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*All communication should be addressed to the Executive Editor, 4A Journal
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Accounting Information Systems of Mobile Telecommunication Companies in Bangladesh: An Evaluation

Taposh Kumar Neogy

Ph. D Fellow, Department of Accounting and Information Systems (AIS), Rajshahi University, Bangladesh

ABSTRACT

Accounting Information Systems are considered as an important subsystem by all organizations for supporting their business operations. Accounting Information Systems are necessary for collecting, recording, maintaining, processing and communicating relevant information to interested users so that they can use the information for effective decision making. At present Accounting Information Systems bear significance because of the fact that they provide historical accounting information and help management in evaluating the past operations, in controlling the present operations and in deciding the future operations of any business organization. The aim of Accounting Information Systems of the selected mobile telecommunication companies is to produce information which helps take decisions of all level of management and making logical choice among alternatives about a business entity. The importance of Accounting Information Systems is increasing day by day and it is used widely in every business organization. This study examines the existing Accounting Information Systems of the selected mobile telecommunication companies and found that the Accounting Information Systems of the selected mobile telecommunication companies is well organized. The selected companies give emphasis on quality of accounting information produced by Accounting Information Systems through various statements. This paper recommends that the internal control system should be effective; the existing Accounting Information Systems should be upgraded through effective use of information technology. The system should be more users friendly and more security measures and control measures should be installed.

Keyword: AIS, Telecommunication, Bangladesh.

INTRODUCTION

Accounting Information Systems are more useful information systems in business. AIS are helping today's businesses meet competitive challenges. AIS are need with financial transactions, that is, transactions that are measured in terms of money. The AIS use a highly structured framework that includes several subsystems and usually utilizes double entry accounting. AIS are the system of records, a business keeps to maintain its accounting system that includes the purchase, sales, and others financial process of the business.

Accounting Information Systems is a subsystem of the MIS that collects and process financial data and data about transactions. AIS are often the largest subsystem of the MIS and in many organizations may be the only formal information systems (Paul John Steinbart, 1994). AIS are mainly consisted of two parts such as Financial Accounting Information Systems and Managerial Accounting Information Systems. The scope of AIS in an organization must comply with Generally Accepted Accounting Principles (GAAP) especially for external users. To produce a complete set of financial statements intended for parties external to the organization GAAP. This part of AIS is called FAIS as its objective is to provide past transactions in financial statements in accordance with GAAP. Usually the need and range of processing information by AIS is broader than that required by GAAP. The necessary information for internal users is more capital forecast information and useful for preparing budget planning for future on making new strategy for competitive success. AIS produces information with the primary intention of using within the organization constitutes MAIS. AIS can be defined as a sum total of two overlapping circles. The left circle points at AIS which provides information for external reporting based on GAAP, where the right one produces information for internal reporting using accounting method prepared by management of AIS. In fact, to collect various financial data, to process them and to help to prepare financial statement and to perform various activities of management, there is no alternative of Accounting Information Systems. Accounting Information Systems combine the study and practice of accounting with the design, implementation and monitoring of information systems. AIS has to monitor the monetary dimension of economic activity in an organization by processing data according to requirements and delivering precise information that is useful to those who plan and manage the organizations activities and also to interested outsiders (Summers 1989). Accounting Information Systems is vital to all organizations and perhaps, every organization either profit or non profit-oriented need to maintain the AIS and indicate an integrated framework within an entity that employs physical resources to transform economic data into financial information for conducting the firms operations and activities and providing information concerning the entity to a variety of interested users (Sori 2009). An information system is an organized means of collecting, entering, and processing data and storing, managing, controlling, and reporting information so that an organization can achieve its objectives and goals. AIS are an information system that is designed to make the accomplishment of accounting function possible. AIS processes data and transaction to provide users with the information they need to plan, control, and operate their business (Romney et al. 1997). Accounting information generated from AIS can be effective in decision-making process, purchase; installation and usage of such a system are beneficial when the benefits exceed its costs. Effectiveness of AIS can be analyzed on three bases such as information scope, timeliness and aggregation. Information scope is considered as financial and non-financial information, internal and external information that is useful in prediction of future events. Timeliness quality is related to the ability of AIS to satisfy information needs by providing systematic reports to the user. Aggregation of information is considered as means of collecting and summarizing information within a given time period (Sajady et. al. 2008).

OBJECTIVES OF THE STUDY

The main objective of the study is to know the existing Accounting Information Systems of the selected mobile telecommunication companies in Bangladesh and the specific objectives of the study are as follows:

- To know the degree of compliance with IAS/BAS and IFRS/BFRS for preparing the financial statement of the selected companies

- To know the existing Accounting Information Systems and internal control systems of the selected companies
- To know the adequacy of accounting information produced by AIS of the selected companies
- To know the usefulness of accounting information for decision making produced by AIS of the selected companies
- To know the relevance the accounting information produced by Accounting Information Systems of the selected companies
- To provide suggestions for increasing the effectiveness of existing AIS of the selected companies

JUSTIFICATION OF THE STUDY

Telecommunication is one of the most dynamic service industries in Bangladesh and also one of the largest sources of revenue for the government. Economic development depends on some basic elements and telecommunication is one of them. The role of telecommunication in stimulating economic growth and improving the standard of living is beyond description. The importance of telecommunication sector for the development of economy need not be exaggerated. Telecommunication plays a great role in business and commerce by facilitating the exchange of pertinent information. If information is not available then business executives can not take proper decision. So, abundance of telecommunication companies is a must for the development of business and commerce. The contribution of telecommunication sector to economic development is very significant. At present time mobile phone sector is one of the major contributors of economic development of Bangladesh because development of telecommunication sector is an essential prerequisite for the growth and development of Bangladesh. So, information of mobile phone sector is very much essential for the economy of our country. To provide relevant information to the users in time the mobile phone sector is equipped with Accounting Information Systems. This study an attempt has been made to examine the Accounting Information Systems of the Mobile Telecommunication Companies in Bangladesh. The study will be helpful to the customers, traders, businessmen, competitors, suppliers, users, vendors, and decision-makers, policy-makers of the government, shareholders, researcher and others.

Hypotheses of the Study

Researcher has developed the following hypotheses:

- H₀₁: There is no significant difference of opinion among the respondents regarding the degree of compliance with IAS/BAS and IFRS/BFRS for preparing the financial statement of the selected companies
- H₀₂: There is no significant difference of opinion among the respondents regarding the adequacy of accounting information produced by Accounting Information Systems of the selected companies
- H₀₃: There is no significant difference of opinion among the respondents regarding the usefulness of accounting information produced by Accounting Information Systems of the selected companies
- H₀₄: There is no significant difference of opinion among the respondents regarding the relevance of accounting information produced by Accounting Information Systems of the selected companies.

Methodology of the Study

Research methodology is a way to systematically solve the research problem. A scientific approach to the research methodology is very much essential to evaluate the research problem systematically. The aim of research methodology is to set up the foundation of the statistical analysis. There are six mobile telecommunication companies in Bangladesh and researcher has selected two mobile telecommunication companies for the research study such as Grameenphone Ltd. (here in Company # 1) and Teletalk Bangladesh Limited (here in Company # 2). This study is based on the primary and secondary data and the review of information collected through secondary sources. Secondary data are collected from the various sources like published books, journals, reports, research works, bulletin board and internet of the selected companies. Primary data have collected from the related respondents through structured questionnaire. Researcher has selected 100 respondents such as 25 Chartered Accountants (CA), 25 Cost and Management Accountants (CMA) 25 Teachers in Accounting (T in A) and 25 Security Consultants (SC). Research has used chi-square test and ANOVA test for analyzing the collected data and test of hypotheses. The chi-square test is an important test amongst the several tests of significance developed by statisticians. The symbol of Chi-square is χ^2 . Chi-square test is based on chi-square distribution and is used for comparing a selected variance to a theoretical population variance.

$$\chi^2 = \sum \frac{(f_0 - f_e)^2}{f_e}$$

Where, χ^2 = Chi-square (Chi is a Greek letter)

f_0 = Observed Frequency

f_e = Expected Frequency

Calculation of Expected Frequency is as follows:

$$f_e = \frac{RT \times CT}{n}$$

f_e = Expected Frequency in a given cell

RT = Row total for the row containing that cell

CT = Column total for the column containing that cell

n = Total number of observations

Findings of the Study

Accounting standards are essential for preparation and presentation of financial statements because it ensure that the quality of reporting systems worldwide. The overall purpose of accounting standards is to identify proper accounting practices for the preparation of financial statements. Accounting standards create a common understanding between users and preparers on how particular items. Financial statements should therefore comply with all applicable accounting standards. The role of accounting standards is therefore to translate high-level principles into reasoned procedures that an entity can apply in practice. Accounting standards may be based either on what is commonly referred to as the rules-based approach or the principles-based approach. A rules-based approach is exactly as its

name suggests detailed rules on a subject. The rules are developed to cover every possible eventuality. The standard setters as a result are forced to issue more rules to plug the loophole, and so no. A principle-based approach involves explaining the general principles that an accounting standard is based on and then providing practical guidance and explanation on how an entity might meet those principles. While containing many detailed rules, IFRS are set on a principles-based approach (IFRS, ICA, England and Wales). The selected companies follow various accounting standards. For preparation and presentation of financial statement Bangladesh Accounting Standards (BAS) and International Accounting Standards (IAS) 1, 2, and 7 have been followed respectively. For accounting policies and revenue recognition Bangladesh Accounting Standards (BAS) and International Accounting Standards (IAS) 8, and 18 are followed respectively. For interim financial reporting and intangible assets Bangladesh Accounting Standards (BAS) and International Accounting Standards (IAS) 34 and 38 are followed respectively. For income tax purpose, Bangladesh Accounting Standards (BAS) and International Accounting Standards (IAS) 12 are followed. For Lease transactions Bangladesh Accounting Standards (BAS) and International Accounting Standards (IAS) 17 are followed and for foreign exchange transactions Bangladesh Accounting Standards (BAS) and International Accounting Standards (IAS) 21 are followed. Researcher made an opinion survey of the respondents regarding the degree on compliance with IAS/ BAS & IFRS/BFRS for preparation and presentation of the financial statement of the selected companies. In order to see whether there is any significant difference of opinion among the respondents regarding the degree of compliance with IAS/ BAS& IFRS/BFRS for preparing the financial statement of the selected companies. For this purpose researcher developed a null hypothesis and conducted χ^2 test to test the null hypothesis.

H_{01} There is no significant difference of opinion among the respondents regarding the degree of compliance with IAS/ BAS & IFRS/BFRS for preparing the financial statement of the selected companies.

Table # 1: Opinions of the respondents regarding the degree on compliance with IAS/BAS & IFRS/BFRS for preparing the financial statement of the selected companies

	Respondents Groups								χ^2	SL
	CA		CMA		T in A		Total			
Types of Opinions	No.	%	No.	%	No.	%	No.	%	11.731	0.068
Greatly Comply	10	40.00	07	28.00	03	12.00	20	26.67		
Moderately Comply	14	56.00	18	72.00	17	68.00	49	65.33		
Slightly Comply	00	00	00	00	02	8.00	02	2.67		
Neutral	01	4.00	00	00	03	12.00	04	5.33		
Not Comply	00	00	00	00	00	00	00	00		
Total	25	100	25	100	25	100	75	100		

(Source: Opinion Survey Reports)

Table # 1 shows that 26.67% of the respondents opined that the selected companies are greatly comply with IAS/BAS & IFRS/BFRS for preparing the financial statement, 65.33% of the respondents thought that the selected companies are moderately comply with IAS/BAS & IFRS/BFRS for preparing the financial statement, 2.67% of the respondents mentioned that the selected companies are slightly comply with IAS/BAS & IFRS/BFRS for preparing the financial statement, 5.33% of the respondents were neutral and none of the respondents opined that the selected companies are not comply with IAS/BAS & IFRS/BFRS for preparing the financial statement. The majority respondents opined that the selected companies are moderately comply with IAS/BAS & IFRS/BFRS for preparing the financial

statements. But the opinions of the company executives are that company # 1 is greatly complying and company # 2 is greatly complying for preparing the financial statement. In order to see whether there is any significant difference between the opinions of the respondents' regarding the degree of compliance with BAS/IAS & BFRS/IFRS for preparing the financial statement of the selected companies and conducted χ^2 test using SPSS 7.5. Researcher observes that the value of χ^2 is 11.731 which is significant at 0.068 levels. So, the null hypothesis is accepted which means that there is no significant difference of opinion among the respondents regarding the degree of compliance with BAS/IAS & BFRS/IFRS for preparing the financial statement of the selected companies. In order to find out the difference between groups and within groups researcher has conducted ANOVA test.

