



SYSTEM DYNAMICS APPROACH AS A TOOL OF STRATEGIC COST MANAGEMENT

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Abstract

The lack of traditional cost accounting systems in meeting the information needs of managers was caused to emergence of first cost management and then strategic cost management. Strategic Cost Management (SCM) also known as Strategic Management Accounting (SMA) uses the cost information in order to formulate and communicate strategies. Also it develops controls that monitor the succes at achieving strategic goals. System dynamics approach can be used as a tool of strategic cost management because of its system perspespective and giving opportunity to design politics that enhance business performance. The aim of the study is to introduce system dynamics approach to accounting world and make a start up.

Key Words: Strategic Cost Management, Strategic Management Accounting, System Dynamics Approach

1. INTRODUCTION

Most textbooks of management accounting define the discipline in terms of its decision making role. It is generally stated that since managerial functions involve using information for better planning and control, therefore, management accounting is very important for effective and successful management at all levels. (Shah at al. 2011, p. 1)

In the 1950s, the focus in the USA and UK began to shift towards 'managerial accounting'. Three seminal US textbooks by Anthony (1960), Horngren (1962), and Shillinglaw (1959) led the change in emphasis towards decision analysis in Fİelds such as marketing (pricing), operations (make vs. buy), Wnance (capital budgeting), and organizational behaviour (responsibility accounting). The rise of 'MBA education' at that same time gave legitimacy in our universities to the idea that accounting should be a key part of the

education of business managers. Accounting fitted well as the source of the information that was the 'grist' for the 'mill' of 'M4' (mathematical manipulation masquerading as management!). MBA programmes were already full of 'optimization' and 'simulation' and 'regression' and 'analysis of variance', all drawing heavily on accounting information. Management accounting had almost completely replaced cost accounting in graduate management education by the mid-1960s.(Shank 2007, p. 355-356) One of the earliest surveys of practice was commissioned by the National Association of Accountants (NAA) in the USA. In this study, they found a wide range of traditional management accounting practices in place, such as job costing and process costing, but little evidence of "advanced" accounting practice, even though advanced manufacturing technologies were widely adopted. There was a high level of dissatisfaction with the cost data by preparers, who did not find it useful for decisions.Two other surveys published in the few years after





the NAA study revealed similar results. Enmore and Ness (1991) studied cost management practices in mid-western US manufacturing companies and found the high implementation of advanced manufacturing technologies was not accompanied by changes in the cost accounting systems and nor were most companies planning to make changes. (Langfield 2008, p.216-217)

This situation leads most of the business managers to think strategically and hence to change their organization structures, production environments, production methods and sense of their rules. Intensifying competition usually necessitates low costs, high quality, more goods and service variations that factors such as customer satisfaction features accounting which comes up not only as a recording scheme in business management in term of business but also becomes an appliance that leads and sheds light to future plans and strategies or rather sensitive to the forwarding management necessities which might occur. Thus business managers have internationalized to focus on cost accounting to benefit as a management tool. (Yüzbaşıoğlu 2004, p. 388)

While management accounting has a discipline focused perspective strategic management accounting has a strategy focused perspective. The functional disciplines would be integrated much more closely. Problems would come to be seen as 'business' problems, rather than 'marketing' problems, 'manufacturing' problems, or 'logistics' problems. (Shank 2007, p.356)

Strategic management accounting is the applications of preparation, making available and analysis of cost accounting data intended for management related with business strategies. It could be seen that term of Strategic Cost Management (SCM) is also used instead of Strategic Management Accounting (SMA) in literature. (Yüzbaşıoğlu 2004, p. 395)

Johnson and Kaplan, identify three main limitations in their seminal book. One, MA information was acquired from the existing financial accounting information systems. As a result the focus generally remained on annual periodical targets and internal accounting systems thus failing in providing accurate and holistic information that mirrors the technology, products, and complexity of the operational processes on the one hand and on the other hand failing in integrating these for operating in a highly competitive environment. Second, its aggregated form renders it less useful for a manager who wants information to be customised according to the specific managerial needs. Third, the window dressing applied by financial accountants to make it look good to the external users makes it less reliable for managerial decision making. (Shah at al. 2011, p. 2)

