On Design of SDM Model of an ERP Implementation for MCD

Dr. Sanjay Kumar Gupta[1], Vilender Kumar[2]

[1]*School of Studies in Computer Science & Applications, Jiwaji University, Gwalior-474002*
[2]*Associate Professor-Computer Science, IITM New Delhi-110058*

*Abstract--*MCD is a large service provider organization and providing large services and functionalities but still struggling to give real benefits to citizens. ERP is a complex piece of software and provides real-time operational capabilities and therefore successful implementation of ERP systems in MCD is a demanding assignment to promote public services and citizen centric administration. The objective of this paper is to consider CSF and design a SDM model of an ERP implementation for MCD. This will act as a reference model to help and avoid previous mistakes, and minimize the ERP failure risks associated with MCD for successful ERP implementation.

Keywords-- ERP implementation, Critical success factors (CSF's), Information sharing, Database, Software Development Model (SDM)

I. INTRODUCTION

Municipal Corporation of Delhi (MCD) is one such service provider organization which provides many essential services in Delhi like school education, waste management, property tax, and hospital services etc.[5,8]. Presently, many MCD services are successfully in use and its benefits are delivered to citizens in the form of better response time, multiple access points/ locations, minimum personal visits, paperless transactions, better transparency, multiple mode of payment & reduction in service charges. Even then lack of dynamic information's availability and data digitization makes very difficult for MCD to maintain hundred percent service and business transparency. This forces MCD to integrate all functions and departments by implementing an ERP system to extend its reach up to common citizens. Furthermore, use of ERP offers transparent, accountable, and efficient governance from anywhere through use of modern technologies. But, evidence shows that the number of failing ERP projects is increasing [1, 20]. This means that a model is necessary to help organizations to avoid previous mistakes and provide them with understanding of how ERP implementation can be effectively carried out and what its essential success components are [12].

Lots of literature and research articles are available to resolve management related CSF's of an ERP implementation issues but very limited research was done in past to resolve problems associated with software development methodology (SDM) which is one of the important CSF of an ERP implementation for MCD. This issue needs proper attention to understand and explore its dimensions in more detail. However, an ERP implementation is a complex and challenging task to improve efficiency and workflow of an organization and thus, this work will provide a platform to help & act as a reference model for MCD to implement any package based ERP in its organization and may save huge amount of consultancy cost for MCD, which incurs for finding MCD requirements, business case analysis, an ERP product selection and its implementation as described in [18]. Model for an ERP implementation in MCD is designed after analyzing the performance and limitations of present database management system used by MCD for delivering citizen services and provides ample freedom to MCD for selection of any ERP vendor to its successful ERP implementation according to their budget, time, and cost.

The aim of this paper is to make MCD capable to offer real-time operational potential by understanding the importance of CSF's. So, we propose a design of standardized lifecycle SDM as model of an ERP implementation for MCD considering CSF's (specially SDM) in nutshell to combing people, hardware, software, data, and networks for seamless flow of quality information to encourage citizen centric administration.

The outline of this paper is as follows. We begin with introduction of problem and objectives of design to implement an ERP for MCD in section 1. Section 2; contain the literature review of prominent work done by scientist and researchers for information sharing across the world. In section 3 we look at the requirement of database integration in MCD to share citizen information to get reliable and speedy services via an ERP implementation. SDM one among many CSF's of an ERP implementation for MCD is discussed in section 4.

In section 5, effort has been made to design and develop standardized lifecycle SDM model of an ERP implementation for MCD. Section 6 represents suitability of SDM model to implement an ERP and other available models. ERP expert opinion about Waterfall, Prototype and Spiral models fits for an ERP implementation is in section 7. In Section 8, we give our concluding remark.

