociological perspective has established that an organisation's accounting system is affected by environmental factors in each setting. This realisation set the stage for a number of studies in management accounting that adopted an organisational theory approach to understanding the design and use of management accounting systems across organisations (Macintosh, 1985). A sample of three of these studies is briefly discussed here.

Gordon and Narayanan (1984) studied the influence of the operating environment and structure of an organisation on its accounting system design and usefulness. Gordon and Narayanan, following previous literature, argued that environmental perceptions of key decision-makers are incorporated in organisational structures (Weick, 1969, Lawrence and Lorsch, 1967). They argue that mechanistic forms of organisational structure are associated with stable environments whereas organic forms of organisational structures tend to be prevalent in dynamic environments. They further argue that when key decision-makers perceive greater complexity in the environment, they seek additional information of an external, qualitative and pre-emptive nature for planning. Finally, they argue that in complex environments, the key decision-makers arrange their organisation along decentralised (organic) structures so that the organisation can effectively respond to the environment. To facilitate the response, they also design accounting systems to provide more external, qualitative, non-financial and pre-emptive (ex-ante) information for decision making. In summary, Gordon and Narayanan predicted that an increased level of environmental complexity would be associated with decentralised (organic) organisational structure and the usefulness of external, qualitative, non-financial and pre-emptive (ex-ante) information. They also predicted that decentralised structure would be associated with
the above-mentioned types of information. Figure 6 below illustrates Gordon and Narayanan's (1984) study.

**Figure 6**
Perceived Environmental Complexity, Organisation Structure and Management Accounting Systems
(adapted from Gordon and Narayanan, 1984)

In another study, Chenhal and Morris (1986) examined how managers' perception of environmental complexity (PEC) and organisational interdependence (OI) influence an organisation's structure (OS), and how these three factors together influence the usefulness of the organisation's accounting system in terms of a set of information characteristics. Organisational structure was viewed in terms of decentralisation, defined as the level of autonomy delegated to managers. The authors argued that decentralised structures provide managers with greater responsibility over planning and control activities and greater access to information not available to the corporate body. Perception of environmental complexity was defined in terms of lack of information on environmental factors, difficulties in assessing how the environment
may affect success or failure and difficulties in the identification of a cause-effect relationship. Finally, organisational interdependence was defined in terms of the exchange of outputs that takes place between segments within organisation’s sub-units.

Chenhall and Morris (1986) argued that the environmental factors, PEC and OI, influenced the extent to which an organisation’s structure would be decentralised. They also argued that the organisation would design its management accounting system (MAS) as such that it suits the structure and the environmental requirements. Figure 7 presents Chenhall and Morris’s (1986) study. The results supported the authors’ arguments.

**Figure 7**
The Impact of Structure, Environment, and Interdependence on the Perceived Usefulness of Management Accounting Systems
(Adapted from Chenhall and Morris, 1986)

As discussed above, Gordon and Narayanan (1984) and Chenhall and Morris (1986) investigated the impact of the contextual variable on the design and usefulness of management accounting systems in organisations. Intuitively, it is expected that a management accounting system which is properly designed to suit the contextual requirements of an organisation should promote effective managerial decision making, leading to an improvement in performance and employee job satisfaction. Mia (1993) tested the statement empirically, thus, extended Gordon and Narayanan’s
(1984) and Chenhall and Morris's (1986) model explaining the usefulness of MAS design to manager's use of the system for improvements in managerial performance and job satisfaction.

Mia (1993) argued that managers' perception of their work environment is a determinant of their use of the system for decision making. Following relevant previous literature (Mia, 1989; Ferris and Haskin, 1988; Leblebici and Salancik, 1981; Mensah, 1981; and Hopwood 1974), Mia (1993) argued that if a decision situation is more complex (uncertain), more information is needed to reduce the complexity. Thus, the more complex the environment is, the more information the managers are likely to use to allow them to make more accurate decisions leading to improved performance and job satisfaction. Figure 8 illustrates Mia's (1993) model. The results indicate that managers' perceived environmental complexity is positively associated with their management accounting information use which, in turn, is positively associated with their performance but not job satisfaction.

