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THE TECHNOLOGY SYSTEMATICALLY: INTRODUCTION OF ERP SYSTEM IMPLEMENTATION CHECKLIST

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Tackling the Technology Systematically: Introduction of ERP System Implementation Checklist

Abstract

Enterprise Resource Planning is one of the thriving trends in the drastically changing business world. The success achieved by tycoons in the technologically advanced business world through the adoption of ERP systems has attracted many other organizations to consider adopting the same. However, looking at past trends, it is evident that adopting the same ERP system does not necessarily promise the same success achieved by another . Even if the way of achieving the success in ERP implementation is becoming problem and a considerable attention is given to the decisive factors of gaining success, how it could be achieved seems not to be identified with a proper spotlight in the past literature. Going through the past studies makes it apparent that the various models brought forward to facilitate the successful implementation of an ERP system have not served the purpose in reality due to the failures reported around the world .Hence, the author is trying to walk through the literature to identify the existing models on ERP implementation along with the similar concepts which are available in various streams to with the hope of coming up with a potential concept to overcome the loopholes prevailing in the existing models. Accordingly, in the first half of the paper an introduction of ERP by bringing about the definitions given by various scholars followed by the identification of the factors which affect the successful implementation. Out of the factors identified, the most important factor would be analyzed as the decisive factor for achieving the success in implementation based on the past researches. The existing models presented in the literature which guide the successful ERP implementation have then been reviewed to identify the possibility of coming up with a new concept for the same. Finally, the conclusions are arrived at based on the review done on the literature on the subject matter.

Keywords: Enterprise Resource Planning (ERP), ERP implementation, Decisive Factor, Technology Adoption Model

Introduction to Enterprise Resource Planning

In the current business world, the excessive use of technology is very prominent. With the invasion of Industry 4.0, the intensity has grown, as every business is seeking to be SMART. The owners, themselves or through the management, are making efforts to be part of the Internet of Things (IoT), by trying to have an end to end connected technological solution that enables better functionality of business processes. The preference in style is the implementation of an Enterprise Resource Planning (ERP) system or other similar large scale systems such as Warehouse management systems and Customer Resource Management (Topi, Lucas, & Babaian, 2005) through which the organizations are seeking to reach the heights. For businesses, having an ERP system is considered as a concession which ensures recognition among the rivalry (Hawking, 2007).

In addition to the competitive edge, the thriving urge for ERP implementation is fuelled by the call for streamlining the business processes while responding to customers hastily with the lowest possible cost and enabling data visibility to energize the future growth towards a digitalized world (Hawking, 2007). The proven success of ERP systems in realizing business performance led to grasp more organization in a wide spectrum from manufacturing to service provision (Topi, Lucas, & Babaian, 2005).

However, reminding that being in the trend alone would not bring the prize, many researchers have manifested that not every implementation would put the success on the table (Kane, Palmer, Phillips, Kiron, & Buckley, 2015). Inability to forecast the impact an ERP system would have on the business could convert the whole fantasy of success to a bitter hell of failure (Hawking, 2007). Being blinded by the performance shown elsewhere, most organizations embrace ERP systems as they are, without considering the versatility of own business processes as well as the strategic structure. The misconception of 'Technology will do it all' predominantly steers such impulsive decisions leading to invite greater complexities at a cost of wasted lump sum amount of money (Kane, Palmer, Phillips, Kiron, & Buckley, 2015). The very option once thought as a blessing would pose a curse to the organization when the implementation is not well-thought before actual initiation.

The identification of grounds for failure has been spotlighted in various scholarly articles, however, to-the-date, none has been successful in tackling the exact reason as to why the failure occurs or how to remedy it systematically. Even though these points are widely known, inability to plot a way to success which bypasses the loopholes is a key lagging point that continues the trend of failure. The very reason urges the necessity of a systematic way of pitching ERP implementation which necessarily forces success rather than dragging to known catastrophe.