II. REVIEW OF LITERATURE

Holland and Light [4] developed an ERP framework to help managers successfully plan and implement ERP project based on the critical success factors suitable for the analysis of ERP projects. Brehm and Markus [3] presented an extension of the SLC model for ERP packages and focuses on the activities performed by a company for developing, implementing and maintaining software for its own internal use. Scheer and Habermann [18] given importance of business process model for successful implementation of ERP and e-business solution in small and medium size organization. Teltumbde [21] proposed methodological framework for evaluating Enterprise Resource Planning (ERP) projects. Schoenefeld and Vering presented a conception for integration of ERP- and Computer Supported Cooperative Work (CSCW) systems. Ahituv et al. [1] presented an ERP model to reduce ERP implementation failure risk and improve the probability of ERP project success. Sedera et al. [19] given importance of Knowledge Management (KM) for successful ERP implementation. Barki and Pinsonneault [2] examined the ERP implementation challenges. Ragowsky et al. [17] proposed Research model based on application use of ERP and information systems. Park and Lee [14] presented a conceptual model that describes five subsystems for ERP implementation in small and medium size organizations. Perera and Costa [15] suggested several multiple criteria for selecting ERP model for various manufacturing companies.

Kuo-En Fu [11] presented Component based generic procedure model for implementing ERP system in small and medium enterprises.

III. REQUIREMENT OF ERP FOR MCD

Many citizens are common to approach services for more than one MCD departments then because of many independent schemas of database management are in use in various applications in MCD, the same citizen has to do multiple entries of their personal details in many of the MCD departments like Health, Education and Property Tax. These database management schemas are much costlier to maintain for MCD in terms of computer hardware's, software's and human resources. There are services which directly generates revenues for MCD beside some of their regular services (as shown in figure-1) but due to lack of database integration, MCD is unable to share citizen information across different departments and that is a cause of delay in services and administrative decision making. Problems in accessibility of data through database integration of administrative departments like account and finance; planning and monitoring etc. is a barrier to deliver quality citizen services. Such departments are unable to exchange departmental details with each other resulting dissatisfaction in citizen services. Therefore, it is very difficult for MCD to bring hundred percent service and business transparency objective into the existing system without ERP implementation because of disintegrated nature of database management system and some where dependent on manual file based work culture. Integration of MCD administrative functions like accounting and finance, planning and monitoring and others will give MCD an edge to monitor their overall administrative services. The database integration also makes MCD environment more transparent and accountable owing to ERP for complete removal of manual file base system.
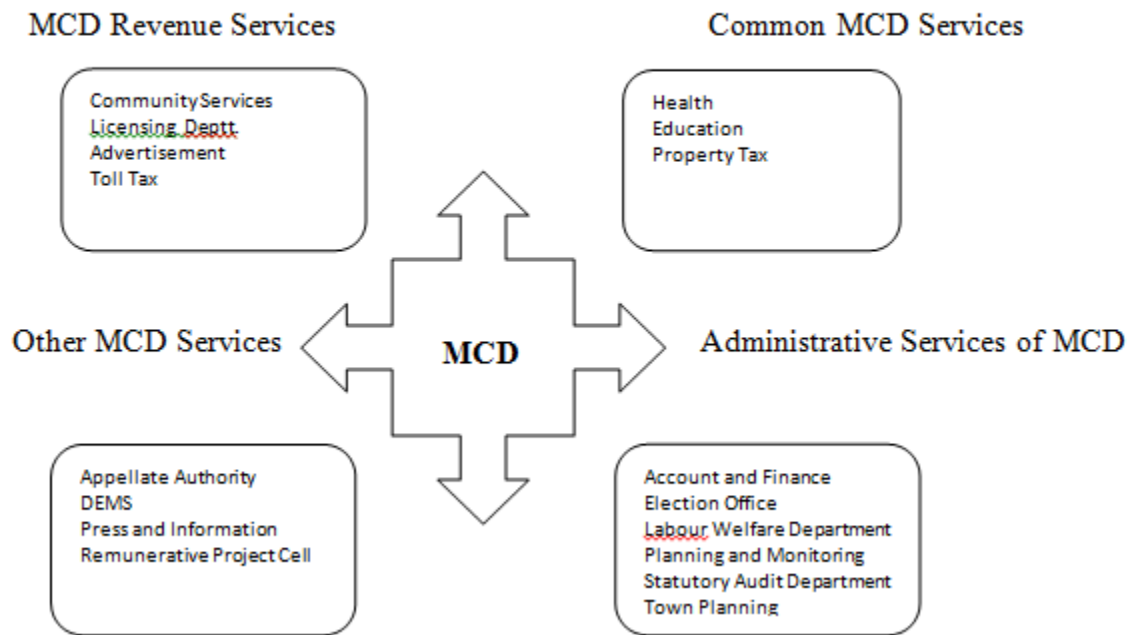
Figure-1: Services, Revenue and Admin Database of MCD