An implication of Mia's (1988) study is that the information provided by the MAS in an organisation should commensurate the level of environmental complexity perceived by the managers. Therefore, MAS in an organisation should be designed taking into consideration managers' perception of the operating environment.
Figure 8
Environmental Complexity, MAS information, Performance and Job Satisfaction
(adapted from Mia, 1993)

Use of Management Accounting Information

Environmental complexity

Performance and job satisfaction

Up to this point I have been discussing how employees' behaviour and the environmental/organisational factors have led to the research and development in management accounting since the 50s. However, introduction of advanced manufacturing technology has been an impetus of a more recent stream of management accounting research and development. I explain this below briefly.

Technological developments and management accounting

The recent automation revolution demands a dramatic change in today's management accounting and control reports. With the advent of robotic technologies, the traditional way of focusing on direct labour has been changing rapidly and is close to disappearing in modern organisations. Management accountants' focus has been shifting from inventory valuation for financial reporting to management information (Rayburn 1989). The fast pace of change which has effected manufacturing industries over the last three decades and whose effects continue to alter not just approaches to
production but also organisational structures, business strategies and managerial philosophies, has been viewed as a new industrial revolution (Bronwich and Bhimani, 1994). Ayres (1991, p.8) suggests:

“If the first industrial revolution was the substitution of steam power for human and animal muscles, the present revolution is the substitution of electronic sensors for human eyes and ears, and computers for human brains.”

Operational changes arising from technological advances are not limited to manufacturing process, but extend to post production back-up activities including services.

The impact of these changes has not gone unnoticed by management accountants (Spicer, 1992). Calls for revolutionary transformations in management accounting have emanated from many quarters, including academics, practitioners, and consultants, for at least a decade (Brimson, 1991; Kaplan, 1983; 1984; 1985; 1986a; 1988a; 1990; Johnson and Kaplan, 1987; Morrow, 1992).

The principal aim of applying the new technologies is to shorten production times by reducing set-up activities, which do not add value to the processing function. Other benefits which may accrue from such technologies include improved quality and reduced variability of output, decreased scrap and rework levels, substantial reductions in the number of direct labour workers required to achieve a desired output level and a significant overall productivity gains (McNair, Mosci and Norris, 1988). Because of these benefits, applications of the technologies have been widespread (as indicated in Table 1) and increasing.
Table 1
Population of Computerised Machines (New Technology) in USA, Japan, UK, FRG and France

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Computerised Machines</th>
</tr>
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<tbody>
<tr>
<td>USA</td>
<td>1989</td>
<td>222000+</td>
</tr>
<tr>
<td>Japan</td>
<td>1987</td>
<td>70000+</td>
</tr>
<tr>
<td>UK</td>
<td>1987</td>
<td>53000+</td>
</tr>
<tr>
<td>FRG</td>
<td>1985</td>
<td>50000+</td>
</tr>
<tr>
<td>France</td>
<td>1985</td>
<td>35000+</td>
</tr>
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Adapted from Tchijov (1992) and Tani (1992)

The application of new technologies is not, however, without challenge. For example, performing investment appraisals for the decision to acquire a computer operated machine can be problematic in that benefits such as decreases in direct labour costs, lead times, inventory levels and increases in quality, capacity and manufacturing flexibility are difficult to evaluate quantitatively. This and the problem of separating cash flows from different automated machines used together in the production process also make performance measurement a difficult exercise.

Undertaking cost control poses another challenge as the new technologies replace direct labour costs with depreciation and machine-related costs, which are not readily captured and controlled by conventional cost/management accounting systems. Moreover, delineation of controllable versus uncontrollable costs is not easy and may be impossible. For instance, cost tracing and performance evaluation can become complex where the manager making the decision to purchase an automatic device is not in charge of scheduling labour usage since labour cost savings assumed in the acquisition decision may not be realised if labour is not subsequently discharged or reallocated. In addition, the use of new technologies can make product costing increasingly arbitrary as the cost behaviour of machine operator wages is altered and
cannot be said to be categorically direct or indirect. Furthermore, overhead rates, if continued to be based on direct labour costs or hours, become volatile and distort product costs to the extent that product line profitability figures may mislead decision makers when judging the returns from individual product lines. Using machine hours to overcome the problem can be costly, requiring machine time monitoring, personnel retraining, and altered information collection practices.

