

Top Management Control Functions for Information Systems in Small and Medium Enterprises

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This paper analyzes the Top Management Control functions for Information Systems (IS) in Small and Medium Enterprises (SMEs). SMEs extensively rely on information technology resources to enhance their competence in today's global economy. They should have adequate top management control mechanisms in place for their efficient functioning. Top Management Controls determine how effectively the senior management manages the IS functions in a SME. The major tasks at this level consist of Planning, Organizing, Leading and Controlling functions. A brief introduction to SMEs is given at the beginning followed by the different categories of Top Management Controls. The final section highlights on some good practices to be followed by Top Management to realize the vision for the IS project in SMEs.

Keywords: Charge-Out, Information Systems, IS Plan, Small and Medium Enterprise, Top Management Controls, Zero Based Budgeting

1 Introduction

An enterprise is an entity engaged in an economic activity. Enterprises can be classified as Micro, Small, and Medium and large based on *labor employed*, *capital turnover* and *balance sheet* [5]. Small and Medium Enterprises (SMEs) play a vital role in the world economy. They contribute to the provision of new jobs and sustaining employment growth rates. They also participate effectively in creating stable economic structure, since their activities are extended to all major sectors.

According to European Commission's definition, small enterprises have 10-49 employees whereas medium enterprises with 50-250 employees [5]. The SMEs in the modern business environment extensively make use of Computer-based Information Systems and Information Technology Resources in their day-to-day operations.

An Information System [3] uses people, hardware, software, data and network resources to perform input, processing, output, storage and control activities that transform data resources into information products. People resources include information systems specialists and users.

Hardware resources include machines and media used in information processing. Software resources include programs and procedures for people to follow. The data resources can be typically product descriptions, customer records & student databases and are encoded in ASCII (American Standard Code for Information Interchange), image, video, audio and other forms of data. The information products can take a variety of forms, including reports, visual displays, multimedia documents, electronic messages, graphic images and audio responses.

Top Management Controls determine how effectively the senior management manages the IS (Information System) functions in a SME. The major tasks at this level consist of Planning, Organizing, Leading and Controlling functions. The present work focuses on *top management control* functions for *information systems* in small and medium enterprises to ensure their reliable functioning.

2 Objectives and Motivation

The present work is intended to meet the following objectives:

- Examine the various categories of Top Management Controls in planning, organizing, leading and controlling functions;
- *Specify some good practices to be followed by Top Management to realize the vision for the IS project in SMEs.*

SMEs extensively rely on information technology resources to enhance their competence in today's global economy. There exists a strong requirement to exercise adequate Top Management Controls to achieve *the goals that have been established for the IS project in SMEs*. The present work is motivated by the increasing importance of Top Management Controls for Information Systems in SMEs.

3 Problem Description

The present work analyzes the key functions of Top Management Controls in SMEs. The SMEs considered in this paper have been drawn from selected *computer firms, access control and security companies, manufacturing segment, consultancy organizations, trading and construction companies* in India and United Arab Emirates.

4 Related Work

The two popular methodologies for organizational planning used in business today include Scenario Approach & Planning for Competitive Advantage. In the Scenario Approach [3] to strategic IS Planning, teams of business and IS managers create and evaluate a variety of business scenarios. They make assumptions on what a business will be like in the next three to five years and the role that IT (Information Technology) can play in the future scenarios. Alternative scenarios are created by the teams, based on combining a variety of developments, trends and environmental factors such as political, social, business and technological changes that might occur. This will help greatly in business / IS planning.

Planning for Competitive Advantage [3] is important in today's competitive business scenario and complex IT environment. The

business / IS planning in this approach involves an evaluation of the potential benefits and risks a company faces when using IT based strategies and technologies for competitive advantage.

The present day computers form part of a vast computer network in a wider area. Organizations are required to closely monitor the hardware and software configuration of all systems regularly and this is possible only by means of adequate audit and control processes [8]. The successful deployment of Information Systems creates value for the organization. The control processes should be deployed in *acquisition, implementation, operation and upgrade* of IS [4].

ISACA (Information Systems Audit & Control Association) and ITGI (Information Technology Governance Institute) have proposed an Audit-Oriented set of guidelines named COBIT (Control Objectives for Information and related Technology) for IT processes, practices and controls [1], [2]. It acts as a good checklist for IT. The main limitations of COBIT are that it does not deal directly with *software development or IT services*.

The present work focuses on the key functions of Top Management Controls in SMEs. The controls can be applied at planning, organizing, leading and controlling functions.