Table # 1.A: Table showing the results of ANOVA test regarding the degree on compliance with IAS/BAS & IFRS/BFRS for preparing the financial statement the selected companies

	Sum of Squares	df	Mean Square	F Ratios	Sig. Level
Between Groups	4.187	2	2.093	4.640	0.013
Within Groups	32.48	72	0.451		
Total	36.667	74			

(Source: *Opinion Survey Reports*)

The above table shows that there is significant different of opinions on the degree of compliance with IAS/BAS & IFRS/BFRS for preparing the financial statement of the selected mobile telecommunication companies among the different respondents groups.

The Accounting Information Systems of the selected companies is fully computerized and use accounting software for recording of their transactions. Accounting policies are followed based on Generally Accepted Accounting Principles (GAAP). The selected companies follow Going Concern and Historical Cost for preparing the financial statement. The selected companies follow Bangladesh Accounting Standards (BAS) and International Accounting Standards (IAS) for preparation and presentation of financial statements. They prepare financial statements like income statement, balance sheet, cash flow statement, owners' equity statement and others statement as desired by management. The selected companies prepare financial statement on a consistent basis and management use these statements for various decisions making. The selected companies use giving number for codifying accounts and use audit trail for linking transaction processing and prove accuracy of posted amounts by preparing trial balance, using audit trial and rechecking. The selected companies use group coding system, mnemonic coding system and. on-line processing systems. The objectives of data management of the selected companies are capturing and storing relevant data, occupying smallest possible space for storing data, up-dating files timely and makings it accessible to uses, satisfying a variety of information needs, safeguarding from loss or unauthorized access and economy. The selected companies use parity check, read after write check, dual read check and validity check in computer system and use the total system approach for system development for performing the various activities. Company # 1 maintains separate AIS department but company # 2 does not maintain separate AIS department and the selected companies maintain master file, transaction file, reference file and history file for recording various business activities and use AIS for various purpose such as reporting to interested users, decision making and control and generated various reports through AIS such as ratio analysis, working capital forecast, variance analysis and break-even analysis for internal decision making and control purpose. The selected companies take financing decision, investment decision, capital structure decision, working capital decision, pricing decision, servicing decision and outsourcing decision with the help of

AIS and use accounting information which generated by AIS for performing various managerial functions such as planning, coordinating, controlling, directing, budgeting, motivating and decision making. The existing Accounting Information Systems of the selected companies is effective for various activities such as data processing requirement, operations requirement and top-management control requirement and they prepare reports on monthly, half yearly and yearly basis for disclosing accounting information of the various interested users. The purpose of Accounting Information Systems of the selected companies is to provide information that supports decision making, to provide information that supports day to day operations and to provide information that pertains to stewardship.

The selected companies have established an effective internal control system as a part of good corporate governance to maintain accountability, integrity and security of its assets as well as information. The internal control system guides the companies with regard to processing of every transaction, authority level for approval of the transaction, documentation, access to the systems and related responsibilities. As the business of the company evolves continuously, the requirements for amendment and improvement of internal control systems are also a continuous process. The external auditors and the internal auditors review the company's internal controls on an annual basis. To ensure proper safeguarding of assets, physical verification of network assets is conducted periodically and all risks relating to these assets are properly insured both locally and internationally. Internal control is a process, supported by an entity's board of directors, management and other personnel, designed to provide reasonable assurance regarding the achievement of company objectives in the areas of effectiveness and efficiency of operations, reliability of financial reporting and compliance with laws and regulations. The major characteristics of existing internal control systems of company # 1 are functional responsibilities are appropriated segregated, day to day transactions and recording thereof are supervised by responsible officials, existence of a system of authorization procedure that is adequate to provide accounting control over assets, liability, revenue and expenses, existence of a system of periodic comparison of record with actual assets and liabilities and action to correct differences and existence of a recording procedure which check that transaction to be recorded and processed have been authorized. The benefits of existing internal control systems of company # 1 are assets are safeguard, transaction are properly processed and recorded, authority and responsibility become co-extensive, routine supervision of day to day transaction, assets are properly handled and accurate financial reporting and adequate disclosures. There are five essential components of internal control which are control environment, risk assessment, control activities, information and communication and monitoring. All of these five components of internal control are embedded in the control culture of company # 1. The characteristics of internal control systems of company # 2 are day to day transactions and recording thereof are supervised by responsible officials and existence of a recording procedure which check that transaction to be recorded and processed have been authorized. The benefits of existing internal control systems of company # 2 is transaction are properly processed and recorded. Internal control of company # 2 over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with Generally Accepted Accounting Principles. Internal control over financial reporting includes policies and procedures such as pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transaction and dispositions of the assets, proceed reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with GAAP, and that receipts and expenditures are being made only in accordance with authorizations of management and directors and provide reasonable assurance regarding

prevention or timely detection of unauthorized acquisition, use or disposition assets that could have a material effect on the financial statements. The problem of existing internal controls systems of company # 2 is all the areas are not duly covered by the internal control system and the suggestions of existing internal control systems are physical check should be regularly done and duties and responsibilities should be clearly divided. The operational activities of the selected companies in the light of policies on procedures for ensuring an effective internal control, transparency and accountability and researcher observe that the selected companies have control over cash payments and they have flexible internal control system that provides the opportunity for continuous improvement leads to increase in the efficiency of Accounting Information Systems of the selected companies.

Adequate Disclosure: Adequate disclosure means all material and relevant facts concerning financial position and the results of operations are communicated to users. Such disclosure should make the financial statements more useful and less subject to misinterpretation. Adequate disclosure does not require that information be presented in great detail, it does require, however, that no important facts be withheld" (Rahman and Ahshan 1993, 37). But all relevant, material facts cannot be disclosed under the proper caption due to legal and audit objection though such events actually happen. As for example 'speed money' paid by firms cannot be recorded under appropriate head. Thus the question of adequate disclosure is a matter of judgment in the changing complex business world and depends on the nation's economic, social and cultural development (Ahmed 1982, 12). Research has collected opinions of the respondents, developed a null hypothesis and conducted χ^2 to test the hypothesis.

Ho₂: There is no significant difference of opinion among the respondents regarding the adequacy of accounting information produced by AIS of the selected companies

Table # 2: Opinions of the respondents regarding the adequacy of accounting information made by Accounting Information Systems of the selected companies

	Respondents Groups										χ^2	SL	
	CA		CMA		Tin A		SC		Total				
	No.	%	No.	%	No.	%	No.	%	No.	%			
Types of Opinions													
Greatly Adequate	06	24.00	09	36.00	07	28.00	08	32.00	30	30.00	6.643	0.880	
Moderately Adequate	17	68.00	13	52.00	13	52.00	14	56.00	57	57.00			
Slightly Adequate	01	4.00	03	13.00	03	12.00	02	8.00	09	9.00			
Neutral	01	4.00	00	00	01	4.00	01	4.00	03	3.00			
Not Adequate	00	00	00	00	01	4.00	00	00	01	1.00			
Total	25	100	25	100	25	100	25	100	100	100			

(Source: Opinion Survey Reports)

Table # 2 shows that 30.00% of the respondents thought that the accounting information produced by AIS of the selected companies is greatly adequate, 57.00% of the respondents mentioned that the accounting information produced by AIS of the selected companies is moderately adequate, 9.00% of the respondents opined that the accounting information produced by AIS of the selected companies is slightly adequate, 3.00% of the respondents were neutral and 1.00% of the respondents opined that the accounting information produced by AIS of the selected companies is not adequate. The majority respondents thought that the accounting information produced by AIS of the selected companies is moderately adequate. But the opinions of the company executives are that the accounting information of company # 1 is greatly adequate produced by AIS and the accounting information of company # 2 is greatly adequate produced by AIS. In order to see whether there is any significant difference between the opinions of the respondents' regarding the

adequacy of accounting information produced by AIS of the selected companies and conducted χ^2 test using SPSS 7.5. Researchers observe that the value of χ^2 is 6.643 which is significant at 0.880 levels. So, the null hypothesis is accepted which means that there is no significant difference of opinion among the respondents regarding the adequacy of accounting information produced by AIS of the selected companies. In order to find out the difference between groups and within groups researcher has conducted ANOVA test.

Table # 2.A: Table showing the results of ANOVA test regarding the adequacy of accounting information made by AIS of the selected companies

	Sum of Squares	df	Mean Square	F Ratios	Sig. Level
Between Groups	1.040	3.000	0.347	0.579	0.630
Within Groups	57.520	96.000	0.599		
Total	58.560	99.000			

(Source: Opinion Survey Reports)

The above table shows that there is no significant different of opinions on the adequacy of accounting information produced by Accounting Information Systems of selected mobile telecommunication companies among the different respondents groups.

Usefulness - Usefulness, of course, is the most important characteristic of any reported information. People want accounting information that's useful-but what's useful to one user may not be as useful to another. Accounting standards must be set to require that just the right amount of information is reported in a financial statement. Well, now, exactly what does just the right amount of information mean? It doesn't mean exactly anything. What it does mean generally is that the information must be useful to most of the people who want to use it, and that and preparing that useful information won't be a burdensome task for those who have to prepare it (Smith et. al., 1983). Researcher made an opinion survey of the respondents regarding the usefulness of accounting information produced by Accounting Information Systems of the selected companies. In order to see whether there is significant difference of opinion among the respondents regarding the usefulness of accounting information produced by Accounting Information Systems of the selected companies for various decision making researcher developed a null hypothesis and conducted χ^2 test to test the null hypothesis.

H_{03} : There is no significant difference of opinion among the respondents regarding the usefulness of accounting information produced by AIS of the selected companies

Table # 3: Opinions of the respondents regarding the usefulness of accounting information made by Accounting Information Systems of the selected companies

	Respondents Groups										χ^2	SL
	CA		CMA		Tin A		SC		Total			
Types of Opinions	No.	%	No.	%	No.	%	No.	%	No.	%	4.614	0.867
Greatly Useful	08	32.00	10	40.00	08	32.00	12	48.00	38	38.00		
Moderately Useful	13	52.00	11	44.00	11	44.00	07	28.00	42	42.00		
Slightly Useful	03	12.00	04	16.00	05	20.00	05	20.00	17	17.00		
Neutral	01	4.00	00	00	01	4.00	01	4.00	03	3.00		
Not Useful	00	00	00	00	00	00	00	00	00	00		
Total	25	100	25	100	25	00	25	100	100	100		

(Source: Opinion Survey Reports)

Table # 3 shows that 38.00% of the respondents thought that the accounting information produced by AIS of the selected companies is greatly useful, 42.00% of the respondents mentioned that the accounting information produced by AIS of the selected companies is moderately useful, 17.00% of the respondents opined that the accounting information produced by AIS of the selected

companies is slightly useful, 3.00% of the respondents were neutral and none of the respondents opined that the accounting information produced by AIS of the selected companies is not useful. The majority respondents mentioned that the accounting information produced by AIS of the selected companies is moderately useful. But the opinions of the company executives are that the accounting information of company # 1 is greatly useful for decision making produced by AIS and the accounting information of company # 2 is greatly useful for decision making produced by AIS. In order to see whether there is any significant difference between the opinions of the respondents regarding the usefulness of accounting information produced by AIS of the selected companies and conducted χ^2 test using SPSS 7.5. Researcher observes that the value of χ^2 is 4.614 which is significant at 0.867 levels. So, the null hypothesis is accepted which means that there is no significant difference of opinion among the respondents regarding the usefulness of accounting information produced by AIS of the selected companies. In order to find out the difference between groups and within groups researcher has conducted ANOVA test.

Table # 3.A: Table showing the results of ANOVA test regarding the usefulness of accounting information made by AIS of the selected companies

	Sum of Squares	df	Mean Square	F Ratios	Sig. Level
Between Groups	0.590	3.000	0.197	0.294	0.829
Within Groups	64.160	96.000	0.668		
Total	64.750	99.000			

(Source: Opinion Survey Reports)

The above table shows that there is no significant different of opinions on the usefulness of accounting information produced by Accounting Information Systems of selected mobile telecommunication companies among the different respondents groups.