Other management accounting issues, which must be confronted within a production environment using new technologies include volatility in cost behaviour patterns, which can be seen as variable in certain circumstances and fixed in others. Also, the focus on short-run costs as opposed to long-run costs affects new technologies specifically. Efficiency measures, for instance, which stress the short-run costs may take precedence over total productivity which views efficiency as one of many factors contributing to long-term performance.

The application of new technologies and the challenges involving cost management and performance evaluations (arising from the introduction of advanced technology) point to the fact that today’s managers cannot rely on traditional MAS which provide mainly internal, financial, quantitative and historical information. They need to use a system that provides a comprehensive set of performance indicators, and incorporates internal and external, financial and non-financial, as well as historical (ex-post) and pre-emptive (ex-ante) information.

Accounting academics have started investigating the extent to which organisations that are applying the advanced technology have made changes to their MAS to meet their managers’ changed information needs. Hoque, Mia and Alam (1998) is an example of such attempts. The study empirically examines the associations between a set of changes in MAS and the adoption of multiple indicators of performance (known as balanced scorecards for performance-measure (BSP)), market competition, and the
application of advanced manufacturing technology (AMT). Changes in MAS in a firm was conceptualized in terms of the firm's shift in emphasis on (a) project-based costing, (b) actual cost of products and services, (c) non-financial information along with financial information, (d) activity-based costing, and (e) quality cost management. The concept of balanced scorecards focuses on both financial and operational indicators of performance, including profitability, customer satisfaction, product development and benchmarking. Market competition for a firm was defined as strife in terms of price, product variety and quality, distribution channel, number of competitors and its relative position in the market (Khandwalla, 1977; Gordon and Naryanan, 1984; Merchant, 1984; Libby and Waterhouse, 1996; Hoque and Hopper, 1997). AMT in the study represents the application of CAD (computer assisted design) and CAM (computer assisted manufacturing). CAD is a computerised design system that generates benefits like improved productivity and integrated design and production (Primrose, Creamer and Leonard, 1985; Astebro, 1992). CAM is a computerised manufacturing technology that plans, implements and monitors the manufacture of a product. In the main, CAD and CAM systems blend mechanical and computer technology to facilitate the design and manufacture of products. Figure 9 presents the model of the study.
Following the relevant literature, the authors predicted that competition in the market and the application of AMT are two of the important factors that influence the change in traditional MAS both directly as well as indirectly through the adoption of BSP. The gist of the arguments supporting the prediction is that competition and AMT environments demand much more comprehensive and accurate costs and performance information on an organisation's activities, processes, products, services and outcomes (see Kaplan (1995)). Since traditional MAS are inadequate to meet the information needs in enterprises operating in such environments, the MAS in these organisations are likely to change (Johnson and Kaplan, 1987; Young and Selto, 1991; Brinker, 1997).

The results of the study provide a strong (significant) support for the predicted associations between the change in MAS and competition, and the application of AMT. The results also provide strong support for the associations between adoption of BSP and competition, and the application of AMT. However, only a weak support was found for the association between the application of AMT and the change in
MAS. The results support the overall thrust of the study that organisations that introduce advanced manufacturing technology are likely to also introduce changes to their MAS so that their managers are provided with necessary information for decision making.

**Just-in-time systems**

Many organisations applying AMT also introduce a just-in-time (JIT) system. Under a JIT system, goods in one stage of the production-sales cycle are completed just prior to being needed at the next stage; it focuses on the minimization of activities or use of resources which do not add value to products (Gordon, 1997).

The relevant literature suggests that organisations will continue to adopt JIT as it presents an enormous opportunity for improving their competitive position Johansson (1990). Kaplan and Atkinson (1989) argue that successful adopters of JIT enjoy a tremendous advantage resulting from direct and indirect financial savings. An example of the financial savings that result directly from JIT is the decrease in investment required to hold inventory. When inventory levels are reduced from, say, four months to one month of sales, financing costs are reduced by 75%. Application of JIT also promotes indirect financial gains through cost savings from improved product quality, reduced wastage, better coordination and closer relationships with suppliers and customers (Cobb, 1993). By fostering closer relationships with suppliers, JIT minimises inventory of raw materials. Similarly, by creating high task interdependencies among work stations and encouraging closer relationships with customers, JIT minimises slack resources such as inventory of work in progress (parts) and finished products. The result is reduced product costs. Selto et al., (1995, p. 666) argue that because of the highly interdependent nature of tasks under JIT, production of excess parts or finished products is virtually nil or negligible (see also Balakrishnan et al., 1996).
As implementation of JIT minimises slack resources\(^2\), managers operating in JIT environments do not have a buffer against the difficulties caused by defective raw materials, production errors, irregular supply and demand schedules, and consequently they are unable to mask inefficiencies (Daniel and Reitsperger, 1991, Gordon, 1997). Selto et al. (1995) argue that tasks in JIT environments are highly interdependent; each succeeding task depends on quality and timely completion of the preceding task. The high task interdependencies require managers to detect and correct process problems and product defects on the spot and take measures to prevent such problems and defects to keep production flowing. In other words, JIT environments require that managers be able to manage themselves, which means they have greater authority and responsibility compared to their counterpart in non-JIT environments. The relatively high authority and responsibility for managers working in JIT environments make the information provided by MAS more useful for managers to operate effectively (Gordon and Narayanan, 1984; Chenhall and Morris, 1986).