Broomwich defines SMA as the provision and analysis of financial information on the firm's product markets and competitors' costs and cost structures and the monitoring of the enterprise's strategies and those of its competitors in these markets over a number of periods. (Roslender 2003, p. 257)

While SMA is a term used by accounting academics and sometimes practitioners in the UK, Australia and New Zealand, in the USA the term strategic cost management (SCM) is more commonly used in the literature. A range of techniques have been included under the umbrella of SMA, and some commentators define SMA in terms of its techniques. These include target costing, life-cycle costing, strategic cost analysis, competitor cost analysis, activity-based costing, activity-based management (sometimes called activity-based cost management), attribute costing, life cycle costing and strategic performance measurement systems. (Langfield 2008, p. 206)

Term of SMA utters a system, managing the costs effectively, acting with taking care of external environment of the business and environment factors of non-business cost leading by reaching low costs or cost analysing





which includes competitiveness with product differentiation strategies by launching superior products to the market and taking business activities into consideration when counting product costs and performing distributions with respect to the activities with the assist of business measurements. (Yüzbaşıoğlu 2004, p. 401)

The purpose of strategic cost management is on the one hand to strengthen business` strategic position on the other hand to reduce the costs. Traditional cost management systems are only aimed to use to determine one product unit cost or total cost. However in this calculating non-manufacturing costs consist of suppliers and customers are counted effectively. In strategic cost management system, the costs originated from suppliers and customers are taken into consideration beside production cost. In order to manage the costs strategically, are distributed with respect to the consisting reason. (Sağmanlı 2002, p. 130)

2. FROM TRADITIONAL COST ACCOUNTING TO STRATEGIC COST MANAGEMENT

In traditional cost accounting to calculate only cost of produced goods is the principal. The costs which are materialized apart from the goods cost is included in the total cost. In fact this case is different in strategic cost management. The costs such as customer and supplier costs which are excluded from the goods` cost enter into strategic cost management. In strategic cost management, costs are allocated with respect to their occurrence differ from traditional cost management. In strategic cost management it is essential to pay attention not only cost of raw material which is bought but only its quality, reliability and supplement performance. On the other hand the costs which are caused by customer have to be added to goods` cost. Therefore sales representatives focus on customers which cause less cost. All these, on the one hand reduce costs and on the other

hand contribute to strengthen strategic position of the business. (Sağmanlı 2002, p. 131)

The existing discipline of MA was developed after the Second World War and soon it became so popular that it emerged as a standard course in all business schools. Many accounting scholars, however, started expressing their dissatisfaction with the new discipline and criticized its inability to deliver what it had promised. In a seminal article, Johnson and Kaplan (1987) criticized that MA systems had lost relevance as they were inadequate for the modern accounting environment, and that they were not useful in the process of control, product costing and evaluation of managers` performance amid mounting information processing capabilities. They very succinctly summarized the inadequacy of MA to cope with the demands of modern management by stating that the information generated by MA was: "Too late, too aggregated and too distorted to be relevant for managers` planning and control decisions". (Shah at al. 2011, p. 2)

Criticisims about traditional cost and management accounting are as follows (Taşçı 2004, p. 14);

1. They are not in the position of meeting management`s needs.
2. They can`t reflect the production process exactly.
3. Their performance measurements are bad.
4. The information provided by them is not detailed enough.
5. They can`t measure the resource (material, labor, capital) consumption exactly or are not realistic in allocating resource costs.
6. They are too late in providing information.
7. The information provided by them is not reliable.
8. They encourage overstocks.
9. They allocate the costs unrealistically.
10. They can`t provide the information for production planning and programming.

