VOLUME - 11, ISSUE - 05, MAY - 2022 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Engineering

DIAGNOSTIC MODEL FOR DETECTING IMPLEMENTATION FAILURES IN INFORMATION SYSTEMS

Manavjit Singh Dhindsa	Amdocs Development Center India LLP, Pune, Maharashtra.
Dr. Bikram Pal Kaur	Chandigarh Engineering College, Landran, Mohali, Punjab, India.
Dr. Himanshu Aggarwal	Deptt.of Computer Engineering, University College of Engineering, Punjabi University, Patiala 147002, India.

ABSTRACT Information system (IS) is the current trend in the organizations they are gaining competitive edge due to its successful implementation, which is a major factor to improve performance of the organization. The aim of this paper is to report the method for evaluating the failure factors of Information system implementation based on research conducted at two organisation of telecommunication industry using information systems. A quantitative survey-based method was used to collect the data from the two organizations Reliance Communication Limited, Chandigarh and Punjab Communication Ltd. (Puncom) Mohali. The significance of the ensuing factors for implementation success/failure factors are diagnosed from the opinion of the respondents of these organizations. Reliance Communication Limited is the global adopter of IS and is doing well in the market and the other one having domestic IS, not doing well in the current market. 21 variables were chosen for the study relating to failure and success factors of Information System. Quantitative analysis was performed by using various testing models, Factor Analysis, Neural Network to check importance and to identify CFF & CSF between Puncom & Reliance. This paper suggests that starting from the implementation phase of IS, the organizations must be able to recognize that IS is a Socio-Technical challenge and not only a technical or a managerial work. Therefore, there is the need of modifying the prevailing processes or remodelling them in the second organization (Puncom, not doing well in the market) so that it may compete globally. The results are discussed along with the implications of the research for the future work and provide suggestions for both the academicians and practitioners on how to achieve holistic improvement under IS.

KEYWORDS : Information System Implementation, IS, Critical Failure Factors (CFFs), Critical Success Factors (CSFs), Telecommunication.

INTRODUCTION

Information systems are the integrated systems having the mechanism based on implementation and forecasting which support the management in the decision making process and integrate different activities of the organisation. The benefits of IS is like right flow of information at all the levels of the management... Therefore effective IS implementation using certain new technique is important and is the need an hour.

The western countries & US gives importance to the Information Systems. But the effectiveness of the IS is still not very sure. This is because of the absence of IS measures and IS success/failure stories.

There has been tremendous thrust on such studies in US and western countries but such zeal is missing in our country due to certain factors like environment, politics, social setup, culture etc. Each country has its own setup therefore such studies of US and west may not be applicable or useful in our country. Most of the studies conducted focus themselves on the success factors and neglect failure factors. The study of the failures is equally important and yet not highlighted and therefore it is an important candidate of research.

The main purpose of this paper is to realize the method for determining the success/failure of the organisation during implementation phase using Neural Network & SPSS 20. It identifies the potential IS success and failure factors along with their normalized importance.

LITERATURE REVIEW

The review of IS literature suggests that for the past 15 years, the success and the failure of information systems have been major concern for the academics, practitioners, business consultants and research organizations.

A number of researchers and organizations throughout the world have been studying that why information systems do fail, [1] - [2].It has been identified the following critical IS failure factors:

- Fear-based culture., Political pressures. Poor training., Technology focused, Technical fix sought, Development sites split, Poor reporting structures, Poor consultation, Project timetable slippage, Complexity , Inadequate testing,

Leading Edge System, Over Commitment

Six major dimensions of IS viz. superior quality (the measure of IT itself), information quality (the measure of information quality), information use (recipient consumption of IS output), user satisfaction (recipient response to use of IS output), individual impact (the impact of information on the behaviour of the recipient) and organizational impact (the impact of information on organizational performance) had already been proposed [3] All these dimensions directly or indirectly are related to HR of IS.

Cancellation of IS projects [4] are usually due to a combination of:

- Poorly stated project goals;
- Poor project team composition;
- Lack of project management and control;
- Little technical know-how;
- Poor technology base or infrastructure;
- Lack of senior management involvement.
- Escalating project cost and time of completion.
- Some of the other elements of failure [5] identified were:
- Approaches to the conception of systems;
- IS development issues (e.g. user involvement);
- Systems implementation;
- Organizational roles of IS professionals;
- Organizational politics;
- Organizational culture;

All the studies predict that during the past two decades,

investment in Information technology and Information system have increased significantly in the organization. But the rate of failure remains quite high. Therefore an attempt is made to prepare the IS implementation model for the prediction of the success or failure of the organization.

