An Empirical Analysis on Performance Evaluation of Decision Support System (DSS) in Business Process Reengineering

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Abstract—**In this paper the researcher are trying to optimize the information technology system development and change control methodologies in business process reengineering. The research study is based on collection of data and statistical analysis report which is collected from production and manufacturing organization in Mumbai. The researcher study the information technology environment, change control methodologies concepts and its factors which are directed affected to organization development. The main aim of this research study is to find out the IT system development factors and change control methodological concepts which are significant in business process reengineering.**

Keywords- DSS,OLAP,EIS,ERP,GDSS,ODSS,LCAS

I. INTRODUCTION

According to Keen (1978), the concept of decision support has evolved from two main areas of research: The theoretical studies of organizational decision making done at the Carnegie Institute of Technology during the late 1950s and early 1960s, and the technical work on Technology]] in the 1960s. It is considered that the concept of DSS became an area of research of its own in the middle of the 1970s, before gaining in intensity during the 1980s. In the middle and late 1980s, executive information systems (EIS), group decision support systems (GDSS), and organizational decision support systems (ODSS) evolved from the single user and model-oriented DSS.

According to Sol (1987) the definition and scope of DSS has been migrating over the years. In the 1970s DSS was described as "a computer based system to aid decision making". In the late 1970s the DSS movement started focusing on "interactive computer-based systems which help decision-makers utilize data bases and models to solve ill-structured problems". In the 1980s DSS should provide systems "using suitable and available technology to improve effectiveness of managerial and professional activities", and end 1980s DSS faced a new challenge towards the design of intelligent workstations.

In 1987, Texas Instruments completed development of the Gate Assignment Display System (GADS) for United Airlines. This decision support system is credited with significantly reducing travel delays by aiding the management of ground operations at various airports, beginning with O'Hare International Airport in Chicago and Stapleton Airport in Denver Colorado.

Beginning in about 1990, data warehousing and on-line analytical processing (OLAP) began broadening the realm of DSS. As the turn of the millennium approached, new Web-based analytical applications were introduced.

The advent of better and better reporting technologies has seen DSS start to emerge as a critical component of management design. Examples of this can be seen in the intense amount of discussion of DSS in the education environment.

DSS also have a weak connection to the user interface paradigm of hypertext. Both the University of Vermont PROMIS system (for medical decision making) and the Carnegie Mellon ZOG/KMS system (for military and business decision making) were decision support systems which also were major breakthroughs in user interface research. Furthermore, although hypertext researchers have generally been concerned with information overload, certain researchers, notably Douglas Engelbart, have been focused on decision makers in particular. Decision generate by chronical format. So it is important.

A decision support system (DSS) is a computer-based information system that supports business or organizational decision-making activities. DSSs serve the management, operations, and planning levels of an organization and help to make decisions, which may be rapidly changing and not easily specified in advance.

Decision support systems can be either fully computerized, human or a combination of both.
DSSs include knowledge-based systems. A properly designed DSS is an interactive software-based system intended to help decision makers compile useful information from a combination of raw data, documents, and personal knowledge, or business models to identify and solve problems and make decisions.
Typical information that a decision support application might gather and present includes:

- Inventories of information assets (including legacy and relational data sources, cubes, data warehouses, and data marts),
- Comparative sales figures between one period and the next,
- Projected revenue figures based on product sales assumptions

Development Frameworks

DSS systems are not entirely different from other systems and require a structured approach. Such a framework includes people, technology, and the development approach [5].

DSS technology levels (of hardware and software) may include:

1. The actual application that will be used by the user. This is the part of the application that allows the decision maker to make decisions in a particular problem area. The user can act upon that particular problem.

2. Generator contains Hardware/software environment that allows people to easily develop specific DSS applications. This level makes use of case tools or systems such as Crystal, AIMMS, Analytica and iThink.

3. Tools include lower level hardware/software. DSS generators including special languages, function libraries and linking modules

An iterative developmental approach allows for the DSS to be changed and redesigned at various intervals. Once the system is designed, it will need to be tested and revised where necessary for the desired outcome.