SCM defends that costs emerge not only from one cost factor but also from lots of factors those interact each other. In case in



traditional cost accounting, costs only relates with production volume. According to SCM, this thought of traditional approach is inadequate to understand manners of cost. (Şakrak 1997, p. 111)

Traditional cost systems are limited to the walls of the factory and are used to determine only the cost of products. Other potential cost objects such as suppliers and customers are ignored and the costs associated with them are treated either as general overhead and arbitrarily allocated to products or as period costs and assigned directly to the income statement. The problem is that non-manufacturing costs cannot be managed effectively because the underlying reasons for their occurrence are masked by the way they are treated by the firm's cost system. To enable these costs to be managed strategically, they must be assigned causally to cost objects other than products. In traditional cost systems, procurement costs are allocated to products arbitrarily, typically using a percentage of material cost. Without proper assignment of procurement costs, purchasing managers typically select suppliers based on the purchase price of their products. This pattern leads to suboptimal buying behaviors that weaken a firm's strategic position. Strategic cost management resolves the conflict by taking a broader view of component costs and by assigning procurement costs to products causally. (Cooper 2003, p. 25-27)

The strategic decision-making process can influence the procedures of management accounting and the design of management control systems to aid control strategy can also have a positive impact on the performance of management accounting. (Dixon 1998, p. 273)

Strategy writers have been complaining that the accounting discipline had failed to make use of strategic management. For instance Porter (1985) and Hergert and Morris (1989) argue that the cost analysis based data of accounting systems inhibit instead of helping strategic level analysis. In order to address such concerns authors of management

accounting have been advocating the use of analytical tools which were developed in the fields of strategy and marketing. (Shah at al. 2011, p. 3)

The differences between Management Accounting and Strategic Management Accounting can be presented as in Table 1. (Shah at al. 2011, p. 3)

Cost management became a vital capability for most entities in today's hard competition environment. Only focusing on decreasing the costs is not sufficient for entities in achieving their goals. Strategic management of costs has become crucial. (Cooper 1998, p. 14)

Traditional MA	Strategic MA
Historical	Prospective
Single entity	Relative
Introspective	Out-ward looking
Manufacturing focus	Competitive focus
Existing activities	Possibilities
Reactive	Proactive
Programmed	Un-programmed
Data orientation	Information oriented
Based on existing systems	Unconstrained by existing systems
Built on conventions	Ignores conventions

Table 1. Comparison of Traditional and Strategic Management Accounting

3. STRATEGIC COST MANAGEMENT and ITS ELEMENTS

Simmonds defines SMA as the provision and analysis of management accounting data about a business and its competition for the use in developing and monitoring the business strategy, particularly relating levels and trends in real costs and prices, volume, market share, cash flow and the proportion demanded of a firm's total resources. (Dixon 1998, p. 273)

Anderson (2007) argues that SCM has been a success because it has permeated the research



and teaching of virtually all management disciplines. She sees the future challenge is for management accounting researchers to engage with other disciplines and to integrate what has been learned from other disciplines with management accounting theory. She also indicates, there is a lot of “strategic” management accounting happening in organizations, but not always with the leadership or the involvement of the accounting function. (Langfield 2008, p. 221-222)

When we look at accounting’s role in relation to strategy, Broomwich’s approach to SMA exhorts the firm and its management accountants to look beyond the firm itself and its cost structures to competitor firms and customer demand, not only in the immediate environment but, in principal, including all potential competitors and potential customers over the long-term decision horizon. The immediate “traditional” battle to fight to control costs internally must, of course, not be lost sight of, but managements’ and their accountants’ eyes must also be scanning the wider horizons, present and future, and collecting and processing information in a number of firms. (Macve et al. 2006, p. 166-167)

SCM presents non-financial information financial information in the company of for business in decision making process. Competitions on a global scale in order to increase competition strength of the business, non-financial measurements become more of an issue. SCM produce strategies to improve competitive power of the business permanently with its competitors in strategic position of the business. In the light of these statements, SCM can be stated as total efforts of planning, organising, managing, coordinating and inspecting cost management system to produce cost information required by business` mission, aim and strategies. (Erden 2004, p. 255)