Critical Success Factors (CSFs) for IS are the few key areas in which things must go right for an organization to thrive. If results in these areas are inadequate or deficient, the organization's efforts will be without reward. Further, these mission-critical areas must be recognized and acted upon in an effective manner or it will not be possible to ensure success for a manager or an organization. Indeed, a logical conclusion and reasonable inference from this argument is that CSFs are areas of activity that should be receive constant and careful attention from management.

Successfully adopting IT depends on user acceptance and actual usage of the system.

OBJECTIVES AND SCOPE OF THE STUDY

- To study the causes of failures of IS implementations.
- To develop a model of failure.

The objective of study was to analyse the failure a factors of Information System and pinpoint the most important factors in implementation. Also, the study focuses on testing the relevance of the factors existing in literature in the Indian Telecom Industry. In view of the certain constraints like time and money, the study was confined to the two organisations, namely, Punjab Communication Limited (PUNCOM), and Reliance Communication, Chandigarh (Reliance). These enterprises were selected because they are using Information Systems. The former one is using the domestic IS and has low business performance and is late in adopting IS where as the later one is using the international package of IS i.e. SAP (Systems Applications Products in Data Processing) for handing their business and the company have extremely good business performance, high employment generators and early adopters of IT with functional ISs. This industry is strategically and economically important due to high communication need and also India is the second largest mobile user country of the world.

RESEARCH METHODOLOGY

Data Collection Tools

Primary data has been collected through a questionnaire-cum-interview method from the selected respondents. The questionnaire was designed based on the literature survey, and detailed discussion with many academicians, professionals and industry experts. 21 variables were selected for the study relating to failure and success factors of Information System. Quantitative analysis was performed by using various testing models like T & ANOVA test, Factor Analysis, Neural Network to check importance and to identify CFF & CSF between Puncom & Reliance this study was also conducted on overall basis in the last chapter of testing to have the holistic improvement under IS.

Implementation Of Information System

The analysis had been made on the basis of the mean scores and the factor analysis techniques. The responses of the managers of the two companies differ significantly in terms of their mean scores. Among these companies, Reliance Communication Ltd. has been pioneer in implementation full-fledged Information System (IS) with fully automated procedures, processes and practices. The Puncom has a function-wise domestic IS, that is not well-integrated. IS is only being used as a support tool by the Puncom managers.

Scale Reliability

Reliability of the scale was studied for implementation using Alpha method of scale reliability. The Cronbach's Alpha was calculated for both Puncom & Reliance.

The value of the Cronbach's Alpha was found to be greater than the standardized value of 0.6.This means the data is reliable. Hence both Puncom & Reliance had attained value of 0.779 & 0.891 respectively and overall 0.956. This establishes the reliability of the scale.

Implementation Process for Information System

The respondents had been divided into three levels i.e. top level, middle level and operational level. The various sub factors were evaluated under different factors as shown in table 1.

Table 1 Factors & Sub Factors For IS Implementation

1.Technological Related Factors	F1	Documentation of operation, usage, support and maintenance
	F2	Integration of IS with other organizational units
	F3	User support & its requirement specification
	F4	Flexibility & adaptability of IS system to change
	F5	Maintenance, enhancement and keeping up to date of IS
	F6	Up gradation of Technology with time
	F7	Employees possess desired skills and knowledge Operation of IS according to business objectives
	F8	Operation of IS according to business objectives
	F9	IS manages all activities in supply chain.
	F10	Structuring (centralization) of information systems
2.Futuristic & Resource Based	F11	Availability of IS/IT resource based view(RBS)
	F12	User support & its requirement specification
	F13	Trade rules and regulations
3. IS Service Perspective	F14	Competency of IS staff
	F15	Handling of front office queries of quality customers
	F16	Packaging, promoting and communication of IS to employees, before and after implementation
4. Web Based Related	F17	Technical team at the backend
	F18	Multilanguage web site
	F19	Content(value-added, plenty, personalized)
	F20	convenience
	F21	Privacy

The T & ANOVA Test had been performed on the mean scores of the above said 21 factors. From which only 14 factors were found to be significant upon which neural network is applied as this method gives us the better results because it works like human brain and gives predictions like brain.