Relevance - Relevance refers to the capacity of accounting information to make difference decision makers who use financial reports. Accounting information which is relevant to the decision-making needs of users is considered useful. The quality of relevance is gained by a piece of information when it influences the economic decisions of users by helping them evaluate past, present and future events of confirming, or correcting their past evaluations. The fact that new information may add little to the knowledge of an informed decision maker may make the new information less useful, but it does not make it less relevant, only less valuable. Relevance can also be viewed as effectiveness. Researcher made an opinion survey of the respondents regarding the relevance of accounting information produced by Accounting Information Systems of the selected companies researcher developed a null hypothesis and conducted χ^2 test to test the null hypothesis.

Ho₄: There is no significant difference of opinion among the respondents regarding the relevance of accounting information produced by AIS of the selected companies.

Table # 4: Opinions of the respondents regarding the relevance of accounting information produced by of Accounting Information Systems of the selected companies

	Respondents Groups								χ^2	SL
	CA		CMA		Tin A		SC			
Types of Opinions	No.	%	No.	%	No.	%	No.	%	No.	%
Greatly Relevant	09	36.00	11	44.00	07	28.00	09	36.00	36	36.00
Moderately Relevant	14	56.00	12	48.00	16	64.00	13	52.00	55	55.00
Slightly Relevant	02	8.00	02	4.00	02	8.00	03	12.00	09	9.00
Neutral	00	00	00	00	00	00	00	00	00	00
Not Relevant	00	00	00	00	00	00	00	00	00	00
Total	25	100	25	100	25	100	25	100	100	100

(Source: Opinion Survey Reports)

Table # 4 shows that 36.00% of the respondents opined that the accounting information produced by AIS of the selected companies is greatly relevant, 55.00% of the respondents thought that the accounting information produced by AIS of the selected companies is moderately relevant, 9% of the respondents opined that the accounting information produced by AIS of the selected companies is slightly relevant, none of the respondents were neutral and none of the respondents opined that the accounting information produced by AIS of the selected companies is not relevant. The majority respondents mentioned that the accounting information produced by AIS of the selected companies is moderately relevant. But the opinions of the company executives are that the accounting information of company # 1 is greatly relevant produced by AIS and the accounting information of company # 2 is greatly relevant produced by AIS. In order to see whether there is any significant difference between the opinions of the respondents regarding the relevance of accounting information produced by AIS of the selected companies and conducted χ^2 test using SPSS 7.5. Researcher observes that the value of χ^2 is 1.859 which is significant at 0.932 levels. So, the null hypothesis is accepted which means that there is no significant difference of opinion among the respondents regarding the relevance of accounting information produced by AIS of the selected companies. In order to find out the difference between groups and within groups researcher has conducted ANOVA test.

Table # 4.A: Table showing the results of ANOVA test regarding the relevance of accounting information made by AIS of the selected companies

	Sum of Squares	df	Mean Square	F Ratios	Sig. Level
Between Groups	0.366	2	0.183	0.142	0.868
Within Groups	124.634	97	1.285		
Total	125.000	99			

(Source: Opinion Survey Reports)

The above table shows that there is no significant different of opinions on the relevance of accounting information produced by Accounting Information Systems of selected mobile telecommunication companies among the different respondents groups.

CONCLUSION AND RECOMMENDATIONS

The present study examines the Accounting Information Systems of the selected companies. The total Accounting Information Systems of the selected companies are computerized and all transactions are processed by the computer. The use of computerized Accounting Information Systems gives opportunities for the selected companies to perform the various accounting functions such as data collection, data management, data processing, data control and information generation more effectively and efficiently because the use of computerized Accounting Information Systems breeds significant time and cost savings. The existing Accounting Information Systems of the selected companies help recording various accounting transactions, processing these transactions and preparing the financial statements like income statement, balance sheet, owners' equity statement, cash flow statement etc. Accounting Information Systems also provide information which provides supports to all levels of management such as operational level, middle level and top level management in taking effective decisions. Accounting Information System is absolutely necessary for decision making in every functional areas of an organization and every business organization should develop its Accounting Information Systems to avail itself of the benefits of the system. Accounting Information Systems cover a broad area in corporate world and produce information for users of information, both internal and external to the

business organization. Researcher has collected opinion form the respondents to focus on compliance with IAS/ BAS & IFRS/BFRS for preparing the financial statement and the perceptions of the adequacy, usefulness and relevance of accounting information produced by Accounting Information Systems through financial statements of the selected companies. The study shows that the all hypothesis are accepted which means that there is no significant difference of opinion among the respondents regarding the degree of compliance with BAS/IAS & BFRS/IFRS for preparing the financial statement and there is no significant difference in opinion of the respondents regarding the adequacy, usefulness and relevance of accounting information produced by Accounting Information Systems of the selected companies. The users of accounting information desire that the management publish audited annual reports at the end of every accounting period that should be certified properly by the professional accountants so that the quality of the information presented in the financial statements is improved. Since the mobile telecommunication sector is one of the major contributors for developing the economy of Bangladesh researcher suggest that the transparency of financial statements issued by the selected companies be ensured. The financial statements should be more qualitative for the various users and the management of the selected companies should be more careful for improving the quality of accounting information produced by Accounting Information Systems. The selected companies should disclose information timely and the level of disclosure should be adequate for the various users so that the decision makers can take sound decisions. So, it can be concluded that since the various users of financial statements is decision oriented the preparation of the financial statement must be more carefully done for ensuring the qualitative characteristics of accounting information produced by Accounting Information Systems of the selected companies. Researcher also made an opinion survey of the respondents regarding the various suggestions for increasing the effectiveness of existing Accounting Information Systems of the selected companies.

Table # 5: Table showing the opinions of the respondents regarding the various suggestions for increasing the effectiveness of existing AIS of the selected companies

Items	CA		CMA		T in A		Total	
	No.	%	No.	%	No.	%	No.	%
1. Accounting Information Systems should be upgraded	14	56.00	18	72.00	20	80.00	52	69.33
2. More control measures should be introduced	11	44.00	14	56.00	14	56.00	39	52.00
3. More security measures should be installed	08	32.00	13	52.00	14	56.00	35	46.67
4. The system should be more user-friendly	11	44.00	14	56.00	09	36.00	34	45.33
5. All of the above items	04	16.00	10	40.00	06	24.00	20	26.67
Total	25*		25*		25*		75	

(Source: Opinion Survey Reports)

* The responses of 25 respondents regarding items (1 to 5) are overlapping

From Table # 5 shows that 69.33% of the respondents have suggested that Accounting Information Systems should be upgraded as a way for increasing the effectiveness of existing Accounting Information Systems, 52.00% of the respondents have suggested that more control measures should be introduced for increasing the effectiveness of existing Accounting Information Systems, 46.67% of the respondents have suggested that more security measures should be installed for increasing the effectiveness of existing Accounting Information Systems, 45.33% of the respondents have suggested that the system should be user-friendly for increasing the effectiveness of existing Accounting Information Systems and 26.67% of the respondents

have suggested that all of the alternatives for increasing the effectiveness of existing accounting information systems of the selected companies. The majority respondents have suggested that the Accounting Information Systems should be upgraded for increasing the effectiveness of existing Accounting Information Systems of the selected companies. Researcher thought that all alternatives are necessary for increasing the effectiveness of existing Accounting Information Systems of the selected mobile telecommunication companies.

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Application of Linear Programming for Profit Maximization: A Case of Paints Company, Pakistan

Syed Usman Izhar

Lecturer University Community College, GC University, Faisalabad, Pakistan

ABSTRACT

The purpose of the study is to highlight the effectiveness of linear programming in determination of optimal combination of various products that an organization produces to maximize contribution. For this purpose, data for the month of July 2013 of a paint company in Pakistan has been obtained for one of the main products "Plastic Emulsion" that is produced in three different sizes (quarter, gallon and drummy). The simplex method is used to determine the optimal mix of these sizes to be produced to maximize contribution. The results show that the company can earn maximum contribution by only investing its resources (raw material) in the production of gallon and producing 444 units of it thus generating contribution Rs. 162038. This study will recognize the this company and also to the other manufacturing companies, particularly in Pakistan, with the effectiveness of linear programming for making decisions about optimal combination of products to be produced to obtain maximum return.

Keywords: linear programming, paint company, Pakistan

INTRODUCTION

There is a strict shortage of production inputs that the industries are facing now a day that ultimately results in low output. A firm can contribute to the increase production in real sector and to the economic growth through its managerial decisions about maximum output. Thus the managerial decisions are always directed towards finding the right way to maximize profit.

The production-oriented industries require optimal management decisions about production levels due to the present competitive pressure. Due to this pressure, several management theories are promulgated to resolve practical problems e.g. industry specific problems and environmental problems faced by the industries that necessitated the development of several mathematical techniques. Linear programming is one of the most popular that is based on mathematical approach to reach out the optimal solution with constraint resources. There subsist several other mathematical approaches like OLS model, markov analysis, time series analysis and inventory control system.

Linear Programming may be termed as a mathematical approach for identifying the optimum combination of products to be produced to maximize profit or minimize cost as

per objective within the given resources. Linear programming is also used in operations management to find optimum solution of several types of problems like allocation of resources, transportation problems and responsibility problems where linear programming works to choose best course of action among several alternatives (Yahya, 2004). Linear programming is a term that encompasses mathematical techniques targeted to optimizing outcome by amalgamating resources (Lucey, 1996).

The term "linear" here implies one of the assumptions of linear programming i.e. "linearity of variables". For being linear by the variables, we mean that they have straight line or proportional relation. However, the term "programming" refers to an iterative process of moving towards the best solution from the state of "Do nothing".

Linear programming model consists of a linear objective function and several constraint functions. The model is formulated to find the optimum product mix with provided resources (constraints). The objective function in LP model is usually finding the product mix for maximizing contribution or profit or minimizing cost or variable cost whereas, constraint functions are set of restrictions that limit the production at specific level. For example, limited quantity of material availability, limited number of labour hours and limited numbers of machines hours are some of the commonly faced constraints. Moreover, optimal product mix is that point that is achieved with the help of linear programming justifying the constraints and achieving the objective function.

Linear programming is extensively used in many areas of study. Most pervasively, it is used to find solution to engineering, economics and business problems. Some organizations where linear programming is used are transportation companies and manufacturing companies etc.

LP modelling solves particular mathematical problems by forming specific rules that deals with the allocation of limited resources under strict technological or practical restrictions when certain course of action has to be chosen (Andrade, 1990). The simplest form of linear programming for profit maximization is:

$$\text{Maximize } (Y) = B^T Z \quad \text{subject to:} \quad AZ \leq C$$

Where Z denotes vector of variables, B and A are coefficient's vectors of matrices that are known. The expression " $\text{Maximize } (Y) = B^T Z$ " is the objective function that is to be maximize and the expression $AZ \leq C$ is the vector of constraints to be met while optimizing objective function. When there are "n" decision variables and "m" constraints, LP can represent the model in mathematical form either for minimization (e.g. cost or labour hours) or maximization (e.g. profit or contribution) (Corrar and Teophilo, 2003), (Salau, 1998). The objective function in LP modelling is:

$$\text{Max}(Y) = B_1 Z_1 + B_2 Z_2 + B_3 Z_3 + \dots + B_n Z_n$$

The constraint functions are:

$$A_{11} Z_1 + A_{12} Z_2 + A_{13} Z_3 + \dots + A_{1n} Z_n (\leq \text{ or } \geq) C_1$$

$$A_{21} Z_1 + A_{22} Z_2 + A_{23} Z_3 + \dots + A_{2n} Z_n (\leq \text{ or } \geq) C_2$$

$$A_{m1} Z_1 + A_{m2} Z_2 + A_{m3} Z_3 + \dots + A_{mn} Z_n (\leq \text{ or } \geq) C_m$$

Non- negative variables are:

$$Z_1, Z_2, Z_3, Z_n \geq 0$$

OBJECTIVES OF THE STUDY

The objectives of this study are:

1. To suggest an optimal product mix that would maximize contribution of “The company”
2. To highlight the distinctiveness of linear programming modelling at firm level as an optimization technique
3. To suggest the manufacturing concerns to use linear programming for determining their optimal product mix.
4. To contribute in literature about linear programming with reference to Pakistan as there is massive research gap in this area.