SMA enables an organisation to be more aware of its environment, to put more effort into anticipating changes and to be adaptable in

the face of change. The concept of strategic management accounting has to be developed by both practitioners and academics. With greater interaction between the two groups, SMA can be developed beyond its current state and the concept may achieve more widespread application and help in organisations to enhance their competitive advantages in intensely competitive markets. (Dixon 1998, p. 279) The concept of SMA requires management accounting to focus on performance measurement using strategic rather than tactical indicators. (Dixon 1998, p. 273)

SMA techniques have not been adopted widely, nor is the term SMA widely understood or used. However, aspects of SMA have had an impact, influencing the thinking and language of business, and the way in which we undertake various business processes. (Langfield 2008, p. 204)

3.1. The Elements Of Strategic Cost Management

Cost management can be defined as a philosophy in the aim of getting more value by decreasing costs. Cost management giving chance of creating higher value with lower costs also emphasizes the managers efficient roles as well. As a result of this opinion managers have an important effect in topics such as decreasing costs and increasing quality of products and services. Cost management is the whole formed by different reliable techniques. The techniques that service entities in realising the activities and achieving the goals as a whole can be called as cost management system. (Hilton et al. 2000, p. 8)

The increasing importance of the strategic matters in business management caused cost management to change its role from traditional costing and control to a broader strategic focus –strategic cost management. (Blocher et al. 2005, p. 7)



The emergence of SCM results from a blending of three underlying themes that are each taken from the strategic management literature. These are (Shank 1989, p. 50);

- Value Chain Analysis,
- Strategic Positioning Analysis,
- Cost Drivers Analysis.

3.1.1. Value Chain Analysis

Value chain includes whole of activities that create value from suppliers to final consumers. This analysis regards the business as a part of whole which is consisted of value creative activities chain. The business can create value when it both enhance its activities continuously and strengthen relations with other entities in the value chain. Traditional management accounting starts cost analysis from suppliers and stops it in the step of service/product sale. This traditional perspective decreases the use of relations established with suppliers and consumers. (Şakrak 1997, p. 105)

3.1.2. Strategic Positioning Analysis

Generally an business may choose one of two strategies as competitive power: cost leadership and product diversification. Determining the strategic position by choosing one of the strategies is important in that cost management analyses provide the required information for top management. Strategic cost management on the one hand enhance the business' strategic position on the other hand it struggles to decrease the costs continuously. (Gersil 2006, p. 35)

3.1.3. Cost Driver Analysis

The third basic element of strategic cost management is cost driver analysis. Understanding cost behaviour means to understand the cost drivers' effecting each other reciprocally and complexly. In traditional perspective, cost is the function of just one cost driver's (output level). However in in strategic

cost management output level is considered as a driver that can't represent the richness of the cost structure. (Yalçın 2006, p. 29)

3.2. Strategic Cost Management Application Process

Strategic cost management has five steps that are connected with each other logically. The success of the method requires to follow these steps carefully (Hosking 1993, p. 51);

1) Understanding the causes of cost and business' income structure. The knowledge of the causes inables to change the cost structure.

2) Understanding and solving the complexity between functions. This step is important for allocation of the costs between the functions.

3) Establishing a common language and sharing responsibility. Thus the business gets the management methods of cost causes.

4) Increasing the efficiency. The first three steps represent the photo of business profitability elements. The fourth step includes redefining of cost structure in order to choose the costs that will cause profit for the business.

5) Measuring the competitors' cost structures. This proves efficient and effective measures for entities. Also the step helps to determine whether the cost structure of the business provides competition advantage or not.