From the T & ANOVA test it had been concluded that Reliance has been sincere in implementation full fledged Information System with fully automated procedures processes and practices .This showed that the variable identified as in table 1 are executed in the right direction whereas in Puncom there is a need for flexible model and still a huge scope of improvement & integration is possible .On the other hand managers of the Reliance do not have high expectation as the company has already exposed as IT leader.

For the significant finding the difference in the three levels are calculated by using T-test. The variables selected by

application of T test at three different levels showed that the variables contributing are significant. Two factors like privacy, packaging of IS were not used in the inferential analysis for developing the implementation model as they are not contributing significantly in all three levels in Puncom & Reliance.

The differences were existing in the two companies in context to IS which was calculated by ANOVA. The value of sub factor whose significance is more than 0.05 those variables were not significantly contributing towards the model, it was found that the variables like Structuring (centralization) of information systems, Content (value-added, plenty, personalized), convientactual, Multilanguage web site,Privacy actual, Handling of front office queries of quality customers 8. Packaging, promoting and communication of IS to employees, before and after implementation are neither contributing in Reliance nor in Puncom.So these 7 variables in total are excluded from the present study. Further remaining 14 variables whose significance value is less than 0.05 were considered relevant for developing IS model on which the Neural Network is applied. The study of Neural Network is only to find the failure factor of Puncom.

Neural Networks

Further it was explored that for getting accurate results there was a need to minimize the prediction error for three selected level i.e. Top management, Middle management and operation management. Therefore Radial Basis Function (RBF) network was created. The network was the function of predictors (also called inputs or independent variables and target variable) also called outputs) It was used to forecast the company how the improvements could be justified by exploring critical success & critical failure areas. There are p samples (x1, x2.... Xp), the corresponding factors & covariates (f1, f2..... FN), used to minimize the error b/w actual outputs (y1y2----yN) by exploring hidden linkages to attain lesser error in the following results.

Taking the case of PUNCOM how model become failure and to identify failure factor among the pool of variables identified . As depicted by SPSS20 Neural Network using Radial Basis Function (RBF),network result were generated . This network first of all position the active data set of 159 samples into training , testing & holdouts in PUNCOM organization.

Table 2 Neural Network Case Processing

Case Processing Summary			
		N	Percent
Sample	Training	86	65.2%
	Testing	33	25.0%
	Holdout	13	9.8%
Valid		132	100.0%
Excluded		27	
Total		159	

As shown in table 2,the result examined that 65.2% of samples was treated as training where 25% & 9.8% came under testing & hold out sample .Network information and displayed all factor and covariates into input layers, 10 of hidden layer and output layer indicating the target variable i.e. levels.

The model summary showed the 10 hidden linkages that have reduced the error in testing sample from 6.176 to 2.771 . Hence RBF network tries to minimize error function during training & testing sample

Table 3 Model Summary

Model Summary		
Training	Sum of Squares Error	6.176
	Percent Incorrect Predictions	8.1%
	Training Time	0:00:01.47
Testing	Sum of Squares Error	2.771a
	Percent Incorrect Predictions	9.1%
Holdout	Percent Incorrect Predictions	15.4%
Dependent Variable: level		
a. The number of hidden units is determined by the testing data criterion: The "best" number of hidden units is the one that yields the smallest error in the testing data.		

To check the validity of these results the classification table is used as shown in table 4.

Table 4 Classification Of Neural Network Dataset

Classification					
Sample	Observed	Predicted			
		1	2	3	Percent Correct
Training	1	4	1	1	66.7%
	2	0	2	5	28.6%
	3	0	0	73	100.0%
	Overall Percent	4.7%	3.5%	91.9%	91.9%
Testing	1	2	0	0	100.0%
	2	0	1	3	25.0%
	3	0	0	27	100.0%
	Overall Percent	6.1%	3.0%	90.9%	90.9%
Holdout	1	1	0	0	100.0%
	2	0	0	2	0.0%
	3	0	0	10	100.0%
	Overall Percent	7.7%	0.0%	92.3%	84.6%
Dependent Variable: level					

The training sample 91.9% was compared with hold out sample(84.6%) . As the percentage was so near this means the model is correct and all the cases are correctly classified. Model excels in identifying top management, middle management than lower management. This indicates that top & Middle level both need to put their 100% to improve their company.