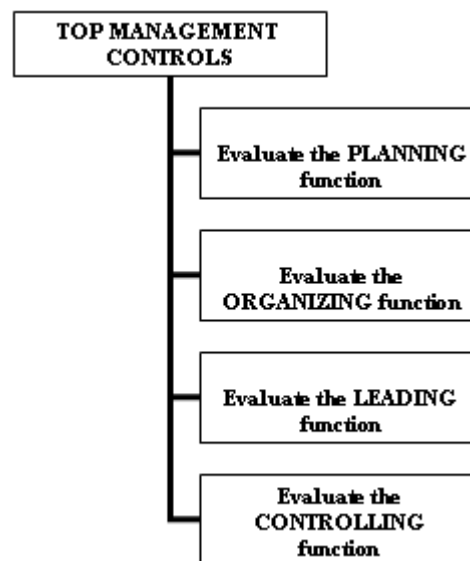


Fig. 1. Categories of Top Management Controls

5 Top Management Controls

Top Management Controls determine how effectively the senior management manages the IS functions in a SME. The major tasks at this level consist of Planning, Organizing, Leading and Controlling functions.

Figure 1 shows the various categories of Controls relating to top management. A steering committee comprising of IS auditor, senior IS personnel and senior users can be formed to take overall responsibility for the

activities of the IS function in SMEs.

5.1 Evaluate the Planning Function

The *planning* function determines the goals of IS functions and the means of achieving these goals. The steering committee can refer the IS plan (strategic & operational) while discharging its responsibilities. The controls for the planning function are shown in table 1.

Table 1. Controls for the Planning function

Type of Control	Description	Activities
1. Evaluation of IS Strategic Plan [6]. (long term plan covering the next 3 to 5 years of operations)	Assess Current IS.	Evaluate the present computer systems configuration, IS personnel hierarchy, SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis on IS.
	Assess Strategic Directions.	Identify the services proposed for future IS and overall strategies for <i>intra</i> and <i>inter</i> organizational IS.
	Assess Development Strategy.	Examine the vision statement for IS and future requirements for the following entities: application systems, databases, computer systems configuration, IT personnel and financial resources. Evaluate the approach to monitoring the implementation of the development strategy.
2. Evaluation of IS Operational Plan [6]. (short term plan covering the next 1 to 3 years of operations)	Progress Report.	Assess the extent to which the current plan initiatives are achieved and missed, major hardware/software platform changes and additional initiatives embarked upon.
	Initiatives to be taken up.	Identify the scope for new application systems, adaptation to new technologies for computer systems and plan for personnel & financial resources.
	Implementation Schedule.	Examine the proposed start and finish dates for each IS project, milestones and project control procedures to be followed.
3. Assess the level of implementation of IS.	Infusion [7].	Examine the extent to which IS is integrated into day-to-day operations in SME.
	Diffusion [7].	Examine the extent to which IS has been dispersed throughout the SME.

5.2 Evaluate the Organizing Function

The *Organizing* function involves gathering, allocating and coordinating resources needed to accomplish the goals in an organization. This will involve establishment of controls over *acquisition, development & termination* of staff.

An IS auditor should examine the organizational structure for the IS personnel and ensure the following:

- Responsibilities of each job position must be clear.
- The jobs performed within IS function should preserve separation of duties.

Figure 2 shows the organizational structure of IS department proposed for a typical SME. Table 2 lists the job responsibilities of IS

personnel.

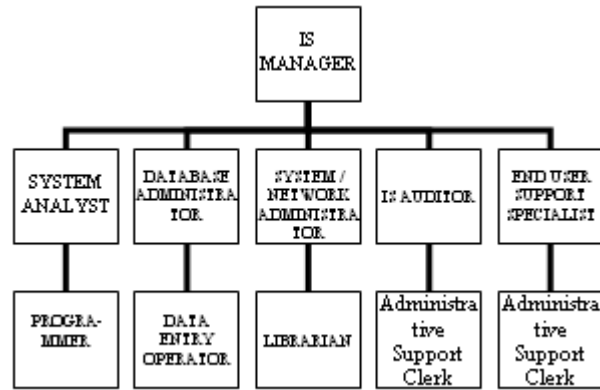


Fig. 2. Organizational Structure of IS department proposed for a typical SME

Table 2. Job responsibilities of IS personnel

Job Title	Position Description
IS Manager	Overall in-charge of IS activities. Manages IS functions related to purchase, development, operations and maintenance.
System Analyst	Analysis and Design tasks for new and existing applications.
Database Administrator	Creation, Maintenance and Granting Access Control of corporate databases.
System / Network Administrator	Manages users, devices and local area network and internet. Implements physical and logical security for IS assets.
IS Auditor	Regular Audit pertaining to system activities and periodic checking of control & security mechanisms in IS.
End User Support Specialist	Advises end-users on analysis, design and implementation of systems. Impart user training & provide support for end-user tools.
Programmer	Develops, tests, debugs, documents and maintains programs for user applications.
Data Entry Operator	Entry, verification, validation and updating of data in a database.
Librarian	Maintains a library of computer storage media, user and technical documents, books & magazines related to IS.
Administrative Support Clerk	Acquires consumables needed by IS function, maintains and operates transfer pricing system, manages user queries, arranges and distribute reports and works on accounting software.

The controls for the *organizing* function are shown in Table 3.