4. A NEW WINDOW FOR STRATEGIC COST MANAGEMENT: SYSTEM DYNAMICS

The more cost and management accounting systems provide accurate and timely information for management the more they are useful. Especially the costs determined by the cost accounting system lead for most management decisions. But managers can get



historical information from the traditional cost accounting system. However strategic management thought aims to produce dynamic cost information which will illuminate the future decision making process. (Şakrak 1997, p. 81)

According to various authors SMA has bridged the gap that existed between strategic management and MA. It is suggested that SMA can help MA moved away from simply monetary concerns and closer to multi-dimensional business matters. Analysts view with great favour that SMA focuses on financial information of a business' product markets and competitors' cost structures and the monitoring of the enterprise's strategies and those of its competitors in these markets over a number of periods. This leads to a greater emphasis on the information related to the external factors of the business including internally generated and non-financial information (Inman, 1999). Another promising feature of SMA is that performance measurement is not based on profit related measures but strategic tools such as BSC are utilized for strategic performance management purpose. (Shah et al. 2011, p. 5)

The term "strategic" in SMA incorporates a longer term outlook, as well as a broader emphasis than the greater part of management accounting. (Roslender 2003, p. 256) Strategic cost management is more than a passive extension of cost management outside the factory walls. The firms must actively work together to find ways to reduce costs. The buyer-supplier interface can be made more efficient through modifications to the behavior of the suppliers, the customers, and of the firm itself. (Cooper 2003, p. 27-28) In SCM it is acknowledged that cost is caused, or driven, by many factors that are interrelated in complex ways. Understanding cost behavior means understanding the complex interplay of the set of "cost drivers" at work in any given situation. (Shank 1989, p. 55)

The properties of Strategic Cost Management are as follows (Erden 2004, p. 230):

- First of all strategic management is a function of top management,
- It is prudential and in relation with long range goals,
- It defines the entities as open systems,
- It regards business as a system (made of particles)
- It handles the goals of business and social interest in coherence,
- It leads junior administrative officers,
- It is related to allocation of business' resources effectively,
- Since it is related to business's efficiency and performance as a whole, its information sources and data are wide range.

When the properties mentioned above are analysed carefully it is understood that Strategic Cost Management handles the business in a system perspective and focuses on long range goals. Then the successful management of costs and business as a whole, strictly depends on defining the behaviors of business' both environment (as a system) and its sub-elements, and also making the proper policies.

4.1. System and System Perspective

It becomes increasingly difficult for managers to identify dependencies between decisions they make and how consequences in turn may affect even a total different department within the firm for example. This means to acknowledge that feedbacks are part of all systems (department, company, market) we belong to and implies that our own actions will probably affect us later probably in a way we did not intend. (Bradl 2003, p. 3)

Dynamic management problems in real life are typically feedback problems: we take managerial actions, observe the results, evaluate them and take new actions, yielding new results, observations, further actions, and so on, which constitutes a "feedback loop." Feedback loops exist not only between the managerial action and the system, but also in





between the various elements within the system. That is, most dynamic management problems are also “systemic” in nature. (Barlas p. 1133)

When we face a management problem we tend to assume that some external event caused it. With a systems approach, we take an alternative viewpoint—namely that the internal structure of the system is often more important than external events in generating the problem. For example, if a new product is not selling (the event that is a problem), then you may conclude that this is because the sales force is not pushing it (the event that is the cause of the problem). However, you can then ask why the sales force is not pushing it (another problem!). You might then conclude that this is because they are overworked (the cause of your new problem). But you can then look for the cause of this condition. You can continue this process almost forever, and thus it is difficult to determine what to do to improve performance. If you shift from this event orientation to focusing on the internal system structure, you improve your possibility of improving business performance. This is because system structure is often the underlying source of the difficulty. Unless you correct system structure deficiencies, it is likely that the problem will resurface, or be replaced by an even more difficult problem. (<http://www.public.asu.edu/~kirkwood/sysdyn/SDIntro/ch-1.pdf>) Accessed 13.07.2012 (p. 2-3)