Managers working in JIT environments have a greater need for the management accounting information as continuous monitoring of actual performance is required for the operation of the production process under such environment (Kaplan and Atkinson 1989). The greater need for information has prompted Japanese manufacturing companies to modify their management accounting systems to meet the additional information requirements in JIT environments (see Hiromoto 1988; Daniel and Reitsperger 1992).

In contrast, the traditional manufacturing system allows use of slack resources to offset unforeseen contingencies. For example, if a production process stops

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\(^2\) Slack resources may be defined in terms of overstated resource requirements (Schiff and Lewin, 1970; Young, 1985). For this study, slack resources represent an amount in excess of the amount required for efficient operation. For example, if an organization can operate effectively by maintaining stocks equivalent to two weeks’ sales of a product but maintains three weeks’ stock, then the one week’s extra stock represents the amount of slack resources.
unexpectedly, customer orders under the traditional manufacturing system could still be supplied as the system allows holding a certain quantity of finished product inventory. However, since JIT minimises availability of resources like inventory of finished product, supplying customer orders under the system would be difficult if the production process stops unexpectedly. Therefore, the provision of the information related to the production process and performance under the traditional manufacturing system is less critical than under JIT (see Daniel and Reitsperger 1991; Hayes and Garvin, 1982).

The above discussion suggests that timely and adequate provision of the MAS information is more critical for the effective operation of a production process in a JIT adopter organisation than in a non-adopter organisation. Therefore, it is argued that high (low) provision of the MAS information would be associated with high (low) profit in JIT adopter organisations. Mia (1998) empirically tested the prediction. The study was conducted in 28 JIT adopter and 27 non-adopter organisations. The results presented in Figure 11 reveal that increasing provision of the MAS information is associated with increasing profitability (ROI) in the case of the JIT adopter organisations, but not in the case of the JIT non adopter organisations. Thus, Mia’s (1998) study suggests that it is worthwhile for JIT adopter organisations to invest in upgrading (improving) their MAS to provide the required information to managers.
What the future holds

As a result of the continuing development and application of technology, the year 2000 and beyond will experience increasing flexibility in both manufacturing and service industries. Management accountants may find the future more rewarding, as they will become increasingly involved in managing their companies. The future management accountants will be business partners as they become increasingly involved in shaping the direction and scope of their companies and they will be dynamic and flexible to help their organisations succeed.
The above prediction places a special responsibility on those of us who are involved in educating future accountants. Our future graduates will require in-depth understanding of accounting concepts, proficiency in the use of computer and ability in communication. Accounting will continue to be the language of business well into the next century, and accountants must have broad-based education and training so that they can become the analyzer, interpreter, and communicator of the language. They must be the people who can manage costs and lead multidisciplinary teams in planning for the future. As Flegm (1996, p. 44) says:

"Tomorrow's accountants must be educated to build on their numeric strengths by adding the skills of the generalist and the team player."

We have the responsibility to educate our future accountants accordingly. In teaching management accounting, we must attach increasing emphasis on the managerial aspects of the discipline. Now we have the opportunity to anticipate the future needs of those who employ our graduates, and so perpetuate our success. Our responses must appeal to the employers and also to the students facing a widening field of choice. We have done an excellent job in teaching our graduates in the past as indicated by their employment rate and also by enrolments in accounting subjects at universities and colleges. There is no reason why we should not be doing even better in the future.
References


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