For the purpose of accomplishing these objectives, data has been collected from a renowned paint manufacturing company. For the purpose of secrecy, we will use “The Company” instead of real name of that company. The company produces various types of paints. The records of company show that the product named “Plastic Emulsion” is the main product in terms of number of units to be sold and thus generating contribution. The product is made in three sizes: Quarter (1 kg), Gallon (3.64 kg) and Drummy (14.56 kg). The data used in the study is for the month of July 2013 obtained from company records and from interviews from Manufacturing department personal and Accounts department personnel. The purpose of this study is to know what number of each size of Plastic Emulsion to be manufactured and sold to earn maximum contribution.

THEORETICAL BACKGROUND

There are contrastive views of researchers about relevance of LP modelling to various managerial decisions. These views are indulged over a long time that improved the LP technique applicability in solving business decision making problems. The economic literature recognize the importance of linear programming particularly for the better planning of developing countries that usually have scarce resources where linear programming assist in apportioning these truncated resources in obtaining optimal solution. Evidencing from the history, LP technique is a mathematical tool that was enrooted by George Dantzig, a mathematician, in 1947 for rationalizing logistics for U.S. Air Force. Later, he argued to use this technique to solve business problems. He also developed simplex method that was improved version of linear programming (Dantzig, 1993).

In case of allocation problems, there are plenty of activities that are required to be done, being various alternative ways of doing them, with limited resources to be allocated among these activities, then management has to confront with the dilemma of how effectively integrate these resources and activities to maximize output. This problem is termed as optimization problem and can be construed with mathematical programming. Charles & Cooper (1963) termed LP modelling as a single objective optimization approach as it exerts to bring out single objective of either maximization (profit or contribution) or minimization (cost or time). Similarly, Gupta and Hira (2009) argue that LP modelling wilds to optimize a linear function termed as objective function contingent on aggregation of linear equations known as constraint functions.

Dowing (1992) recognized the superiority of linear programming over many other optimization techniques like Lagrangian method and Graphic method. Lagrangian method can be used with one constraint, Graphical method can be used with two constraints and linear programming can be used with plenty of constraints. Backing this argument, Dwivedi (2008) conceives that as LP modelling assist in obtaining optimum solution in constraint

problems, it is of inordinate importance for business decision making. He argued that linear programming requires three particularizations including objective particularization, constraints particularizations and non-negativity condition. Authenticating this view, many other authors gave the general LP model specification for example Dowling (1992), Henderson et al (2003), Dwivedi (2008) and Koutsoyiannis (1979).

Turban and Meredith (1991) also recognize the importance of linear programming as a tool of decision making in management science. Management science techniques are made of three ingredients: (1) decision variables that cannot be controlled, (2) environment factors that are also cannot be controlled and (3) result variables. The LP model is also made up of these ingredients with different terms.

LP modelling is claimed to be an operations research methodology by many researchers for example by Wagner (2007) and Lucey (2002). They posit that LP is one of the most acknowledged techniques of operations research. Other areas where LP can be used include: airlines, energy planning, education, portfolio management, transportation problems and scheduling etc.

According to Sarggeaunt (1965), there are three main problems where linear programming is used including blending and mixing, distribution cost and planning problems. He also stated the other areas of applicability of linear programming for example decision of plant location, and staff management. Identical list of problems have been provided by Emory and Niland (1968) where linear programming can be productively used. These include: concoction of gasoline stocks, inception of chemical products, commingling of fertilizers and production of cement etc. Moreover, Hillier and Lieberman (2001) maintains that apart from allocating resources, there are many other appliances as well.

Emory and Niland (1968) catalogued difficulties in adopting linear programming e.g. identification of essential constraints (row equations) and possible choices (column vectors) and presentation of these rows and columns in linear equations. The authentic definition of the problem requires deep understanding of the LP technique and that of company's operations and problem to be solved. Another problem may arise in necessary data collection as experiences shows that it is always time consuming and costly to collect data for linear programming. Another problem noted by Turban (1993) is that uncertainties about the behaviour of variables like commodity prices make it difficult for the managers to choose the best from several alternatives

According to Kurtz (1992), linear programming cannot be used in several organizational problems such as employee attitudes and ramifications of strikes. Furthermore, the managers who are proficient in its accurate models also refrain from its use as they are unaware of its applicability.

Besides these problems, linear programming has been extensively used in many areas of study. Taha (1992) applied linear programming in poultry farm to determine accurate proportion of calcium, fibre and protein in food. Adam et al (1993) implemented linear programming on Multi-Band Enterprises to determine the optimal combination of citizens band radios and portable radios. Murugan and Manivel (2009) applied linear programming on textile industry with linear interactive optimizer software to determine the optimal numbers of each of three of its products to be produced to maximize profit of the organization. Adeyemo and Otiero (2009) extended the scope of applicability of linear programming from management sciences to environmental sciences and conducted study in South African Rand to maximize revenue where sixteen types of crops were implanted in an area of 2500ha. Kareem and Aderoba (2008) attempted to demonstrate the potency of linear

programming by applying it in determination of optimal crew required for maintenance in Akure (cocoa processing company), Nigeria. The application of linear programming is not restricted to the manufacturing industries, it also works for service industry e.g. banks. Balbirer (1981) used linear programming to make financial planning of bank (Central Carolina Bank-CCB) to maximize shareholders' returns. Cohen and Hammer (2013) used linear programming for asset management of bank. Fielitz and Loeffler (2013) implemented linear programming for liquidity management of banks. Guven and Persentili (1997) used linear programming for balance sheet management of a bank i.e. determining the optimal proportion and combination of assets and liabilities.

METHODOLOGY

In order to apprehend optimal combination from various categories of Plastic Emulsion, Simplex method is used. Linear programming converts the data into objective function (in terms of contribution per unit) and relevant constraints functions (in terms of material quantity per unit) which are as follows:

$$\text{Max}(Y) = 98Z_1 + 365Z_2 + 1380Z_3$$

Where Z_1 , Z_2 , Z_3 represent Plastic Emulsion with size Quarter, Gallon and Drummy respectively. The coefficients represent contribution per unit with respective products. The constraints are formed with major material used to manufacture these products that are:

$0.02Z_1 + 0.06Z_2 + 0.28Z_3 \leq 27$	$np = 6$
$0.05Z_1 + 0.15Z_2 + 0.7Z_3 \leq 68$	<i>Tylose</i>
$0.014Z_1 + 0.042Z_2 + 0.196Z_3 \leq 19$	<i>Amonia</i>
$0.013Z_1 + 0.039Z_2 + 0.182Z_3 \leq 18$	<i>Sodium</i>
$0.034Z_1 + 0.102Z_2 + 0.476Z_3 \leq 46$	<i>Polyrone</i>
$0.012Z_1 + 0.036Z_2 + 0.168Z_3 \leq 16$	<i>Margal</i>
$0.14Z_1 + 0.42Z_2 + 1.96Z_3 \leq 189$	<i>GP</i>
$0.01Z_1 + 0.03Z_2 + 0.14Z_3 \leq 14$	<i>Foam</i>
$0.7Z_1 + 2.1Z_2 + 9.8Z_3 \leq 945$	<i>Tio</i>

Where coefficients represent quantity of material to be used to manufacture each product and constant represents maximum quantity available of each type of material.

The first step in simplex method is the introduction of slack variables and converting inequalities into equalities (fig. 1). In second step, initial simplex tableau is formed (Table 1). The table shows the state of "do nothing". The negative values in the last row under Z_1 , Z_2 and Z_3 show the loss of contribution from each product if such product is not produced. From this table, pivot element, pivot row and pivot column is chosen. The column under Z_3 is the pivot column as it has the largest negative value i.e. (-1380). Then, all constants are divided with coefficients of pivot column. Since $(\frac{16}{0.168})$ provides the smallest ratio, its row becomes the pivot row. Finally, coefficient at the intersection of pivot row and pivot column is termed as pivot element i.e. (0.168). In third step, the pivoting process starts in which the pivot row is divided by pivot element (Table 2). Having reduced to pivot element to 1, the next step is to clear the pivot column (Table 3). The initial results in Table 3 show that by producing 95 units of Z_3 i.e. Drummy. But it is not optimal decision as the company is still losing from Z_1 and Z_2 (see values -1.4 and -69.68 in the last row). Therefore, iterative process

continues and from table 3, again pivot column is selected that is Column under Z_2 that has maximum negative value (-69.68). Then pivot row is selected with the same process as previous with smallest ratio (i.e. $\frac{95}{0.214}$). Finally, the pivot element is selected again that is now 0.214. Then, pivoting process will be undertaken again (Tables 4 and 5). Then final results obtained in table 5 show that the optimal decision to maximize contribution would be to produce 444 units of Z_2 (Gallon). At this point the overall contribution is Rs. 162,038 that is higher than the previous state of Rs. 131,100. The values of slack can be read from the table 4 and 5 that can be used in other products of the company.

CONCLUSION

The study is conducted on a paint company in Pakistan. The purpose of the study is to determine the optimal quantity to be produced from three sizes (quarter, gallon and drummy) of one of the main product of the company "Plastic Emulsion". For this purpose, a well known mathematical tool Simplex Method is used. The rationale for the study is to highlight the distinctiveness of linear programming modelling at firm level as an optimization technique, to suggest the manufacturing concerns to use linear programming for determining their optimal product mix and to contribute in literature about linear programming with reference to Pakistan as there is massive research gap in this area. The results of simplex method show that the company can earn maximum contribution Rs. 162038 by producing only Gallon. The values of slack are also important as the company can put these resources left after producing Gallon to other projects of the company. These findings would be helpful for the company to maximize its contribution not only for this month but the company can use this technique throughout its existence. Additionally, this study would insist other companies to utilize this technique to optimize their financial performance.

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APPENDIX

Figure 1

$0.02Z_1 + 0.06Z_2 + 0.28Z_3 + s_1 = 27$	<i>np = 6</i>
$0.05Z_1 + 0.15Z_2 + 0.7Z_3 + s_2 = 68$	<i>Tylose</i>
$0.014Z_1 + 0.042Z_2 + 0.196Z_3 + s_3 = 19$	<i>Amonia</i>
$0.013Z_1 + 0.039Z_2 + 0.182Z_3 + s_4 = 18$	<i>Sodium</i>
$0.034Z_1 + 0.102Z_2 + 0.476Z_3 + s_5 = 46$	<i>Polyrone</i>
$0.012Z_1 + 0.036Z_2 + 0.168Z_3 + s_6 = 16$	<i>Margal</i>
$0.14Z_1 + 0.42Z_2 + 1.96Z_3 + s_7 = 189$	<i>GP</i>
$0.01Z_1 + 0.03Z_2 + 0.14Z_3 + s_8 = 14$	<i>Foam</i>
$0.7Z_1 + 2.1Z_2 + 9.8Z_3 + s_9 = 945$	<i>Tio</i>

Initial Simplex Table

Table 1

Z_1	Z_2	Z_3	s_1	s_2	s_3	s_4	s_5	s_6	s_7	s_8	s_9	C
0.02	0.06	0.28	1	0	0	0	0	0	0	0	0	27
0.05	0.15	0.7	0	1	0	0	0	0	0	0	0	68
0.014	0.042	0.196	0	0	1	0	0	0	0	0	0	19
0.013	0.039	0.182	0	0	0	1	0	0	0	0	0	17.5
0.034	0.102	0.476	0	0	0	0	1	0	0	0	0	46
0.012	0.036	0.168	0	0	0	0	0	1	0	0	0	16
0.14	0.42	1.96	0	0	0	0	0	0	1	0	0	189
0.01	0.03	0.14	0	0	0	0	0	0	0	1	0	14
0.7	2.1	9.8	0	0	0	0	0	0	0	0	1	945
-98	-365	-1380	0	0	0	0	0	0	0	0	0	0

Pivoting (1)

Table 2

Z_1	Z_2	Z_3	s_1	s_2	s_3	s_4	s_5	s_6	s_7	s_8	s_9	C
0.02	0.06	0.28	1	0	0	0	0	0	0	0	0	27
0.05	0.15	0.7	0	1	0	0	0	0	0	0	0	68
0.014	0.042	0.196	0	0	1	0	0	0	0	0	0	19
0.013	0.039	0.182	0	0	0	1	0	0	0	0	0	17.5
0.034	0.102	0.476	0	0	0	0	1	0	0	0	0	46
0.07	0.214	1	0	0	0	0	0	6	0	0	0	95
0.14	0.42	1.96	0	0	0	0	0	0	1	0	0	189
0.01	0.03	0.14	0	0	0	0	0	0	0	1	0	14
0.7	2.1	9.8	0	0	0	0	0	0	0	0	1	945
-98	-365	-1380	0	0	0	0	0	0	0	0	0	0