The “structure” of a system can be defined as “the totality of the relationships that exist between system variables.” (Barlas p. 1134) The aim of the system approach is to examine the behavior of systems and make decisions by defining the strategies that will arrange the behavior. (Söyler 2006, p. 4) It seems obvious that successful management of a company requires different tools and methodologies than some years ago. Since half-life of knowledge decreases, timely access to necessary information becomes increasingly more important in order to have required information

(regarding the own area of business) available at all times. (Bradl 2003, p. 2-3)

4.2. System Dynamics

In the early 1960s it was recognized that control systems viewpoint could be very powerful if applied to business firms. The new approach emerged by using control systems in areas like urban planning, socio-economic scenarios and modeling them is called the system Dynamics method. In other words System Dynamics can be interpreted as the branch of management science which deals with the Dynamics and controllability of managed systems. (Coyle 1996, p. 1-3) The main purpose of system dynamics methodology is to understand the causes of undesirable dynamics and design new policies to eliminate them. Managerial understanding, action and control are at the heart of the method. System Dynamics thus focuses on dynamic problems of systemic, feedback nature. (Barlas p. 1133)

System Dynamics approach aims to design proper policies by analysing the behavior of the system rather than predicting the values. System Dynamics has the ability to state the relations which constitutes the system by pictures, diagrams and simple mathematical methods. So, whenever governors and managers, economists, population experts and others face to problems, they can evaluate the results and apply in their fields by system dynamics approach. (Söyler 2006, p. 3-4) Combi boiler is the typical example of the system dynamics. It is opened and set for a definite temperature. The combi produces heat until the desired level. When the room or house reach the arranged temperature it stops. When the temperature decreases under the desired level it again starts to work and the temperature rises. Dynamic systems approach argues that most important events occur as a result of some accumulations (often hidden) reaching threshold levels over time. (Barlas p. 1139)



4.2.1. The Usage Areas of System Dynamics

The fundamental purpose of system dynamics is to achieve comparable quality of design, and hence performance, in managed systems. (Coyle 1996, p. 4) System Dynamics is an approach that should help to solve important problems on top management level. (Bradl 2003, p. 2)

The first application area of the methodology was the strategic management of industrial problems. In late 1970s, applications have expanded to a very wide spectrum, including national economic modeling, supply chains, project management, educational problems, energy systems, sustainable development, politics, psychology, medical sciences, health care, and many other areas. (Barlas p. 1132) System Dynamics has been applied to issues ranging from corporate strategy to the Dynamics of diabetes, from the cold war arms race between the US and USSR to the combat between HIV and the human immune system. (Sterman 2000, p. 41)

System Dynamics concentrates on the policies and dynamic behaviour of the system in question, which are the strategic concerns of the top managers. This relation can be stated as in Table 2. (Coyle 1996, p. 15)

System Dynamics is a method to enhance learning in complex systems. It helps us learning about dynamic complexity, understanding the sources of policy resistance, and design more effective policies. (Sterman 2000, p. 4)

SD Charecteristics	Top Management Concerns
System viewpoint	Whole company
Feedback analysis	Consequences of actions

Dynamic modeling	Concern with future Testing of Ideas
Optimisation	Robustness against uncertainty
Transparency of Influence Diagram Simple simulation technique	Understanding, input and control
Fast simulation	Study periods

Table 2. SD Charecteristics and Top Management Concerns

4.2.2. The Elements Of System Dynamics

System Dynamics deals with the time-dependent behaviour of managed systems with the aim of describing the system and understanding, through qualitative and quantitative models, how information feedback governs its behaviour, and designing robust information feedback structures and control policies through simulation and optimization. (Coyle 1996, p. 10) The purpose of a system dynamics study is to understand the causes of a dynamic problem, and then search for policies that alleviate/eliminate them. This specific purpose necessitates the adoption of a particular philosophy of modeling, analysis and design. This philosophy can be called “systemic feedback” philosophy (or approach or thinking or perspective). The main principles of the philosophy can be summarized as follows (Barlas p. 1136);

a) Importance of causal relations (as opposed to mere correlations).