Factors affecting success of an ERP implementation

In the road to finding how successful an ERP implementation process is, an attempt to emphasize critical success factors for a successful implementation of an ERP system (Hawking, 2007) could be identified (Table 1 below). As per Hawking (2007), the usability of these critical success factors are questionable since no proven evidence is available as to these could be applicable globally and across any sphere. He also highlights that for not being proved as such, one reason could be that most of researchers have identified these as 'challenges' faced when implementing an ERP system or 'lessons learnt' by failure of an ERP system.

Table 1: Critical Success Factors for ERP Implementation

Critical Success Factor	Components	Researchers
Organizational fit	Failure to re-design business processes Failure to follow an enterprise-wide design which supports data integration Lack of data integration and lack of data standardization	Holland and Light, 1999 Shanks et al., 2000 Sumner, 1999 Summer, 2000 Esteves, Casanovas, and Pastor, 2003
Skill mix	Insufficient training and re-skilling Insufficient internal expertise Lack of business analysts with business and technology knowledge Failure to effectively mix internal and external expertise Lack of ability to recruit and retain qualified ERP systems developers	Holland and Light, 1999 Sumner, 1999 Summer, 2000 Shanks et al., 2000 Esteves, Casanovas, and Pastor, 2003
Management structure and strategy	Lack of senior management support Lack of proper management control structure Lack of a champion Ineffective communications Lack of a change management strategy	Holland and Light, 1999 Sumner, 1999 Summer, 2000 Shanks et al., 2000 Allen and Kern, 2001 Esteves, Casanovas,and Pastor, 2003
Software systems design	Failure to adhere to standardized specifications which the software supports Failure to effectively integrate “add-on” modules Failure to recognize the importance of application-specific knowledge	Holland and Light, 1999 Summer, 2000 Allen, Kern and Havenhand, 2002 Esteves, Casanovas,and Pastor, 2003
User involvement and training	Insufficient training of end-users Ineffective communications Lack of full-time commitment of customers to project management and project activities Lack of sensitivity to user resistance Failure to emphasize reporting	Holland and Light, 1999 Shanks et al., 2000 Sumner, 1999 Summer, 2000 Allen and Kern, 2001 Allen, Kern and Havenhand, 2002 Esteves, Casanovas,and Pastor, 2003

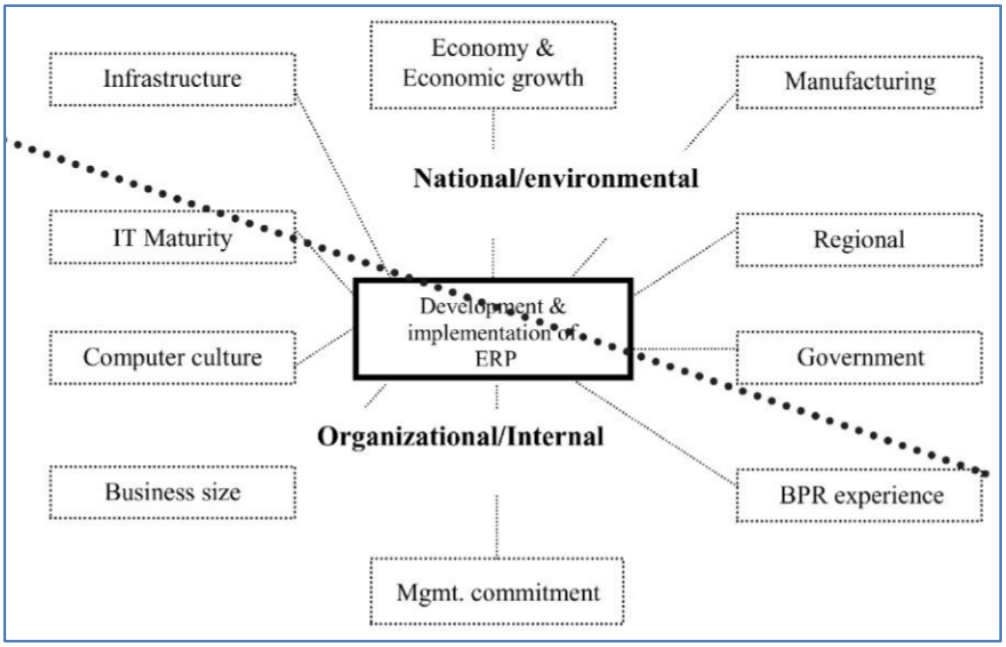
Technology planning	Inability to avoid technological bottlenecks Lack of an integrated technology strategy to support client-server implementation Attempting to build bridges to legacy applications	Holland and Light, 1999 Summer, 2000 Esteves, Casanovas,and Pastor, 2003
Project management	Lack of disciplined, flexible project management	Holland and Light, 1999 Sumner, 1999