IV. CRITICAL SUCCESS FACTORS AND MCD ERP IMPLEMENTATION

A lot of research in CSF's in ERP-implementations or ERP projects has been done. For successful ERP implementation, CSF's are highly important as acknowledged by many ERP experts and research scholars in [12, 13, 21]. MCD ERP Team work and Composition, MCD Change Management Culture and program, MCD Top Management Support, BPR with Minimum Customizations, Business Plan and Vision, Project Management, Project Champion, Communication, Monitoring and Evaluation of Performance, Software Development Methodology Problem, Appropriate Business and IT Legacy System are some of the important CSF's which are also very important that define the success of ERP implementation at MCD. Lots of literature and research articles are available to resolve management related CSF's for resolving ERP implementation issues but very limited research was done in the past to resolves the problems associated with SDM which is one of the important CSF's for ERP implementation.

This work focuses the importance of this CSF and therefore offers design to implement an ERP as model of MCD based on SDM.

V. DESIGN OF SDM MODEL OF AN ERP FOR MCD

During the MCD site visit it was observed that different MCD departments are using individual database management system for managing citizen services. Some MCD departments still used manual file based system for information exchange. This causes delay in citizen services and debars MCD in becoming hundred percent business transparent government organizations. The proposed design consists of standardized lifecycle SDM as model of an ERP for MCD. It will be followed properly to improve service delivery time because of availability of real-time citizens and admin related information's across different functional departments of MCD in quick time that in turn will make entire MCD processes more transparent, accountable, result and profit oriented.
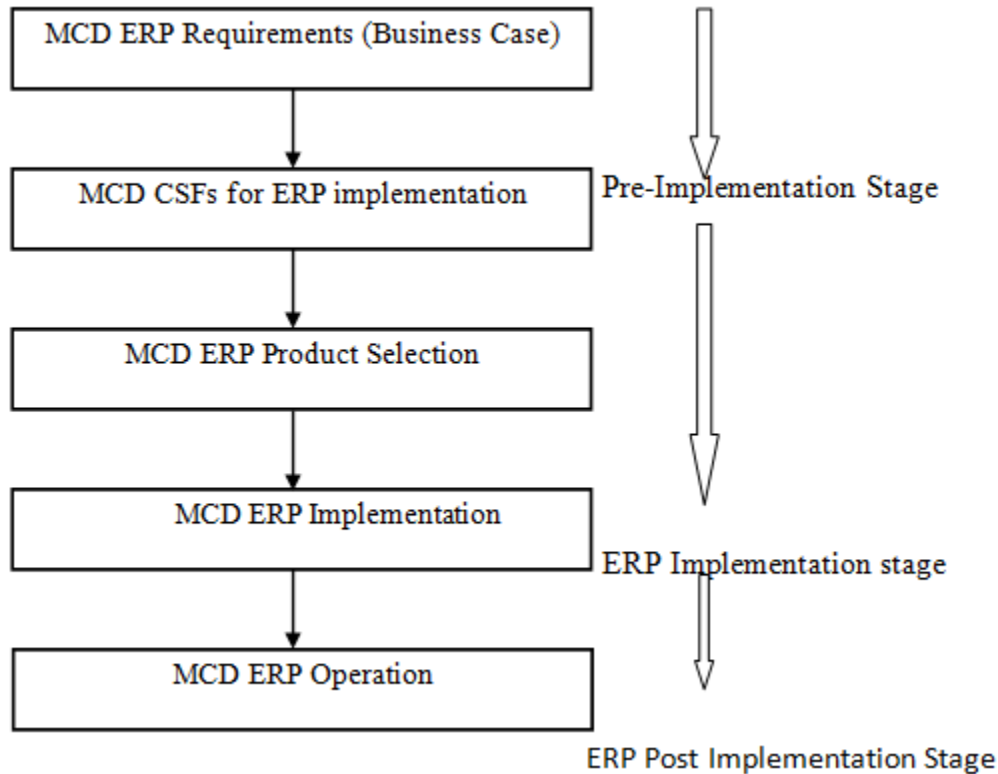
Figure-2, ERP software Development model of MCD