For randomly selected respondent there probability or area was higher(0.980) for the top management,.848 for middle management, and .913 for the lower management.

The predicted pseudo probability of failure will be higher for employees linked with top Management .This means that in PUNCOM Organization Top management needs to substitute efforts in all project phase and there are lot of existing deficiencies amongst the top level which further disturbs the lower level.

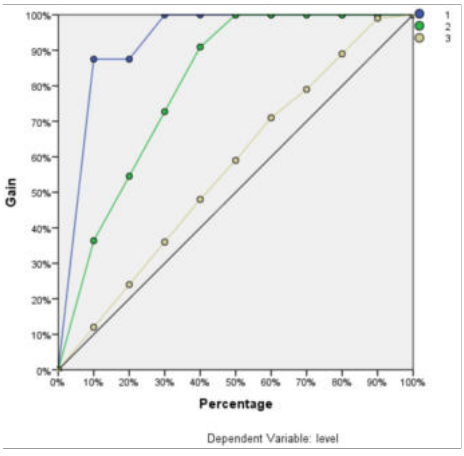

Fig 1 Gain Chart For IS Implementation Model Of Puncom

Fig 1 depicts the cumulative gain chart of organization called PUNCOM. Each and every specified point at

different level can helps to catch the defaulters which indicates more and more failure rate . As it was observe the top level lies further to the base line that means that company was deficit in decision makers among the top most level . Take the first point on Top level (10,87%) means if we sort all the cases by predicted pseudo probability of Top level we would expert top 10% to contain 87% of all those cases that creates losses or failure of company under top level. Like wise 50% of work neglected by top management , deficit would increase to approximately 100%. Least defaulters exists among the lower level than middle level .If there is proper direction in a by the top management in implementation , the company's IS system would definitely improve to a great extent. From the fig. we conclude that the top management plays a pivotal role and is leading PUNCOM towards failure followed by Middle and lower level management . Similarly in case of Middle management first 10% to contain 35% of cases that creates loss under Middle level , similarly it can be worked out for operational level.

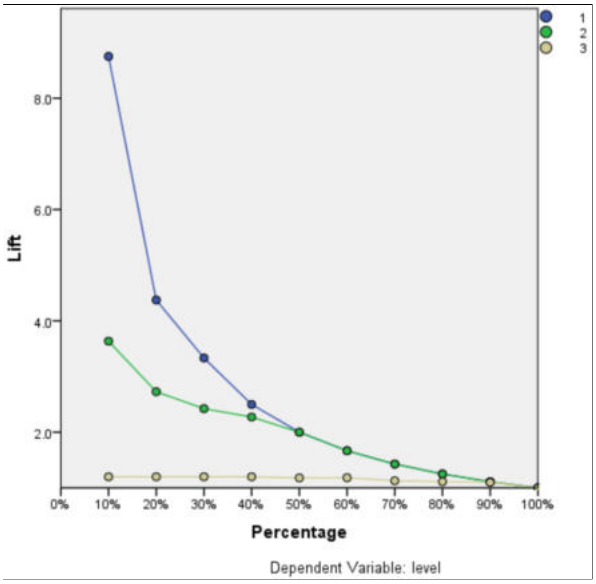

Fig 2 Lift Chart For IS Implementation Model Of Puncom

Fig.2 depicts the lift chart which is delivered from cumulative gain chart . As we observe the lift of defaulters is the highest among top level. If we increase the strength of by 10% the lift of defaulters is 87% / 10% = 8.7. This means the organization can capture the defaults by 8.7 times , Further if we improve next 20% , the lifts is 87% / 20% it would increase to 4.3 times more and so on, where the same can be studied in middle and lower level management . Maximum defaulters can be captured by neural networks. Now The question arise which variable should be given priority to use IS system effectively and lift the PUNCOM organization . The normalized importance of each variable individually which are creating disturbances inside the company and are causes of serious concern. Are Integration of IS with other organizational units (100%, ISmanageactual), Trade rules and regulations (91.4%, tradeactual), Up gradation of Technology with time (86.2%, upgratationactual), User support & its requirement specification (84.6%) etc. and other variables as shown in Bar Chart. Following is the Bar graph showing the importance of the different sub factors.

Hence RFB not only minimize the error of responses but also extracts the variables with attached normalized importance , the variables can be named as critical failure factor for PUNCOM . Hence need to improve all variables identified by creating an effective top level management for implementation IS system in efficient manner .