Source: (Hawking, 2007)

Looking at the components considered under the critical success factors identified by Hawking (2007), a glimpse of reasons that drives to fail an ERP implementation is evident. Similarly, highlighting the usability issues related to ERP implementation Topi, Lucas, & Babaian (2005) articulate that difficuties in identifying and accessing to the correct functionality switly, complications in executing transactions, limitations in extracting system outputs, lack of support received at error situations, difficulty in remembering and understanding system specific terminologies as well as the the overall system complexity lead to dissatisfy users of the ERP system ultimately making the implementation a flop.

Giving another level explanation to the failure points of ERP implementation, Huang & Palvia (2001) bring forward a framework (Figure 1 below) for ERP implementation highlighting two broad categories as 'national/environmental factors and organizational/internal factors', that directly affects the ERP implementation. As per the researchers, poor management of internal resources and lack of awareness about the environmental factors could directly affect the ERP implementation and lead it to an utter failure (Huang & Palvia, 2001).

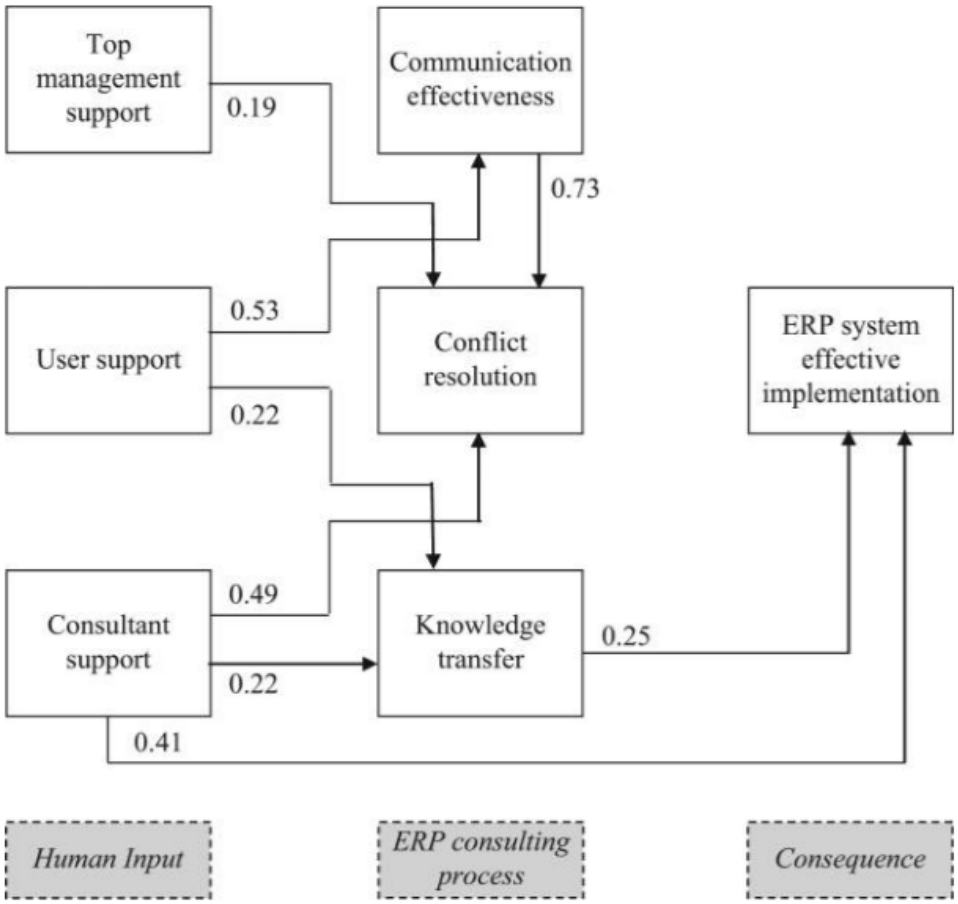
Figure 1: Framework for ERP Implementation