As shown in figure-2, the design of SDM model of an ERP implementation is divided into three stages; the pre-implementation stage contains the detail of MCD ERP requirements (Business Case), MCD CSF's for ERP implementation and MCD ERP product selection. The second stage of design contains detail of ERP implementation processes. Final stage of design focuses about MCD ERP operational stages. The descriptions of all these three stages are further shown in figure-3.

VI. SDM MODEL OF MCD ERP AND OTHER MODEL

Software models such as Waterfall, Prototype and Spiral are standardized software development lifecycle methodologies and used widely but not entirely compatible to incorporate all aspect in view of design of ERP software for MCD. The design of SDM model of an ERP implementation for MCD analyzes the MCD requirements of database integration with the help of business case study.

This identifies various problems faced by MCD in information sharing. This is concluded that there is an urgent need of ERP implementation at MCD for bringing the business and service transparency.

SDM model of an ERP depicted in figure-3 illustrates that business case analysis, CSF's and ERP product selection are all very important segment of ERP software development and implementation. These three important components are missing up to extent in models like Waterfall, Prototype and Spiral from the initial stages. However, among many these three factors are required to build a strong foundation for successful ERP implementation at MCD.

The generic software development models proposed by SAP, Oracle and IBM all follows more or less the same SDLC life cycles for ERP software development after analysis the business requirements of any ERP implementing organization as described in [7].

The proposed design of SDM model of an ERP gives MCD an edge to select best ERP software package offered by SAP, Oracle and IBM etc. Research shows that eighty percent software fails because fault in its system software development methodology suggested by Dorsey in [6]. The research also suggested that fifty to seventy percent ERP, CRM and other MIS related projects failed or are unable to live up to expectation of customer requirements after implementation due to inability of software selection, vendor selection and its development methodologies.

Our SDM model of an ERP software development methodology of MCD already disclose present problems faced by MCD, in data sharing, based on primary research data analysis [9,10]. In addition, this model will also help MCD for selecting any ERP software package based on its requirements.