Second Table

Table 3												
Z ₁	Z ₂	Z ₃	s ₁	s ₂	s ₃	s ₄	s ₅	s ₆	s ₇	s ₈	s ₉	C
0.0004	0.0008	0	1	0	0	0	0	-1.68	0	0	0	0.4
0.001	0.0002	0	0	1	0	0	0	-4.2	0	0	0	0.8
0.00028	0.000056	0	0	0	1	0	0	-1.17	0	0	0	0.38
0.00026	0.000052	0	0	0	0	1	0	-1.09	0	0	0	0.21
0.00068	0.000536	0	0	0	0	0	1	-2.86	0	0	0	0.78
0.07	0.214	1	0	0	0	0	0	6	0	0	0	95
0.0028	0.00056	0	0	0	0	0	0	-11.7	1	0	0	2.8
0.0002	0.00004	0	0	0	0	0	0	-0.84	0	1	0	0.7
0.014	0.0028	0	0	0	0	0	0	-58.8	0	0	1	14
-14	-69.68	0	0	0	0	0	0	8280	0	0	0	131100

Pivoting (2)

Table 4												
Z ₁	Z ₂	Z ₃	s ₁	s ₂	s ₃	s ₄	s ₅	s ₆	s ₇	s ₈	s ₉	C
0.0004	0.0008	0	1	0	0	0	0	-1.68	0	0	0	0.4
0.001	0.0002	0	0	1	0	0	0	-4.2	0	0	0	0.8
0.00028	0.000056	0	0	0	1	0	0	-1.17	0	0	0	0.38
0.00026	0.000052	0	0	0	0	1	0	-1.09	0	0	0	0.21
0.00068	0.000536	0	0	0	0	0	1	-2.86	0	0	0	0.78
0.327	1	4.67	0	0	0	0	0	28.03	0	0	0	444
0.0028	0.00056	0	0	0	0	0	0	-11.7	1	0	0	2.8
0.0002	0.00004	0	0	0	0	0	0	-0.84	0	1	0	0.7
0.014	0.0028	0	0	0	0	0	0	-58.8	0	0	1	14
-14	-69.68	0	0	0	0	0	0	8280	0	0	0	131100

Third Table

Table 5												
Z ₁	Z ₂	Z ₃	s ₁	s ₂	s ₃	s ₄	s ₅	s ₆	s ₇	s ₈	s ₉	C
0.000373	0	-0.00037	1	0	0	0	0	-1.682	0	0	0	0.3645
0.000934	0	-0.00093	0	1	0	0	0	-4.21	0	0	0	0.0088
0.000261	0	-0.00026	0	0	1	0	0	-4.205	0	0	0	0.7112
0.000243	0	-0.00005	0	0	0	1	0	-1.093	0	0	0	0.1869
0.000504	0	-0.00250	0	0	0	0	1	-2.871	0	0	0	0.5420
0.327	1	4.67	0	0	0	0	0	28.03	0	0	0	444
0.00261	0	-0.00056	0	0	0	0	0	-11.78	1	0	0	2.55
0.000186	0	-0.00004	0	0	0	0	0	-0.84	0	1	0	0.6112
0.013	0	-0.0028	0	0	0	0	0	-58.87	0	0	1	12.756
21.38	0	325.40	0	0	0	0	0	10233	0	0	0	162038

Stock Market Manipulation: A Literature Review

Maruf Rahman Maxim

Lecturer, East West University, Dhaka, Bangladesh

ABSTRACT

This paper classifies the major types of stock market manipulation that have been observed over the past 30 years. The key objective of this paper is to summarize the findings of some of the leading research works done on stock market manipulation. This paper also talks about some of the major incidences of stock market manipulation that took place in various developed financial markets. Research work on stock market manipulation is scarce and this paper tries to give a holistic view of stock market manipulation to have a better understanding of it. Market manipulation is a dynamic problem. It's been changing with time, with the advancement of technology and with the evolution of financial markets. This paper exhibits this characteristic of stock market manipulation and explains how it has been changing over time.

Keywords: Stock market manipulation; Insider trading.

JEL Classification Code: G14

INTRODUCTION

The financial world is changing very fast. With the help of technology and globalization financial innovation is at its best. It's far more complex and integrated than it was ever before. The more complex it gets, the more opportunities it creates for the market manipulators. To deal with such a dynamic problem it's very important to have a good understanding of the problem itself.

Stock market manipulation started getting scholarly attention from early 1990s (John and Narayanan 1997, pp. 217-247). It's a growing concern in the emerging Asian markets because they have securities that are very thinly traded and are vulnerable to manipulation (Huang and Chen et al. 2013). The biggest problem of stock market manipulation is that it distorts price and creates dead weight loss. For regulatory perspective the difficulty is that it's hard to detect manipulation for its latent nature. This paper aims to compile all the major scholarly contributions made since 1990s and give a summary of their findings. The objective of this work is twofold: (1) to review the existing literature on stock market manipulation, (2) to observe the change of its nature over time.

CLASSIFICATION OF STOCK MARKET MANIPULATION

Allen and Gale classified the market manipulation in three different categories (Allen F and Gale D. 1992).

- Action based manipulation
- Information based manipulation
- Size or trade based manipulation.

In this paper various instances and studies of market manipulation are categorized and discussed among these three broad categories.

ACTION BASED MANIPULATION

Various actions taken by the management of a company or big investors can manipulate the actual value of an asset. Any action that can distort the true value of the asset can be seen as an instance of action based manipulation. A corporation itself can be viewed as an action based manipulator of its assets since it has the power to take actions that can positively or negatively impact the public perception (Chatterjea A et al. 1993). Taking favourable capital budgeting decision, financial restructuring decision and dividend payout policy can artificially increase/decrease firm's value in the eye of the investors.

The phenomenon that insiders know more about the financial condition and the growth prospects of a company than prospective investors do is commonly known as asymmetric information (Myers and Majluf, 1984). The presence of asymmetric information enables managers to potentially capitalize on their access to inside information and to violate the terms of the contract under which control rights to the company's assets and cash flows have been pledged to the shareholders (Hart, 1995). Fishman and Hagerty (1995) showed that when an insider makes a trade and discloses it to general public (buying or selling of the corporation's shares) (s)he has opportunity to manipulate the market as investors don't know of the underlying information of that trade. The insider might have no price sensitive news but his/her action would lead the general investors infer the information content. For example having no information the insider discloses a sale of stocks and the market price drops. This type of manipulation is led by the action of the insider. John and Narayan (1997) present a model where they explain how insiders can manipulate the market by sometimes trading at the wrong direction. An example of that would be buying the shares when there is a bad news and making general investors believe that there is positive information underlying that trade. That would inflate the price and insiders can benefit from that by selling their shares before disclosing the bad news. Both the studies show that insiders can influence the market with or without having any price sensitive news. Chakraborty and Yilmaz (2004) confirm this finding with their own research outcome that shows how both informed and uninformed insiders possess manipulation power and how informed insiders can trade in the wrong direction for a short while to confuse the market and get a long term profit. In most cases trade based manipulation tend to increase the stock price during manipulation and a big drop after it. (Aggarwal and Wu 2006).

Another way of orchestrating an action based manipulation is through takeover bids. Bagnoli and Lipman (1996) developed a model where they described how a large trader can announce a takeover bid to inflate a stock's price. The manipulator then sells his/her stocks, realizes the profit and drops the takeover bid.

INFORMATION BASED MANIPULATION

This is a form of manipulation often done by using inside information of management or by spreading rumours. The history of Information based manipulation goes back to as early as 1920s when it was done mostly through trading pools in the United States. This is a manipulative strategy where a group of investors would form an investment pool. They would buy a particular stock and spread favourable rumours about it in the market to

artificially inflate the price. Once that's done they would sell out the stocks at a profit. Villa (1989) exhibits how a manipulator can benefit by selling the shares short, spreading false information in the market to reduce the share value and buy it back to close his/her position. This instance is known as 'bear raid' in the literature of finance. People who possess privileged information can also have the power to manipulate the market by announcing strategically misleading information. They can influence the stock price with their announcement. Example of such people would be market analysts, forecast agencies and such entities. Entities or individuals that are more likely to have access to more information such as insiders, brokers, underwriters and market makers have more manipulative power (Aggarwal and Wu 2006).

Internet access availability of traders from all over the world made information based manipulation a lot more severe. A very common form of market manipulation is known as 'pump and dump'. Pickholz and Pickholz (2001) explain this form of manipulation and how it can be done. In summary it's a strategy where a large owner of a stock spreads misleading and false positive statement about the company, inflates the price and sells it at a higher price which does not reflect the true value of the asset. Internet offers a much cheaper and easier way to disseminate such false statements. This is done through various internet chat rooms for traders and spam emails. Again the use of internet fastens the speed of such manipulation. In August of 2000, Emulex corporation in America was a victim of 'Pump and dump' when they lose around 2.5 billion dollar in less than half an hour (Pickholz and Pickholz 2001). Another notable example is when a manipulator bought the stocks of a company called E-Connect. Then the manipulator prepared various fraudulent statements and analyst reports of that company claiming that the company's stock price was extremely undervalued and the actual price should be around \$135 when the shares were trading at \$1.4. Within a week after publishing that fraud report the share price moved up to \$22 and the manipulator managed to make a profit of around \$1.3 million (Pickholz and Pickholz 2001). Various macroeconomic incidents can create an incentive for insiders to lie or to spread misleading information. Pinheiro M (2008) showed that in-case of a demand shock, the higher is the degree of the shock the more likely that there will be a lie associated with the bad news.

Announcing higher dividend by the company is also seen as an instance of information based manipulation. Miller and Rock (1985) show in their model that firms pay dividend to signal positive financial state of the company and high expected earnings of the future.

SIZE BASED MANIPULATION

Noise traders are price takers but large traders can influence the market, change the price and can create an arbitrage opportunity to generate risk free profit (Jarrow 1992). Based on Jarrow's work Bagnoli and Lipman (1996) showed another manipulative strategy where they explained how large traders can announce a pseudo takeover bid to influence the target company's stock price. The false takeover bid can inflate the price of the asset. Then the manipulator can sell his position and get out of the market without taking over the target company. Some of the common manipulative strategies implemented by large traders are trend setting and trading against the trend, short squeeze and market corner.

Some examples of size based manipulation would include cornering the gold market on black Friday, cornering of northern pacific railroad, Stultz motors and the radio corporation of America (Chatterjea A et al 1993). Credit movement over international borders also create big threat for manipulation. In 1992 the share price of banks in Japan dropped by 31%. It was due to a heavy selling pressure by the short sellers. Later investigation finds out that it

was mostly done by non-Japanese securities firms who worked as a team and started short selling together to cause a major drop in price (The economist 1992).

A related example was given by Gerard and Nanda (1993) where informed large traders can create a manipulative strategy before a seasoned equity offering. New equity offering always reduces the stock price. Using this knowledge informed traders can aggressively short sell prior to the offering and buy it back later when the price is lower to close their positions. The discount available for general investors who win shares in the seasonal offering goes down due to this manipulative strategy. The aggressive short selling prior to the offering reduces the price significantly which diminishes the discount and hence profitability for the winners of the offering. This situation is often referred to as 'winner's curse'.

CONFLICTING EVIDENCE

Beanbou and Laroque (1992) argue that manipulation can hamper an insider's market reputation which will refrain them from manipulating market. Manne's (1966) argument is that the higher cost of orchestrating a manipulation does not allow manipulators to make sufficient money and thus it is irrational to distort information. A group of researcher advocates for insider trading with an argument that under certain conditions allowing insider trading improves investment decisions made by the management. It can also help to solve the agency problem. Another positive thing of insider trading is that if it's allowed, stock prices will fully reflect the information (Leland 1992). Whether inside trading is good or bad is an age old debate in the finance community but according to Leland (1992) the single most important factor is the sensitivity of investment to current price. If the sensitivity is great, insider trading is likely to be beneficial.