Source: (Huang & Palvia, 2001)

In lilght of identifying the factors affecting effective ERP implementation, Maditinos, Chatzoudes, & Tsairidis (2012) have depicted framework which basically looks at the integrating external consulting with the internal factors of a company which ultimately results in increasing the effectiveness of the implementation process. As per the results arrived at the end of their research, these three researchers highlight that conflict resolution as well as the user support gained through effective communication increases the chances of smooth ERP implementation due to their strong positive correlation with each variables (shown in figure 3 below). In addition, the consultant support and proper knowledge transfering have been identified to be equally crucial for effective ERP implementation.

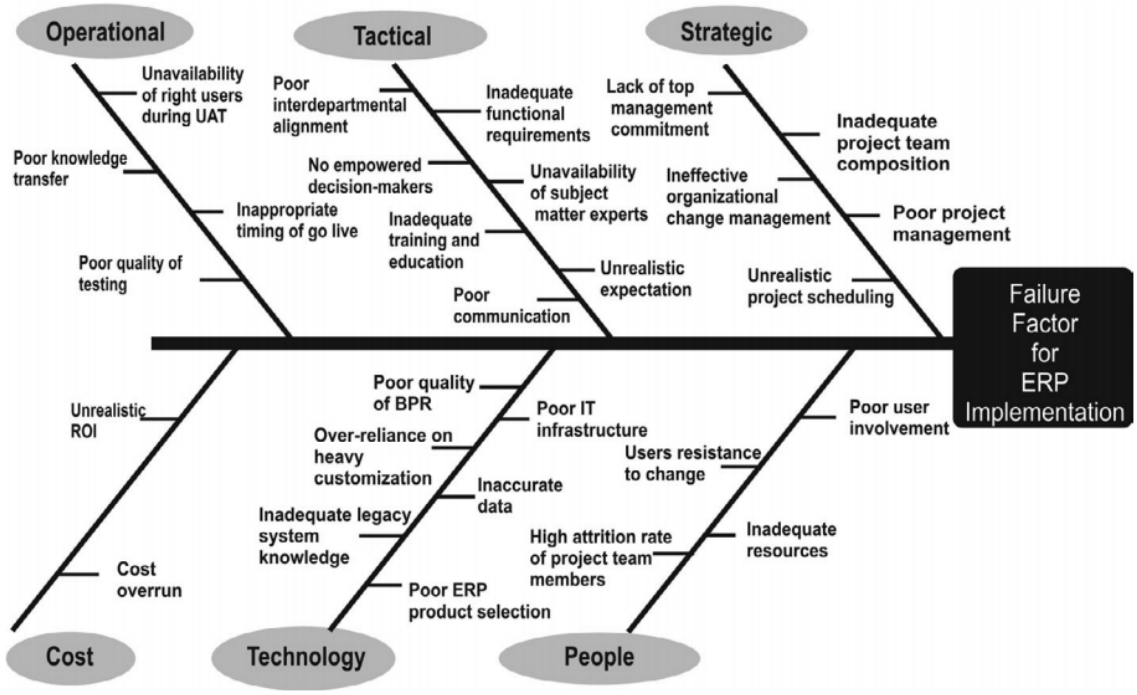
Figure 2: ERP implementation process model



Source: (Maditinos, Chatzoudes, & Tsairidis, 2012)

The outcome of researches carried out on the search of identifying points for failure of ERP implementation largely revolves around similar platforms. A fishbone analysis carried out by Garg & Garg (2013), further digs in the causes along with the sub causes that affects the failure of an ERP implementation (Figure 3 below).