The purpose of a system Dynamics study (“understanding and improving the dynamics”) is very different from short-term prediction (forecasting) of future values of variables. The very purpose of system dynamics study requires that the model consist of causal relations, not mere statistical correlations. It is possible to generate excellent short-term

forecasts by non-causal correlational models, but impossible to understand and control dynamic problems.

b) Importance of circular causality (feedback causation) over time.

Identification of one-way causal relations described above is only the first step in dynamic feedback model conceptualization. The next crucial phase is the identification of dynamic, circular causalities (feedback loops) over time. One-way causality is in a sense “static” causality at a point (or small interval) in time.

c) Dynamic behavior pattern orientation (rather than event-orientation).

It is crucial to reiterate that the purpose of a system dynamics study is to understand the causes of a dynamic problem, and search for policies that alleviate/eliminate them.

d) Internal structure as the main cause of dynamic behavior (Endogenous perspective).

The structure of a system was already defined as “the totality of the relationships that exist between system variables.” One way of representing the structure of a system is diagramming the causal links and (especially) loops that exist between the variables. As stated above, the interaction of the feedback loops in a system is the main engine of change for the system. That is why it is said: “the structure causes the behavior of the system.”

This principle is critical in a system dynamics study, because the purpose is to understand the causes of an undesirable behavior and try to improve it.

e) Systems Perspective.

For the system Dynamics methodology to be applicable to a problem, the dynamics of the variables must be closely associated with the operation of the internal structure of a system. But what if the dynamics in the real problem are dictated by external variables? There are

two possibilities: Rarely, it may be indeed true that by its very nature, the real system may be too vulnerable to external influences. We already mentioned such an example: If a multinational grocery chain opens a super-store next to a small grocery store, which in turn causes an unavoidable decline in small store sales, this would not be a systemic feedback problem. There is not much “management” the small grocery store owner can do in order to influence the policies of the multinational chain, economies of scale, regulations, and so on. Such extreme cases are simply “illchosen” system dynamics problems and there is not much the methodology can do.

4.2.3. The Tools of System Thinking

According to the system Dynamics approach all dynamic behaviors are formed of stocks and flows. Stocks are the accumulations that represents the current position of the system. Stocks change slowly. However flows are the elements cause change in the system. In terms of accounting balance sheet elements represent stocks and cash flows, income statement elements represent flows. (Sterman 2000, p. 198) After a variable in the system changes, this cause an effect on the same variable. It is called as “feedback”. The circle way from the variable to itself is called “feedback loop”. If an increase in a variable sooner causes an increase in the same variable this means there is a positive feedback loop. If the increase sooner causes a decrease in the same variable then there is a negative feedback loop.

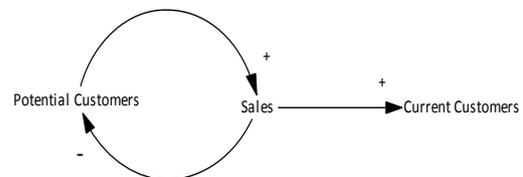


Figure 1. Causal Loop Diagram

System Dynamics approach uses two diagrams –“Causal Loop Diagram” and “Stock-Flow Diagram”-in order to represent the behavior of the system. Causal Loop Diagram shows the cause-effect relations between the variables. Similarly Stock-Flow Diagram shows the relations between the variables that have the potential of change by time. The example may help us to understand these diagrams. As soon as the sales of business increase the number of the current customers increase and the number of potential customers decrease. The variables in the stock-flow diagram are potential customers, sales and current customers. Different from causal loop diagram, stock-flow diagram classifies variables as “stock” and “flow”. “Potential Customers” and “Current Customers” in rectangles are stocks and “Sales” shown as a valve on the pipe is flow. The diagram states that there is a flow from Potential Customers to Current Customers and it is controlled by Sales valve. The basic way to understand whether a variable is stock or flow is to stop the time and check the variables. When the time stopped variables that have values other than zero are stocks and zero values are flows. (<http://www.public.asu.edu/~kirkwood/sysdyn/SDintro/ch-2.pdf> Accessed 13.07.2012 p.16)

that the relation between these variables is positive (if the potential customers increase, sales increase), the (-) in front of the arrow from “Sales” to “Potential Customers” states that if the sales increase, potential customers decrease.