CONCLUSION

Stock market manipulation is an important issue for the efficiency of market and regulation of trading. It increases the cost of capital for a company interested in raising capital from the equity market and hence gives them little incentive to get enlisted in a market that is known for manipulation (Comerton-Forde and Putninš 2010, pp. 135-158).

Some assumptions can be drawn from reviewing the rich literature of market manipulation. It's evident that market manipulation is not static. It's changing with technology, globalization and with the introduction of new and complicated financial instruments, just as Pickholz and Pickholz (2001) mentioned in their paper that 'manipulation is timeless and ever changing'. It is also evident that market manipulation exists despite the conflicting arguments presented by different scholars. Studies on market manipulation are not adequate to keep up with this dynamic problem. Most of the studies are done in the context of USA. Some scholarly works are done in other countries such as Pakistan (Khawaja and Mian 2003) and China (Walter and Howie 2003). But still there is a huge scope to do more country specific research on manipulation.

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Information Security Management System in Terms of Business Practice in Slovakia

Jana Urdziková¹; Martina Jakábová²; & Vanessa Prajová²

¹Slovak University of Technology in Bratislava, Faculty of Materials Science and Technology in Trnava, Institute of Safety and Environmental Engineering, Slovak Republic,

²Slovak University of Technology in Bratislava, Faculty of Materials Science and Technology in Trnava, Institute of Industrial Engineering and Management, Slovak Republic

ABSTRACT

The values of society turbulently change with the ongoing changes in the world. It is the information which values most. Demand for information increases along with the need for even more advanced communication and information security in all fields of human activity. Development in the field of science and technology has brought many advantages such as Computational Age and massive introduction of the Internet as a communication and information platform, along with disadvantages which are particularly due to insecure sources of information assets exposed to a wide scale of threats and hazards such as degradation, loss, damage, disclosure and misuse. The paper deals with information security and its role in management systems. There is no simple recipe providing 100 % security of information. Companies apply the best security procedures with the aim to achieve an appropriate level of their information security. One of the possibilities is the implementation in the information security management system according to ISO/IEC 27001 standard.

The above-mentioned fact was the reason for carrying out the research and mapping the information security as well as closely related areas in terms of business practice in Slovakia. The aim of the article is to point at the information security in the companies, emphasize importance of the information security management system in the business practice and analyse the current state of the information security and processes of the information security management system in the Slovak business entities.

This article deals with selected results of the research carried out within the project „Information assets security as an integral part of quality management system in accordance with the principles of socially responsible business practises“, (acronym: SeInA). Methodology of the study was based on the scientific methods of acquiring and processing data: observation, questionnaire, interview, qualitative methods (analysis, synthesis, induction, deduction, comparison, abstraction, etc.); quantitative methods (descriptive statistics such as frequency analysis, statistical analysis, confidence intervals) and graphical methods. The research results identified the strengths of business entities and revealed the areas which need to be improved. Entrepreneurial entities should primarily realize that information security cannot be provided randomly, i.e. in particular cases of emergency or

incident; it requires a well-established and well-attended system providing minimum risk to information security, with a required level of guarantee and secured continuity of processes and individual activities of organization. The reason of the security information management system is to achieve better results than those that would be attained with independent behavior and operation. A well-established and well-attended system should ensure that the attributes (confidentiality, integrity, availability etc.) of the information assets security are being met, thus providing security of all parties and cultivating trustworthy relationships with them.

Keywords: information; security; management system; business practice; research results.

INTRODUCTION

Security of information assets can be seen as protection of information from devaluation, loss, corruption, revelation and misuse. Ideally, it might be characterised as threat elimination; practically it is mainly minimisation of risks that these cases really happen (or more precisely, the aim is to lower the risk to the acceptable level). Security is the key parameter gaining ground in all fields.

Reasons and scopes of choosing this topic:

- Using the information and communication systems and technologies presents a means of surviving for most of organisations these days. Technological, system and other related personal, physical and administrative imperfections of information processing use a variety of threats. Depending of information assets value, company's dependence on using them and with a probability of raising threats in combination with following destruction, these threats transform into less or more critical risks and result in security incidents daily attacking the information security of every organisation.
- Requirements to prevent systems from security incidents, minimisation of risks to the lowest level.
- Focusing on complex protection of information assets, not only on security of information systems and technologies, which is considered a subarea in this field. In complex protection of information assets, it is necessary to have physical and object-oriented security in view, along with the personal security and administration security.
- Nowadays, most of organisations find this time complicated and the managers face difficult challenges of the market. Main presumption of success is not only to identify the signals from customers and integrate them into the system of creating values, but also to build the efficient system of internal corporate communication and external marketing communication with customers and other related parties on national and international level. Different aspects may contribute to quality improvement of organisation's integrated communication. These aspects are related to information security according to the rules framed by the European Union and supported by managerial processes, procedures, corresponding software or hardware devices associated with examination of information leak risks. When assessing the quality of communication effect in present communication policy and organisations' strategy, it is generally possible to presume a number of limitations related to insufficient system orientation in this field. Moreover, there is a possible existence of barriers and

limitations within effective utilisation of organisation's communication mix, limitations in information security management and in the area of customer protection.

- Utilising of process-analytic managerial system in terms of practice.
- Establish and certify the information security management system according to ISO/IEC 27001:2005 standard as an integral part of quality management system, so the protection of all related parties would be provided. Established and integrated quality management system as well as the information assets security system will provide the evidence that a company is able to supply products meeting the requirements, improving effectiveness and efficiency of the company's performance and at the same time, it is capable of providing and keeping the security attributes of information assets such as confidentiality, integrity, availability, authenticity etc. thereby sustaining and cultivating relationship based on confidence with all related parties.
- Observance of information assets security attributes such as confidentiality, integrity, availability, authenticity etc. is in accordance with the principles of socially responsible business practices.
- Organisation adopting and applying the rules and principles of socially responsible business practises creates new and positive trends, new opportunities to innovate and it is characterised by greater transparency and activity. Such company acts more credibly than the competing business and this all contributes to cultivation of positive relationship based on confidence with all related parties.

Problem of information security management system (ISMS) has been included into a project called „*Information assets security as an integral part of quality management system in accordance with the principles of socially responsible business practices*“, (acronym: SeInA). Project SeInA was elaborated within the frame of the Programme to support young researchers of the Slovak University of Technology in Bratislava in Slovakia, which was being carried out from 11 June 2012 to 31 January 2013. Project SeInA also continued, extended and appended the partial goals of the VEGA project No. 1/0558/12 entitled „*Research of factors affecting selection and implementation of integrated marketing communication tools regarding information security and customer protection*“.

RESEARCH METHODOLOGY

Project SeInA was mainly focused on survey dealing with the present condition of the information assets security system in organisations in the context of principles concerning socially responsible business practices and verifying objective interest of organisations doing business in Slovakia in information security as an integral part of quality management system. Output was presented as knowledge of the given problem in terms of practice, identification of the strengths and revealing areas for further improvement.

Main goal of SeInA project was to *analyse the current condition of information assets security system in organisations in the context of principles concerning socially responsible business practices and analyse objective interest of organisations active in Slovakia in information security as an integral part of quality management system.*

Questionnaire, as a primary exploring technique, was used to gain empirical data. It had been composed in printed (a pilot version) and on-line (final version) format using the software application www.formees.com. Empirical data collection through on-line questionnaire was carried out in the period of November - January 2013. Research analysis procedure emerged from the specified goal only possible to fulfil by following detailed and systematic processing of sufficient amount of theoretical and practical knowledge from the given field gained from

primary and secondary resources (analysis of domestic and foreign scientific resources; mainly standards, methodologies, frames and models, studies, documents and scientific papers related to the topic, monographs, guidebooks, scripts, lecture notes, webpages; Ernst & Young; The Information Security Research Association, ISRA; the (ISC)² Foundation; Forrester Research, Inc. etc.). On the behalf of achieving the given objectives, various approaches, methods and techniques were used to process the topic – observation, questionnaire, interview, qualitative methods (for example analysis, synthesis, induction, deduction, comparison, abstraction, etc.); quantitative methods (for example descriptive statistics such as frequency analysis, statistical analysis, such as hypothesis testing, confidence intervals), graphical methods for example bar charts, pie charts, tables, diagrams, flow charts etc.), the principle stratification and a number of other creative methods and techniques.

RESEARCH RESULTS

Research results were obtained with the help of different scientific methods and SPSS software. Using the comparative analysis, they were compared with the results arising from previous researches that had formed a part of the research projects carried out at the company Ernst & Young, as well as researches conducted at other universities in Slovakia.

ANALYSIS OF THE CURRENT STATE OF THE GIVEN PROBLEM IN TERMS OF BUSINESS PRACTICE IN SLOVAKIA

Representative selected set of potential respondents was composed following the database of the Statistical Office of the Slovak Republic. Out of 2 000 addressed organisations active on the Slovak market, 835 respondents joined the questionnaire research; it means 41.75 % return. Experienced by previous questionnaire researches and due to particularity and demandingness of the problem, researchers discarded 309 out of 835 filled in questionnaires due to detected errors which might devalue the results. It is assumed that the error rate may have been caused mainly by time pressure, respondents' unwillingness, exhaustion and unfamiliarity with the topic. Selected set comprised of 526 statements of organisations active on the Slovak market, 17.5 % of which was of production character and 82.5 % providing services. In terms of the site of action, the greatest sector represented subjects active in the Bratislava region, nearly 30 %. 2.5 % of them were production subjects and remaining 27.5 % were providing services. According to the number of employees, it was possible to divide corporate subjects into four size groups in compliance with the regulation of EC No. 2003/361/EC. Stated classification and corresponding rate in individual groups can be seen in Figure 1.

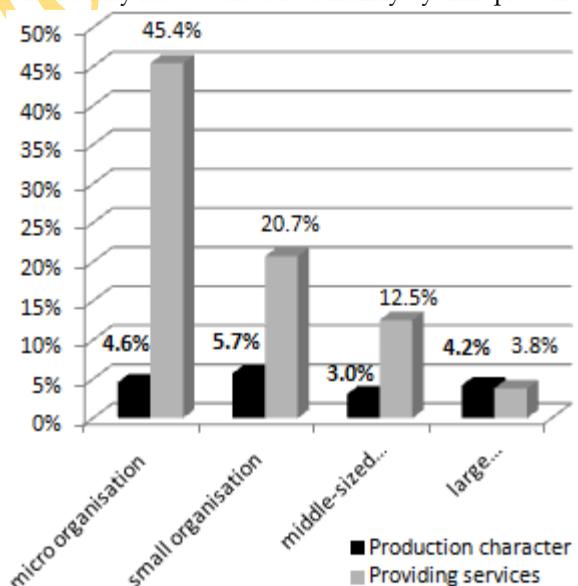


Figure 1: Graphic illustration of subjects classified according to their size considering the subject of their business practices (own source, 2013)

Concerning the topic of SeInA project, it was interesting to find out the time period the subjects had been active on the Slovak market. 77.8 % of subjects being active for more than 10 years on the market joined the questionnaire research. 7.6 % of them represented large companies, 14.8 % middle-sized and 22.1 % small organisations. Sixteen and a half per cent of the subjects had been active on the market for 5-10 years and 5.7 % had been active for less than 5 years. Greater part of the subjects was private property, 62.2 % domestic, 5.7 % foreign and 5.5 % with domestic and foreign participation. Eleven point two per cent of the subject represented majority ownership of foreign business entities. This allowed transfer of management system from the existing foreign parent business entities to Slovak subsidiary corporations. Twenty six and six percent state-owned organisations joined the survey. The last, but not less important, information depicting the Slovak subjects addressed in the questionnaire was the respondents themselves; it means representatives of organisations filling in the questionnaire. The most frequent positions of respondents in organisations were the top management representative, CEO, CISO, CIO, quality manager/manager for QMS and ISMS, IT manager/director and marketing manager. Following part of this paper deals with processing and analysis of the selected results.