Application:
As mentioned above, there are theoretical possibilities of building such systems in any knowledge domain.
One example is the clinical decision support system for medical diagnosis. Other examples include a bank loan officer verifying the credit of a loan applicant or an engineering firm that has bids on several projects and wants to know if they can be competitive with their costs.
DSS is extensively used in business and management. Executive dashboard and other business performance software allow faster decision making, identification of negative trends, and better allocation of business resources. Due to DSS all the information from any organization is represented in the form of charts, graphs i.e. in a summarized way, which helps the management to take strategic decision.
A growing area of DSS application, concepts, principles, and techniques is in agricultural production, marketing for sustainable development. For example, the DSSAT4 package, developed through financial support of USAID during the 80's and 90's, has allowed rapid assessment of several agricultural production systems around the world to facilitate decision-making at the farm and policy levels. There are, however, many constraints to the successful adoption on DSS in agriculture.
DSS are also prevalent in forest management where the long planning time frame demands specific requirements. All aspects of Forest management, from log transportation, harvest scheduling to sustainability and ecosystem protection have been addressed by modern DSSs.
A specific example concerns the Canadian National Railway system, which tests its equipment on a regular basis using a decision support system. A problem faced by any railroad is worn-out or defective rails, which can result in hundreds of derailments per year. Under a DSS, CN managed to decrease the incidence of derailments at the same time other companies were experiencing an increase.

II RELATED WORKS

The researcher pointed out the complexities inherent in the evaluation process and the lack of structured information. The evaluation process must consider a multitude of relevant information from both the internal and external environments of the organization. Various analytical and normative models have helped decision makers utilize large volumes of information in strategic evaluation; however, most of these models have some limitations. We present a multiple criteria decision support system, called strategic assessment model (SAM) that addresses some of the limitations inherent in the existing models. SAM captures the decision maker's beliefs through a series of sequential, rational, and analytical processes. The environmental forces-decomposed into internal, task, general opportunities, and threats--are used along with the analytic hierarchy process (AHP), subjective probabilities, the entropy concept, and utility theory to enhance the decision maker's intuition in evaluating a set of strategic alternatives [6].
The researcher found the traditional process of designing a manufacturing system; a sequential approach treats each

of the design steps individually, without considering the requirements of concurrent design activities. The lack of systematic and concurrent consideration of the interactive impact of design decisions leads to repeated and excessive changes in the design and process. To resolve this problem, this research develops a production engineering-oriented virtual factory – a planning cell-based manufacturing systems design approach. The manufacturing systems design process based on a planning cell is reengineered according to the concept of concurrent engineering. The process modeling of a production engineering-oriented virtual factory is proposed at generic and particular levels. [7]

In this research, the researcher investigated the topic of Enterprise Resource Planning (ERP) and ways that ERP systems are being used in today's complex business environment. There are two critical requirements in the Enterprise Resource Planning process: Identification of key business processes and functions and implementation of ERP software that will serve as the architecture for those processes. ERP systems can greatly enhance organizational effectiveness by connecting a company's business units internally as well as externally to customers and vendors. Many organizations have benefited greatly from implementing ERP systems and some "best practices" are reviewed. In other cases, organizations have under-utilized their ERP systems or have struggled with successful deployment [8].

In many industries today, one no longer needs to be concerned only about competition on a local or national level, but about competition on an international level as well. To be viable in this increasingly competitive environment and to maintain or increase their market share, businesses need to be more concerned than ever with those areas of management that are concerned with productivity, quality, and cost in the operations function as well as strategic planning for the organization. This requires an emphasis on improving various aspects of operational functioning including the development of a sound strategy that will allow the organization to increase its competitive advantage, development of a value chain that will effectively and efficiently distribute inputs to and outputs from the organization while adding value to the product or service that is delivered to the customer, various performance variables including the implementation of a solid infrastructure that supports the business processes, the processes themselves, quality assurance mechanisms, and various human resource considerations including motivation.[9]

Poudelet, Victor, Chayer, Julie-Anne, Margni, Manuele, Pellerin,Robert, Samson, Réjean(Sept,2012) is recognized as a powerful method to evaluate the environmental impacts of a product. However, its use in product development processes remains marginal. While authors have advanced different technical solutions to facilitate or accelerate the conduct of an LCA, current methods are generally still not adapted to designers, who often lack the time and expertise to make use of LCA results in their day-to-day activities. This paper addresses the issue by proposing a Business Process Reengineering (BPR) methodology that can be used to develop suitable Decision-Support Systems (DSS). These systems would enhance the use of LCA results in early design phases. The development of such a tool in a particular case study illustrates how its development is aligned with the current designer expectations and constraints. The case study is built on the results of a previous LCA of a known strategic product and includes a library with existing newly characterized materials and components, making it possible to evaluate several design alternatives from an environmental and cost perspective, using LCA as a predictive tool rather than a retrospective one[10].