Literature survey also unfolded fact that majority of municipal organizations across world like USA, UK, Australia etc. has implemented the SAP or ERP products for bringing business and service transparency in their organizations. Even Mumbai Municipal Corporation has implemented SAP ERP model in 2010 [16] for maintaining citizens and administrative services but paid heavily to ERP vendor's for their business case analysis, ERP selection, and its implementation. MCD have a freedom to choose any ERP software package according to its requirements. Our proposed design of SDM model will provide MCD an open platform to select any ERP package offered by vendors like SAP, Oracle, IBM etc or MCD can ask any government agency to develop ERP for them. Hence, in either case our proposed model for database integration act as a reference model for them, which in turn will save huge amount of consultancy fee of MCD and will guide them for successful ERP implementation.
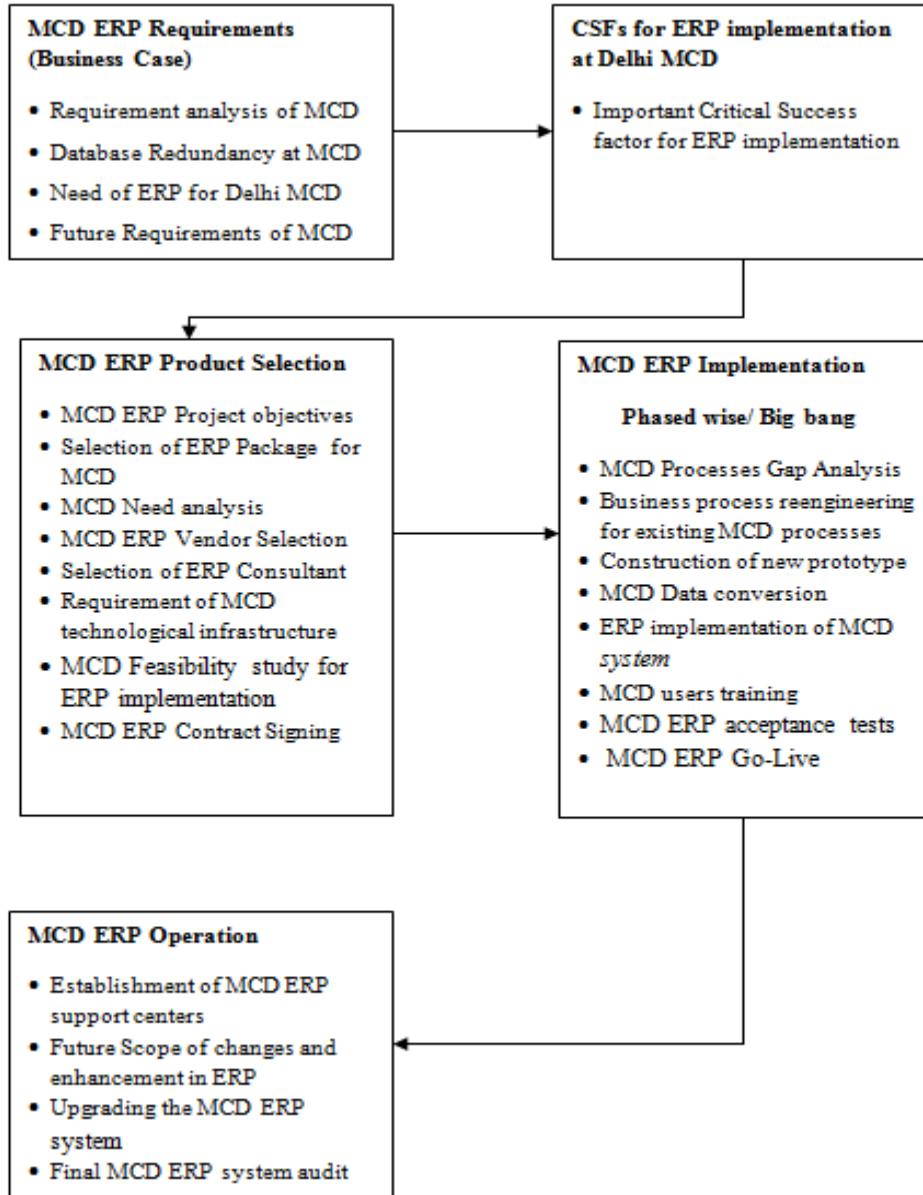
MCD ERP Requirements (Business Case)

- Requirement analysis of MCD
- Database Redundancy at MCD
- Need of ERP for Delhi MCD
- Future Requirements of MCD

CSFs for ERP implementation at Delhi MCD

- Important Critical Success factor for ERP implementation

MCD ERP Product Selection

- MCD ERP Project objectives
- Selection of ERP Package for MCD
- MCD Need analysis
- MCD ERP Vendor Selection
- Selection of ERP Consultant
- Requirement of MCD technological infrastructure
- MCD Feasibility study for ERP implementation
- MCD ERP Contract Signing