Figure 3: Fishbone Analysis - Failure factor for ERP implementation



Source: (Garg & Garg, 2013)

Considering all the identified factors in the literature, a vast number of points could be determined as the causes for the failure of ERP implementation. In a nut shell, lack of knowledge and guidance of top management, absence of a clear strategy, inability to identify and invest on the required talent, inadequate insight about the requirement and not having the connectivity between various departmental spectrums are some common points which requires thorough consideration in the process of an ERP implementation.

Decisive factor of ERP implementation

Connectivity, as a multi-disciplinary concept, poses a higher criticality whenever it is discussed. As the word itself emphasizes, this is the concept which highlights the link maintained between various platforms or even among human beings. As a set of people living in a technologically dynamic era, phasing accordingly while maintaining the link with both people and technology is not effortless. Because, matching the requirement of human mind is not as straightforward as it seems. The very reason encourages building and improving the connection people have with each other, so that, through collective generation of ideas, better development and usage of technology could be ensured.

Emphasizing the universality of the concept, connectivity is well discussed and explained under Lean concept. The pervasiveness of Lean has made it viable as a versatile concept which could be used in almost every discipline and the identification of connectivity within

the main four rules of Toyota Production System itself makes it apparent how significant this is, even if it sounded very simple. As explained under four rules of Lean, the connection between every customer and supplier must be direct and unambiguous and that every request should have a direct response with a clear yes or no answer (Spear & Bowen, 1999). The rule establishes a platform for every individual in the end to end process to be identified as a customer and a supplier, therefore making it clear to everybody who is accountable for what and who should provide what and to whom. Not only in smoothing the process, but when any advice or a grey area occurs with the requirement of assistance, everybody is aware to whom they should talk to or from which point they can get the required assistant.

In the implementation of ERP system, as per the literature, it was evident that most of the issues that lead to failure revolve around people. If we dig in, it is apparent that these issues related with people could have been eliminated with a simple discussion which would enlighten all the participants (Hawking, 2007). For an instance, if the issue of inadequate requirement gathering is considered, the issue itself is because the related parties have not reached the expected areas which could have been help improve the customization required in the ERP system. If the requirement gathering was planned with the representatives from all departments across the organization, the scenarios identified for the customizations would include end to end business processes and having both customer and supplier of each process enables coming up with the best solution possible. Otherwise, the requirement gathering would not be comprehensive enough to tackle all the potential scenarios that determine the actual requirement. Not having a proper understanding on what exactly is needed, in turn, would lead to create a higher resistance to change from the current process (Garg & Garg, 2013) since requirements of the users are not properly addressed in a way which satisfies them and adds value.

Similarly, when assistance is needed in case of an error, as the supplier of the assistance is clearly defined, the person who has the issue could directly consult him for the solution (Spear & Bowen, 1999), making the process convenient for the users. Even the top management leadership as well as the strategic direction required for the successful implementation would be bestowed since their responsibility would be clearly defined under customer-supplier connection identification (Spear & Bowen, 1999). As people are involved at every level of the ERP implementation process, having the connections between everything and everyone standardized and well defined seems to be the most crucial factor which decides whether the implementation is going to be successful or an utter failure given that this factor is interlinked with every other challenge which affects failure.