Leedal, J. Matthew; Smith, Andrew F.(2006) defined and illustrated some business and management techniques with the potential to enhance the running of the operating theatre. These include: quality improvement (including total quality management), benchmarking, project planning, business process reengineering and the use of databases and decision support systems. There are few reports in the academic healthcare literature of instances where these techniques have been applied in practice. We explore the reasons why this should be so. It is, however, possible to make some practical suggestions for those who wish to bring about change and improvement. We advocate that a theoretical framework is adopted to guide the process, and that repeated measurements are made to establish a baseline and track progress. Perhaps most importantly within healthcare, an appreciation of team dynamics and 'hidden agendas' within the workforce is vital, and engaging staff in the process early on, with open communication thereafter, is more likely to lead to success[11].

A Simulation Modeling-Based Investigation of the Impact of IT Infrastructure on Business Process Reengineering: Innocent Baguma and Joseph K. Ssewanyana, defined the BPR as the radical redesign of business processes enabled by information technology (IT) in order to achieve dramatic improvements in their performance (Hammer, 1990), has been described abundantly in managerial journals (Earl, 1994; Hall, 1993; Hammer, 1990, Davenport and Short, 1990). Several management concepts, principles, guidelines, checklists and step approaches have been proposed to demonstrate how to make BPR work. In spite of all these, many BPR projects have failed. Mistakes are realized after the redesigned processes are implemented, and it is too late, costly, and difficult to reverse the situation (Hlupic and Robinson, 1998).[12]

III. STATISTICAL ANALYSIS

Statement: Importance of Decision Support System in Business Process Reengineering

Ho= There is no significant relationship between decision support system and its impact in business process reengineering.

Decision Support System

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Poor	2	3.6	4.0	4.0
	Below Average	3	5.5	6.0	10.0
	Average	9	16.4	18.0	28.0
	Good	18	32.7	36.0	64.0
	Excellent	18	32.7	36.0	100.0
	Total	50	90.9	100.0	
Missing	System	5	9.1		
Total		55	100.0		

Table 3.1: Statistical Analysis of Decision Support System

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Decision Support System	50	1.00	5.00	3.9400	1.07684
Valid N (list wise)	50				

Table 3.2: Descriptive Statistics of DSS

Test Statistics

	Decision Support System
Chi-Square(a)	24.200
df	4
Asymp. Sig.	.000
Statistical Analysis	Rejected

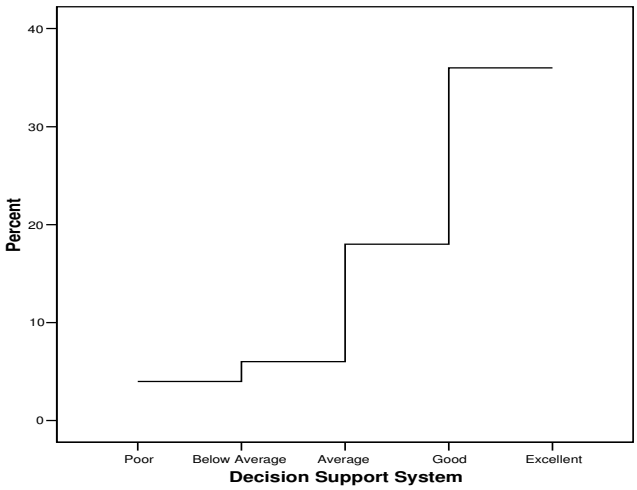
Table3.3: Test Statistics of DSS

Note: a 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 10.0.

Inference: This statistical analysis is based on chi-square test at 0.05 significance level, in this the researcher is analyzed the probability of the statistical analysis of Chi-Square test is 24.200 and its P-Value is 0.000 which is very less than 0.05, so the null hypothesis is rejected and result is significant, and concluded that there is a significant relationship between decision support system and business process reengineering in production and manufacturing industries.

Data Analysis

This graph is the statistical analysis report of performance level of decision support system in business process reengineering, very few organizations are not using the services of DSS in business process reengineering, but most of organization are using the DSS for improving their performance level of services and decision making process in core activities in production and manufacturing unit.



Graph 3.1: Performance of DSS in BPR

Implementation and Benefits:

1. Improves personal efficiency
2. Speed up the process of decision making
3. Increases organizational control
4. Encourages exploration and discovery on the part of the decision maker
5. Speeds up problem solving in an organization
6. Facilitates interpersonal communication
7. Promotes learning or training
8. Generates new evidence in support of a decision
9. Creates a competitive advantage over competition
10. Reveals new approaches to thinking about the problem space
11. Helps automate managerial processes

12. Create Innovative ideas to speed up the performance

IV. CONCLUSION

In this research the researcher is analyzed the decision support services in business process reengineering with reference to production and manufacturing core activities. The research is concluded that there is a significance relationship between DSS and its impact factors in business process reengineering, it improves personnel efficiency, speed decision, encourage exploration, increase organization control, automate processes and innovative ideas to speed up the performance level.

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