INFORMATION SECURITY – INFORMATION ASSETS SECURITY

One of the questions to answer in the survey was whether the respondents knew the term information assets security. Middle-sized and large corporations had the greatest knowledge in this field. These corporations had also implemented various management systems. Organizations dealing with information security (IS) as a priority were active in the field of IT/telecommunications, public and state institutions, chemical industry, health service and finances/bank sector/insurance industry. IS was mainly related to information/data (e.g. documents, database) – 48.9 %, physical assets (e.g. computer hardware, means of communication, buildings) – 39.7 % and last but not least software – 35 %. In case of 27 %, security incident was expressed as a technical failure. Analysis results show that in general it is not possible to define the most vulnerable area, because every organization has its own specifications making it a unique subject. An interesting finding of the research was how the respondents themselves viewed and evaluated the level of information assets security in organizations – 48.3 % found the level sufficient and 26.2 % of the subjects found it satisfying. Respondents working in IT/telecommunications and public institutions evaluated the level as excellent or very good. Insufficient level appeared on a large scale in the field of Sales/Commerce/Consulting/Services. Nowadays, the most frequently used standards of IS management system are ISO/IEC 27001:2005, ISO/IEC 27005 (replaced standard BS 7799), ITIL® and CoBIT®. Besides the mentioned standards and frames in the field of standardization of information security, some other important players are in the game, e.g. AIM, BiSL®, CMMI®, ISO/IEC 15504-x, AS8015, SABSA®, P-CMM® etc. Information security frames seen at national level are defined by different legislation standards. Comparison of the results gained from research studies and carried out by various companies led to these findings: since 2005, the internal standards of companies have mostly been established. This trend appears to be the same in Slovakia and the Czech Republic. Most frequently used standard in the field of information security and establishing management system in Slovakia and the Czech Republic was ISO/IEC 27001. Comparison of the research results (research reports of Ernst&Young Company and PricewaterhouseCoopers Company) showed constant increase in the standard utilizing. It is possible to assume that the main cause of this phenomenon is the compatibility of various standards being implemented to improve management systems (e.g. ISO 9001, ISO 14001, OHSAS 18001).

INFORMATION SECURITY MANAGEMENT SYSTEM AND OTHER VARIOUS MANAGEMENT SYSTEMS

Analysis results show that up to 81.8 % of organizations in Slovakia do not have IS management system established according to the international standard ISO/IEC 27001 (Fig. 2). IT/telecommunications-oriented organizations have well-established and certified ISMS according to stated standard. Primarily, these are the large companies dealing with providing of services which have been on the market for more than 10 years. Findings of research studies carried out by different companies prove this fact as well. There is a great area for further improvement in small and middle-sized organizations to increase awareness of information security, but also possibilities of its management.

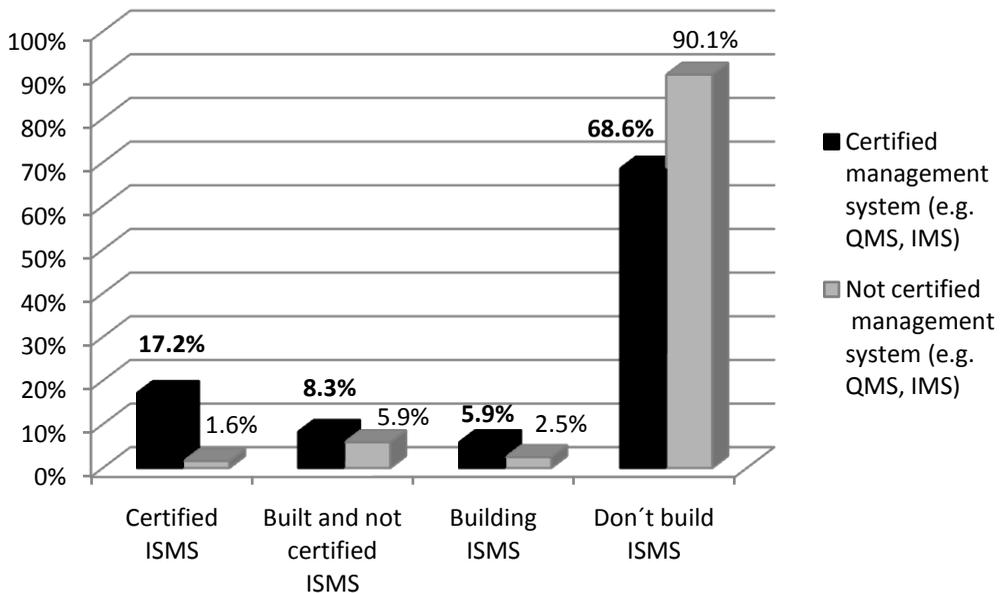


Figure 2: Information Security Management System according to ISO/IEC 27001 in organisations active in Slovakia (own source, 2013)

Nowadays, the most common implemented and well established management systems in organizations are the Quality Management System (QMS) and the integrated management system (IMS). Out of 526 participants, only 22.8 % had certified QMS and 6.1% of them had also built and certified ISMS. More detailed analysis was used to find the level of ISMS in individual organizations (Tab. 2) and the difference of their behavior considering application of various standards to improve management systems, or more precisely their complex integration. Stratification principle (in compliance with the certified management system) was used to compare ISMS according to ISO/IEC 27001 in organizations in Slovakia. Based on the results of this study, the following hypothesis was verified:

H₁: Organizations active in Slovakia using different certified management systems show the same level of ISMS as the organisations which do not use certified management systems.

Table 2 Outline of different items showing the level of ISMS in organizations in Slovakia (own source, 2013)

Items depicting the level of ISMS	Certified management system	Not certified management system	Significance
Exercise of process management in information assets management	7,4 %	1,2 %	***
Advance in information security processes	6,4 %	4,0 %	-
Defined scope and limits of ISMS in the context of business activities and risks	6,4 %	2,2 %	**
Declaration of ISMS policy in accordance with business requirements and relevant laws and regulations	11,8 %	8,4 %	**
Documented statement describing goals of management and ISMS measures	4,9 %	1,9 %	**
Regularly carried-out analysis of information assets security risks	22,5 %	11,5 %	***
Reconsideration and approval of residual risks of IS by top management	18,6 %	10,6 %	***
Process dealing with management of information assets security risk	12,7 %	5,3 %	***
Programme of increasing the security awareness (it means knowing the need and basis of information security)	10,8 %	4,7 %	***
Clearly defined competencies (competence, responsibility etc.) of employees' information security	24,5 %	15,8 %	***

Comment: *** Very high significance, ** High significance, * Significance, - Don't significance

To draw conclusions, the results of statistical analysis were used. These results are stated in the Table 2. Table 2 shows the proof of statistically highly significant and significant difference with the significance level of 0.1 % in large number of items related to ISMS level. With the probability of 99 %, it is possible to confirm the existence of significant differences affecting the level of ISMS. It means that these significant differences emerged from implementation, maintenance and improvement of management system meeting the requirements of various standards. Based on the above mentioned, it is possible to prove positive influence of standards utilization on management system improvement in organizations.

Following the results, the hypothesis H01 has been rejected, because of 9 items showing significant differences in distribution of answers of surveyed organizations. At the same time, the alternative hypothesis H11 has been accepted: Organizations active in Slovakia with different certified management systems do not show the same level of ISMS as the organizations without certified management system. This hypothesis can be confirmed with the probability of 99 %.

CONCLUSION

Analysis of the problem was carried out based on the knowledge of content and causal relations among individual mutually coherent items characterizing the topic of SeInA project. Problem of information security as an integral part of QMS is a highly actual topic,

which was also proved by respondents' interest in the research results. Moreover, interest of individual organizations in the problem was demonstrated following the findings of the research and after the comparison of the results with the results of research studies carried out by individual companies (they showed gradually increasing trend in ISMS implementation). On the ground of the respondents' statements (respondents who joined the research to find what really prevents information assets security from expansion in the Slovak Republic) and following the findings of research studies, there is still very low level of security awareness. It is the main barrier on the way to further development. When analysing the present state of information assets security, **the following strengths** of organizations emerged:

- positive influence of various standards used in management systems and their mutual integration (e.g. integrated management system - ISO 9001, ISO 14001, OHSAS 18001) on ISMS implementation; increasing trend in applying the ISO/IEC 27001 standard in organizations in Slovakia (coming out of comparison of SeInA project results and the results of research studies carried out by Ernst & Young Company; PricewaterhouseCoopers Company); the most frequently used standard in the field of information security to establish management system in Slovak and Czech organizations is ISO/IEC 27001. (Research report of Ernst&Young Company, report of PricewaterhouseCoopers in comparison with the results of SeInA project); minimum requirements for information security provided by means of national legislation standards, it means information security becomes an integral part of the activities of all organizations (not only those large corporations).

Simultaneously, some **areas for further improvement** emerged:

- demonstrably low awareness in the field of information assets security in small and middle-sized business entities; many companies understand information security only at the level of IS/ICT security; demonstrably low level of ISMS implementation in organizations in Slovakia; it is necessary for the top management to take full responsibility for IT management and to manage actively its strategy and security processes. Information security is not only a question of IT manager's concern, or concern of IT operator. Management of each company should insist on implementation of information assets security in the organization as an integral part of QMS in compliance with the CSR principles so it can provide uniform contribution, uniform approach to IT management and IT security in an organization; carry out the program to increase awareness of information security in organizations focused on reducing of any risks which might cause a security incident.

Findings coming out of the research created space for further research in the given field.

ACKNOWLEDGEMENTS

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Brand Making Process in B2B Companies (Case Study: Tam Iran Khodro Company)

Dr. Mahmoud Samiei Nasr¹, Mohsen Mahmoudzadeh², ShahabMousavi³, & Elham Agha Alikhani⁴

¹Department of Business Management, South Tehran Branch, Islamic Azad University, Tehran, Iran
^{2,3,&4}MA Student, Business Management, Islamic Azad University, South Tehran Branch, Tehran, Iran

ABSTRACT

In this research we have tried to analyze the brand making process of Tam Iran Khodro Company from the view point of the employees who are the most important factor in brand making of a company. The purpose of this research is to know whether such Companies that are not in direct connection with the final customers will try to be changed into a valid brand from a merely trade name. Also another purpose of this stage is providing a general and up to date picture of internal company-based perceptions of the brand, so that the process will be started based on the business realities. This research was carried out through holding the training courses for all employees in regards to the upcoming challenges at the time of entering the brand making management and distributing questionnaires which are the most important instruments of this research. The present research is a field study research from the view point of manner of gathering information, a survey study research from the view point of manner of performance and a developmental & applied research from the view point of the purpose. The statistical universe of this research consist of personnel of Tam Iran Khodro Company including managers and employees who are totally 450 persons and 126 persons out of which were selected accidentally as the final sample. The instrument of gathering information is questionnaire designated by the researchers. Cronbach's alpha coefficient of this questionnaire was calculated 0.838 considering 15 persons as the initial sample and since this digit is more than 0.7, its reliability is proved. Student's t-test & Friedman test were used to test the hypotheses. The results indicate that Tam Iran Khodro brand has not favorable conditions. Finally, occupational stability, promises of Tam Iran Khodro Company to the customers, motivation of the employees and its role of in improvement of Tam Iran Khodro Brandand capabilities of Tam Iran Khodro Brand, respectively, were determined as effective factors for Tam Iran Khodro Brand from the view point of the employees.

Keywords: Brand, Occupational Stability, Motivation, Employees

INTRODUCTION

Precise familiarity of all staff with the concept of brand and understanding of different approaches to this important issue, and also understanding the fact that refusal from entry into the field of brand and global organization in light of creating competitive space in the

country, has gradually shifted the company from the competition battle and will threaten the occupational prospect of the staff.

Hence, the first challenge faced by "Tam Iran Khodro Company" to enter the field of brand management depends on training all staff and finding the impacts from the viewpoints of staff, so that in addition to assessing the weaknesses and problems in the past activities we become able to draw the road map for the future. In the smart future markets from which we are not so far, the company's success is less dependent on higher production and/or attendance in various tenders and entry into new enterprises. On the contrary, focusing on customer needs and wants, we should seek ways to make permanent the value of our services in the minds of consumers. And this method only works through making powerful brands and correct management conformed to environmental conditions and choice of appropriate strategy to pass through this transition term. Considering the spread of rapid global revolutions and fading of economic boundaries and the increasing emergence of rivals with the names turning into significant brands every day, the effect of politics, our current relationship with other countries, the promotion of Iranian customers' expectations to global wants and their relatively good recognition of reputable brands, low presence of private sector, exclusion from WTO, lowered foreign investment, low familiarity with the laws of international markets, semi-competitive atmosphere of the country, etc., have made challenges on the way of Iranian companies particularly those not in contact with end customer to the field of brand management.