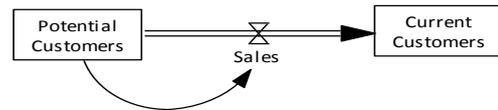


Figure 2. Stock-Flow Diagram

Figure 3 summarizes the constitution of costs and profit briefly. In model if orders increase then direct raw materials and supplies costs, direct labour costs and factory overheads increase. And this increase in production costs cause an increase in finished products in stocks. When products are shipped both sales revenue and cost of goods sold increase. The profit is the difference of sales revenue and cost of goods sold. The more the business increases profits the more advertisement costs increase. At the end advertisement causes an increase in orders (feedback loop). Since the aim is to show the basic principles of the approach equations of variables are not mentioned here.

In the diagram, the (+) in front of the arrow from “Potential Customers” to “Sales” states

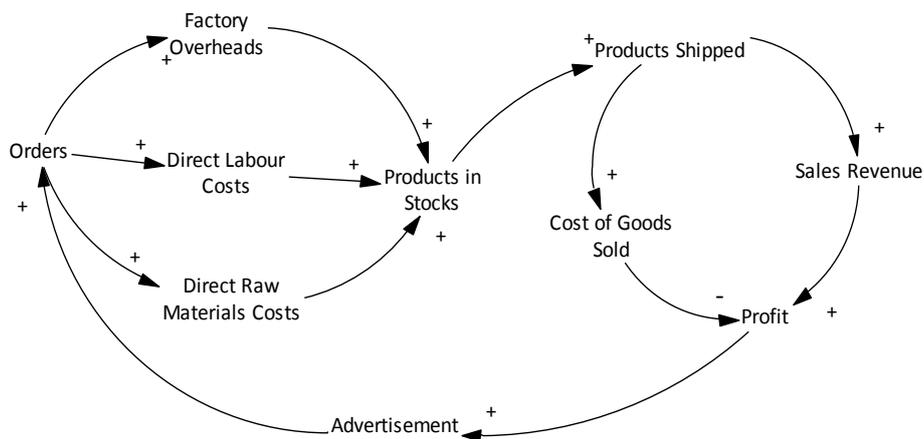


Figure 3. Basic Production Firm Model



5. CONCLUSION

The lack of traditional cost accounting systems in meeting the information needs of managers was caused to emergence of first cost management and then strategic cost management. Strategic Cost Management is the common roof of techniques as target costing, product life cycle costing, strategic cost analysis, activity based costing which managerial accountants use in strategic decisions. In other words strategic cost accounting is the sum of business' efforts to sustain its strategic position by controlling the costs in long range.

Since Strategic Cost Management is interested in business' long range goals and defines business as a system, System Dynamics approach can be used as an instrument in SCM. Further by the approach decision makers will be able to evaluate non financial data that enhance the performance of business and different scenarios which may constitute due to environment conditions.

System Dynamics approach not only determines the cost behavior structures based on the causality and without necessity of fixed-variable classification in traditional management accounting, it presents the relationship between variables simply and effectively by causal loop and stock-flow diagrams as well. It will be possible to monitor the possible changes and behavior manner in different scenarios by system dynamic models. In this way managers will achieve the information used in strategic decisions before activities will occur and in the light of this information, will produce proper policies for realising the goals of entities.

This study is just a start up and there is long way for management accountants to walk. The approach can be used in many management accounting's topics as budgeting, profit planning and cost volume profit analysis.

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