MCD ERP Implementation

Phased wise/ Big bang

- MCD Processes Gap Analysis
- Business process reengineering for existing MCD processes
- Construction of new prototype
- MCD Data conversion
- ERP implementation of MCD system
- MCD users training
- MCD ERP acceptance tests
- MCD ERP Go-Live

MCD ERP Operation

- Establishment of MCD ERP support centers
- Future Scope of changes and enhancement in ERP
- Upgrading the MCD ERP system
- Final MCD ERP system audit

Figure-3: SDM model of an ERP implementation for MCD

## VII. FEASIBILITY OF ERP SELECTION STANDARD

Many researchers in the past have done great research about ERP selection benchmarks for successful ERP implementation in many government and private sector organizations.

According to Nah et al. [13] some of the contributing benchmarks are ERP product selection; CSF's, role of ERP consultant, business case analysis, ERP software development methodology and ERP implementing partners etc.

Waterfall, Prototype and Spiral etc. models do not define the scope of above mentioned factors in their software development methodologies.

In response to questions pose for ERP experts to take their valuable views about Waterfall, Prototype and Spiral models fit for ERP implementation in MCD. The ERP expert's data analysis response is shown in figure-4.
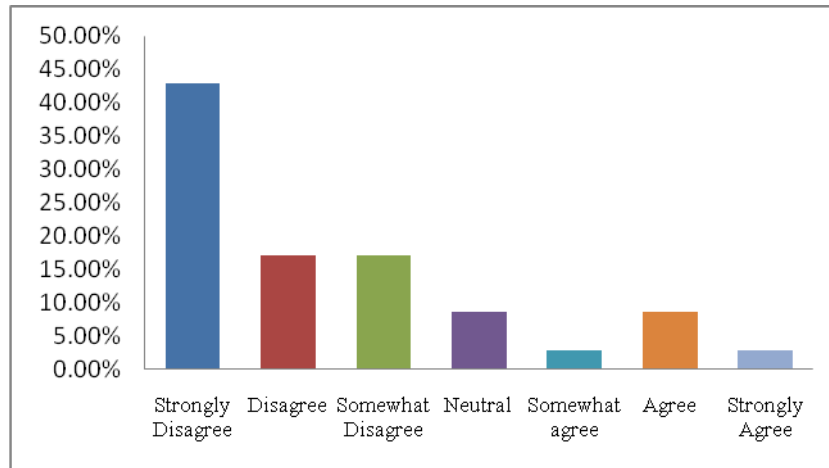
Figure-4

ERP experts' received data analysis suggested that more than seventy seven percent of ERP experts do not recommend Waterfall, Prototype and Spiral software development methodologies for MCD ERP implementation. Hence, there is an urgent need to develop new ERP SDM model which take care most important critical business factors into consideration for successful ERP implementation in MCD. There are two alternatives for MCD organization to implement ERP for dynamic information sharing. Either it has consultancy firm to select ERP product that also take care of all contributing factors for successful ERP implementation, or directly approach ERP vendors like SAP/Oracle/IBM for ERP implementation. In first alternative, hiring ERP consultancy firm for implementation again add extra costs, in form of ERP consultancy charges [18], to total project costs, and in second alternative, if implementing organization directly approaches to any ERP vendor than client has to pay extra for analyzing the business case requirements for its database integration. In second alternative, ERP vendor's SDM and its product customization is biased towards their own product offering.

VIII.   CONCLUSION

Looking at challenges faced due to rapid growth of data, there is an increasing need to have a comprehensive model of ERP for integrating various departments and functions of MCD. This model is a fine initiative for more investigation that present a large and complete picture for the aspects that guide to successfully implementation of ERP in MCD. In this work, effort has been made to design and develop standardized lifecycle SDM model which is one among many CSF of ERP implementation for MCD. This model must largely taken into consideration to follow its design steps to act as a reference model to help and avoid previous mistakes, and minimize the ERP failure risks associated for successful ERP implementation to enhance the performance of MCD organization by delivering people-oriented, cost-effective quality services on citizen's demand quickly with utmost reliability.

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