Today as we are trying to attract customers and satisfy them, our rivals are trying to preserve their customers and convert satisfied customers to loyal customers. Hence it is necessary that CEO's and other colleagues, regarded as the most important capitals of the company, study precisely the end markets, and present appropriate brand strategy so that gradually observe the brand "Tam Iran Khodro" and other Iranian apt companies in the strategy circuit of international reputable brands they deserve. In its assessment and goal setting, the country should act in a way to be able to realize this period besides preserving its entity more than ever, and conform to these revolutions and specialized activities to stay in the minds of domestic and international customers. No need to say that brand management is regarded as a systematic process of marketing and market development.

Brand strategy is enterprise strategy today, the realization of which requires the belief of management and cooperation of organization body, because by the time the efforts made by the company are not integrated toward brand support, they will not be accompanied by the contemplated success.

LITERATURE REVIEW

Brand Definition

Brand is a combination of tangible and intangible feature, appearing mostly as the company brand.

(1) Brands can't merely be made of preparing imaginary advertisement. If you promote the concept of brand as a promise for your customers, obviously that brand can only emerge if you fulfill that promise. Of course, your promise and brand should be clear, relevant and meaningful and should not be confused with exaggerated marketing promises. (2)

Importance and Value of Brand for B2B Companies

Many industrial marketers consider the development of a brand only as a variable marketing cost with a high failure risk; whether we name an industrial business, service or product or not is not often contemplated by many companies, but do they really have any

alternative? Is naming in industrial situation as important as it is in consumption situation? Industrial marketing atmosphere is changing so rapidly that the enterprises failing to conform themselves to the new situation are necessarily excluded from the competition. Industrial mergers, flimsy global economy and alternative products in the market are effective competitive factors. In many increasingly competitive environments, it is no longer enough to offer excellent services and products.

Through determining a brand and attaining a desirable competitive place in the market, enterprises can distinguish themselves from the entire setting through achieving success.

There are many powerful factors converting the establishment of industrial brand to a very important factor. Interestingly, the main factors promoting the brands in consumer markets are also obvious in industrial markets, and more surprisingly, the importance of naming is still neglected in industrial market. These factors are divided into three main categories:

- 1- Development of similar products and services
- 2- Increasing complexity
- 3- Incredible price pressure (2)

It should be said that its signs and power are more significant in industrial marketing (B2B); where the customer's sensitivity is so much and flexibility is so low and the slightest inattention spoils all marketing efforts.(3)

Recent studies conducted by McKinsey and MCM, indicate the importance of brand in different industrial markets. They studied the inseparable functions of brand considering their importance in an industrial environment and indicated that the most important functions of brand include:

1-Increasing the Efficiency of Information: Named products facilitate the gathering and procession of information regarding a product for customers.

2- Risk Reduction: In industrial markets, brand can contribute to the warranty and justification of a purchase decision, because industrial customers are so interested in avoiding risks.

3- Creating an Image of the Advantages and Value Added: In an industrial environment, the added value created with the brand is not in an explaining position. Existence of such a subject can be so important. Through a brand, not only you can introduce your staff to the world, but also you can present your whole company (2)

Also to survive in the global competition, industrial companies (B2B), providers of products and services in industrial marketing, seek to gain competitive advantage through strategic use of brand development and through investment in this field they may gain as much profit as in consumer markets. (1) Two variables of loyalty and trust are the most important value-generating variables for an industrial brand. It should be considered that merely generating value is not enough for the brand; industrial marketers should convert the brand value to the efficiency of buyer-supplier connection. (4)

Brand Promise

Brand promise is the same as a framework based on which the distinct experiences related to brand in specific times, places and situations are explained to the customer by the company.(5) In a book titled "The Glossary of Brand" in defining the brand promise, Swystun, J suggests that the brand promise depicts the mutual nature of Brand-Customer relationship.(6) Brand promises mostly indicate themselves as the product's functional emotional features and experiences resulting from the purchase of the brand, identification of various personalities against the purchase and gaining the product's distinct features by buying a specific brand.(5) A feature of a specific brand is that the promised item should

enjoy features such as simplicity, conformity to the customer's requirements, continuity, and directionality for the customer. (7)

Role of Brand Promise in Gaining Competitive Advantage

After making promise by company to the customer, a transient distinction for the brand is made in the customer's mind, leading the customer to buy the product. Further, fulfilling the promise made by the company for the customer, makes trust by the customer and this trust leads to satisfaction of the customer with the brand purchased. Since based on different scientific studies, a huge part of customer loyalty to a specific brand depends on their satisfaction with the purchase of that brand, the loyalty made in the previous stage ends up with customer loyalty and this makes a loyal customer due to a more stable relationship with the brand not only take the advantage of buying a brand but also create a high benefit for the company. (1)

Role of Motivation of Staff in Enhancing the Brand of B2B Companies

To take step in gaining competitive advantage, industrial organizations have to provide motivation for the staff higher than the rivals, and motivation is regarded as a key factor in this regard. With the intensification of competition in trade and rapid technological changes and also the increase the power and option of customers, the success will be for companies who are able to understand and identify the expectations and values of customers and respond them in a desirable manner. (8)

A Relevant step is the employee branding in industrial organizations that can be defined as a process through which the employees internalize the desirable image and are motivated to present this image to the customers. In the way to enter the brand field, staffs are expected to keep the brand alive and act as brand ambassadors. Brand is created in the interaction between the staff and the customer requiring high commitment in the staff toward the brand. The greatest advertisement campaigns are effective when the staff of that organization can induce a positive sense of their brand to their customers. (9)

Personal stability of staffs and promotion of brands of B2B Company Job security has two objective and mental dimension, objective dimension refers to the non-existing of threatening factors in organization and mental dimension refers to feeling and perception of lacking obstructions to occupation at present and future, job security means feeling of having a good job and confidence from its continuity in future and lacking the factors that threatens the good conditions of the work in that job (10). Staffs as the first customers, are the most powerful and the most important factor in enhancing and or weakening of the brand and doing commitments related to the brand that is given to the customers, because they are always in continuous interaction with customers and the other staffs.

Today, building a brand will not be successful without supporting services including expert manpower, information and appropriate organization, hence organization members should know themselves as a part of this process in the process of building brand, not merely do their task as a duty. New theories about the economic growth also emphasize on this point that human capital is human resource of technology growth and consequently the origin of achievement to high economic growth rate, today, leading companies pay special attention to the role of human factor in organization, accumulation of human capital and establishing an environment with creativity and innovation and becoming a valid brand, are among the fundamental factors in their work. (9)

Staffs who have experienced an appropriate job security in organization can ascertain the brand management at industrial companies and bring growth for organization brand.

The objective of this research is analyzing brand making process in industrial companies.

RESEARCH METHOD

The present study in terms of gathering information is a field study, in terms of execution is descriptive if survey type and in terms of objective is developmental and applied. In this research in order to gathering information, questionnaire is used. This questionnaire with respect to the volume of first sample is 15 people; Cronbach's Alpha coefficient was calculated 0.838. Since this number is more than 0.7, its durability will be proved. Based on Cochran formula the volume of ultimate sample was calculated 126 people.

HYPOTHESES

Considering the necessity of the present research, the main and secondary hypotheses of this study include:

Main Hypothesis: The brand "Tam Iran Khodro" is not in a desirable position to become a reputable brand according to the staff.

Hypothesis 1: From the point of view of the staffs, the brand "Tam Iran Khodro" doesn't have a desirable situation in comparison to the rivals.

Hypothesis 2: Commitment to the brand promise is not performed in a desirable manner in "Tam Iran Khodro".

Hypothesis 3: The staffs of "Tam Iran Khodro Company" don't have enough motivation to become a reputable brand.

Hypothesis 4: The necessary occupational stability in the staff to change the brand "Tam Iran Khodro" to a reputable brand is not in a desirable place.

INFORMATION ANALYSIS

General information of respondents

After the reviews that were obtained from descriptive statistics, general information of the respondents are as follow:

69.75 percent woman, 30.25 percent man

Age: 20 to 30 years old, 23.08 percent; 30 to 40 years old, 69.23 percent; 40 to 50 years old, 7.692 percent Education: diploma, 11.02 percent; junior college diploma, 11.02 percent, bachelor degree, 61.86 percent; master degree and higher, 16.10 percent

HYPOTHESIS TEST RESULTS

In order to analyze the brand of "Tam Iran Khodro" from the point of view of the staffs, the data is designed by questionnaire and is collected by researchers and these collected data was analyzed by student's T-test and Friedman test.

Table 1) Hypothesis Test Results

Research hypothesis	hypothesis	Measurement basis	High limit	Low limit	result
Main hypothesis	the brand "Tam Iran Khodro" is not in a desirable position to become a reputable brand according to the staff	2	0.9710	0.7591	Hypothesis proof
Secondary hypothesis 1	From the point of view of the staffs, the brand "Tam Iran Khodro" doesn't have a desirable situation in comparison to the rivals.	2	1.2641	1.0406	Hypothesis proof

Secondary hypothesis 2	Commitment to the brand promise is not implemented in a desirable manner in "Tam Iran Khodro".	2	1.0794	.8085	Hypothesis proof
Secondary hypothesis 3	The staffs of "Tam Iran Khodro company" don't have enough motivation to become a valid brand.	2	0.7677	0.4392	Hypothesis proof
Secondary hypothesis 4	The necessary occupational stability in the staff to change the brand "Tam Iran Khodro" to a reputable brand is not in a desirable place.	2	0.9512	0.6453	Hypothesis proof

After testing hypothesis and proving all the hypotheses we can conclude that commercial name of Tam Iran Khodro for becoming a valid brand is not in a desirable situation from the point of view of the staffs.

Table 2) Rating of effective factors in "Tam Iran Khordo" Brand from the point of view of the staffs

Effective factors on "Tam Iran Khodro" brand from the point of view of staffs	Test result	rank
Situation of commercial name of "Tam Iran Khodro" in comparison with rivals	4	1
The motivation of staffs of "Tam Iran Khodro"	2.83	2
Commitment to the brand promise in : "Tam Iran Khodro" company	2.15	3
occupational stability of staffs of "Tam Iran Khodro"	1.02	4

CONCLUSION AND RECOMMENDATIONS

Analysis of the collected data shows that most respondents are female staffs with bachelor degree and their ages are between 30 to 40. Population mean test was used to test the hypotheses. Because the test is one-sided, obtained sig can't be used to verify the hypothesis. So the obtained high and down limit scale was used. As can be seen in Table 1, according to the positivity of high and low limit of the hypothesis test, main hypothesis and all of the secondary hypotheses proved. The results of the analysis of the hypothesis show that commercial name of "Tam Iran Khodro" from the point of view of the staffs isn't in a desirable situation for becoming a valid brand. the results of the analysis of Secondary hypothesis indicate that from the point of view of the staffs, the commercial name of the "Tam Iran Khodro" in comparison with rivals isn't in a desirable situation, adherence to the brand promise doesn't implement in a desirable manner in "Tam Iran Khodro" company, the staffs of "Tam Iran Khodro company" doesn't have enough motivation for becoming a valid brand and ultimately, staffs don't have desirable job stability for turning commercial name of "Tam Iran Khodro" to a valid brand. The obtained results from the Freedman Test show that, respectively, the situation of commercial name of "Tam Iran Khodro" compared to the rivals, the motivation of Tam Iran Khodro staffs, adherence to brand promise in "Tam Iran Khodro company" and finally required job stability of staffs of "Tam Iran Khodro" and for turning the commercial name of "Tam Iran Khodro" to a valid brand are considered the effective and important factors in "Tam Iran Khodro" Brand from the point of view of the staffs.

With respect to the obtained results, the following recommendations can be offered for analyzing the brand of B2B companies:

1. Providing Job stability and creating an organizational environment where staffs are empowered to become more and more creative it is necessary to promote the brand of B2B companies.
2. Motivation of the staffs and their tendency to render distinguished service to the customers in promoting the B2B brands not only is necessary but also is the main factor in distinguishing the products and services of B2B companies.
3. B2B companies can only become a prestigious brand if they are obliged to the promises given to the customers.
4. The training of all staffs and problem finding of the company from the point of view of staff, is necessary for promoting the brands of B2B companies
5. If the companies want to resist in the competition field, they shall emphasize on the needs and demands of customers and look for ways to create good and lasting images on the customers' mind.

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