Table 3. Controls for the Organizing function

Organizing Function	Control Activity
Acquisition of Staff.	Checking of Resumes, References, Skill Sets and Educational Qualifications.
	Screening applicants for physical & mental health.
	Orientation on IS policies and procedures.
	Determine the job requirements as per IS plan.
Personnel Development.	Conduct staff reviews on regular basis covering the following aspects: <ol style="list-style-type: none"> 1) Promotion Policy. 2) Employee’s self-development (sponsoring the employee for higher education and short-term courses / seminars / conferences in IS related topics. 3) IS personnel’s strengths and weaknesses.
Personnel Termination. (voluntary or involuntary)	<ol style="list-style-type: none"> 1. Identify the reasons/problems for leaving and take corrective measures, if required. 2. Recover Keys and ID badges. 3. Close down Login & Password. 4. Modify Distribution List. 5. Check for return of all reports, books and documents by employee. 6. Check for return of equipments. 7. Arrange for handing over of the assigned IS tasks to replacement employee. 8. In the case of disgruntled employees, do not assign critical tasks and arrange for early relieving.

5.3 Evaluate the Leading Function

Leading is a complex management function designed to influence the behavior of an individual or group. The process of leading requires managers to motivate subordinates, direct them and communicate with them. An IS auditor should evaluate how well top management performs the leading function by examining the following factors:

- Staff turnover statistics.
 - Check if the projects related application systems meet their budget.
 - Absenteeism levels in complex projects.
- IS auditor can perform the following actions:
- Assess IS plan;
 - Go through documented standards, policies, minutes of meetings & memoranda distributed to IS staff;
 - Conduct interviews with IS staff about their level of satisfaction with the ways top management communicate their messages;

- Assess the cooperation and general awareness of IS among the project group members.

5.4 Evaluate the Controlling Function

The controlling function involves the act of determining the deviation between actual and planned activities of the IS function. An IS auditor should assess the strategic & operational plans and see evidence that the IS function has resulted in operational efficiency in SMEs. When new information technologies are introduced into an organization, managers can apply moderate controls to foster innovation and diffusion of the technologies. When the technologies have matured, greater control can be enforced.

IS auditor should examine the IS policies and standards followed in a SME. The IS policies specify the following general guidelines for behavior:

- The nature of work that can be undertaken by IS team.
 - The type of computer hardware and software that can be purchased to ensure compatibility among systems.
- The IS standards enforce specific guidelines for behavior and are shown in table 4.

Table 4. IS standards for a typical SME

Type of Standard	Description
Methods	Establish practices and procedures to govern Analysis, Design, Programming, Testing & Implementation activities of IS.
Performance	Expect reasonably good response time for online applications and the expected time for testing the application programs.
Documentation	Documentation for software development and user operations.
Project-Control	Specify the major checkpoints at which reviews and sign-offs must be undertaken and the variance-monitoring procedures to be adopted.
Post-Audit	Makeup of the review team and its activities & the form of the final report that must be prepared.

IS auditor can evaluate the top management's choice of the means of control over the users of IS services. This includes mechanisms such as *zero-based budgeting* [6] and *charge-out* [6] scheme.

Zero-based budgeting refers to the identification of users requests for IS services and assigning priorities to users requests. The first step here is to reduce all IS activities to a zero base. Next, all IS activities are identified and structured into sequentially dependent incremental service levels. For each service level, estimates must be made of the *expected benefits* and *resource consumption*. The review committee assigns the priorities for IS activities at each service level. Cumulative resource consumption can then be calculated. Depending on the funding available for IS services, the activities are chosen in the order of their priorities, at each service level.

The charge-out is based on number of *transactions processed / number of report pages generated* for each user, availing the IS service.

6 Good Practices

This section deals with some of the good practices that the top management can follow in realizing the vision for the IS project in SMEs:

- Define the purposes of IS project, what it intends to solve / improve.

- Build up a strong management team with leadership skill and commitment to IS plan.
- Provide training for management team and staff in IS related skills.
- Establish good communication with the staff on IS Plan.
- Get external help from Consultants in some specialized areas. This will help in improving specific business issues and also offering existing staff a chance to learn during the process.
- Focus on avenues for financial assistance (govt. agencies, SME banking sector, hardware & software vendors) to implement IS project.
- Consider the option of a cost-effective ERP (Enterprise Resource Planning) System, specifically designed for SMEs. ERP software suite [9] typically includes integrated modules of manufacturing, distribution, sales, accounting and human resource applications.

7 Conclusion

The demand for IT services in SMEs is increasing every year. IT vendors, business financiers and telecom service providers all see considerable opportunities in this sector. The present work analyzes the different categories of top management controls as applicable to SMEs. It can be inferred that

top management control functions enable effective functioning of SMEs, as observed during field visits to selected SMEs in India and United Arab Emirates. The present work can be extended further to analyze *controls* relating to *system development management, programming and data resource management, security management and operations management.*

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