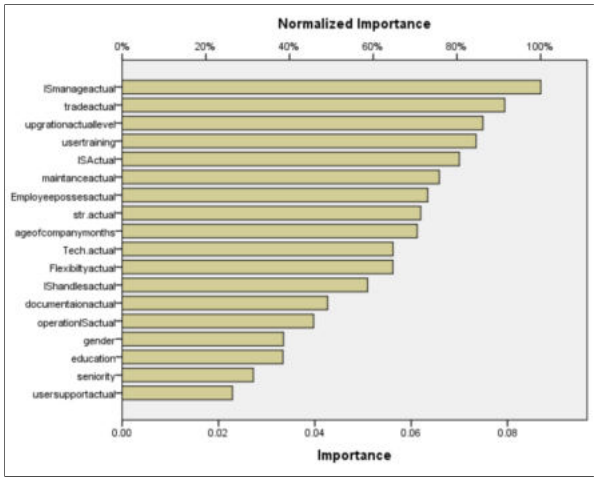

Fig 3 Bar Chart For Is Implementation Model Of Puncom With Normalized Importance

RECOMMENDATIONS

In the telecommunication industries IS play a vital role for the success or failure of the organization. It must be a part of the organization, so that the role of IS for decision making and not just a support. As per Fig.3, the role of the IS successful implementation is highly due to the proper integration of the different organizational units. Since the Puncom industry has a domestic IS it is mostly used as the transaction processing unit not as decision making information system. The implementation of IS in the communication industry is successful only if the top management is concerned about the new trade rule and regulations. From the graph of neural network it is found that if the top management is involved in the up gradation of technology with time. Therefore there is a need of supportive management which led the team as a leader. Top management must provide user training for its successful implementation. User support & its requirement specification are the pivotal sub factors for the successful implementation of the IS.

In Puncom the vailability of IS/IT resource based view (RBS) is found to be missing which is the key factor for the success of IS implementation. Domestic IS is nonflexible & nonadaptable with the current market ISs like SAP etc.

Poor Documentation of operation, usage, support also leads to the failure of IS Implementation.

Maintenance, enhancement and keeping up to date of IS is the requirement of the successful implemented IS.

CONCLUSIONS

Our findings at the systems level will help the management in our case organisations make the implementation of IS effective at individual and organisational level. If the above concepts are implemented in their present ISs, the systems acceptance is very likely to improve because it would be based on how the future the effective implementation of IS is required for successful system. The study has many implications for both academic and practice communities. The results are especially important to the organisations seeking standardisation of their ISs according to Indian culture and environment. Besides, the study is important as it is empirical and pertains to large sector industry of strategic importance having direct impact on the country's economy. Further, as there is a shortage of IS failure studies pertaining to the Indian industry and culture, the study can contribute significantly in evolving and conceptualising an effective IS

implementation model for IS in Indian Telecom industry.

Some of the important limitations of study were confinement to single industrial sector, fixed sized population evaluation, divergence from strict random sample selection, sticking to five point scales. The study has proposed CFSs IS implementation factors However; the study can be carried out for a large sample or organisations across the industries. Further, it will be extremely useful if the suggested factors are incorporated in the ISs of the considered organizations.

REFERENCES

1. Angeliki Poulymenakou1 and Vasilis Serafeimidis2,Volume1, number 3, 1997, "Failure & Lessons Learned in Information Technology Management", Vol. 1, pp. 167-177.
2. DeLone, W.H., and McLean, E.R. 2004. "Measuring E-Commerce Success: Applying the DeLone & McLean Information Systems Success Model," International Journal of Electronic Commerce (9:1), Fall, pp 31-47.
3. Flowers, S. (1997), "Information systems failure: identifying the critical failure factors," Failure and Lessons Learned in Information Technology Management: An International Journal,Cognizant Communication Corp., Elmsford, New York, NY, Vol. 1 No. 1, pp. 19-30.
4. J Jay Liebowitz , "A look at why information systems fail Department of Information Systems," Kybernetes, Vol. 28 No. 1, 1999,pp. 61-67, © MCB University Press,0368-492X, University of Maryland-BaltimoreCounty, Rockville, Maryland, USA.
5. Kweku Ewusi Mensah, "Critical issues in the abandoned information system development projects", Loyola Marymount University, Los Angeles, CA, Volume 40, Issue 9(September 1997) pages 74-80, 1997, ISSN: 0001-7082.