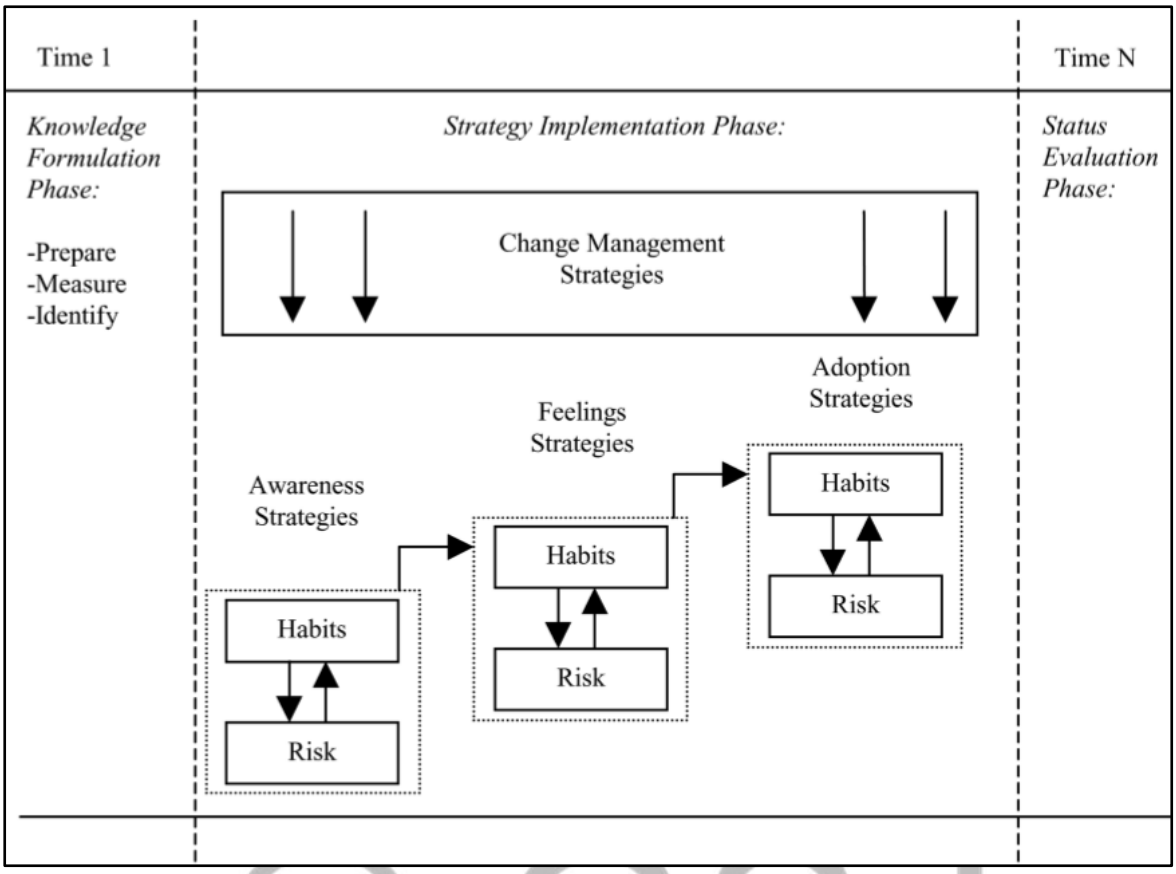
Ways of Achieving a Successful ERP Implementation

Going through past literature, it is evident that various scholars have identified different ways to achieve the intended goals with less or no complications. As this is again a universal question which arises at any kind of process which comprises a problem solving act with the involvement of various human groups, most researches have made available universal frameworks or techniques.

Framework for successful ERP adoption through change management

Accordingly, Aladwani (2001) suggests that the success of an ERP implementation could be achived through the effective management of change. For the purpose of concreting the suggetion, a model has been propsed which comprises three phases as knowledge formulation phase, strategy implementation phase and status evaluation phase. Under the knowledge formulation phase, the resercher has looked at preparing, measuring, identifying the requirement which has then been implemented considering three main strategic aspects as awareness strategies, feeling strategies and adoption strategies along with the consideration of the change management. As the final phase evaluation of the adopted ERP system has been proposed to showcase the success or the failure status of the implementation.

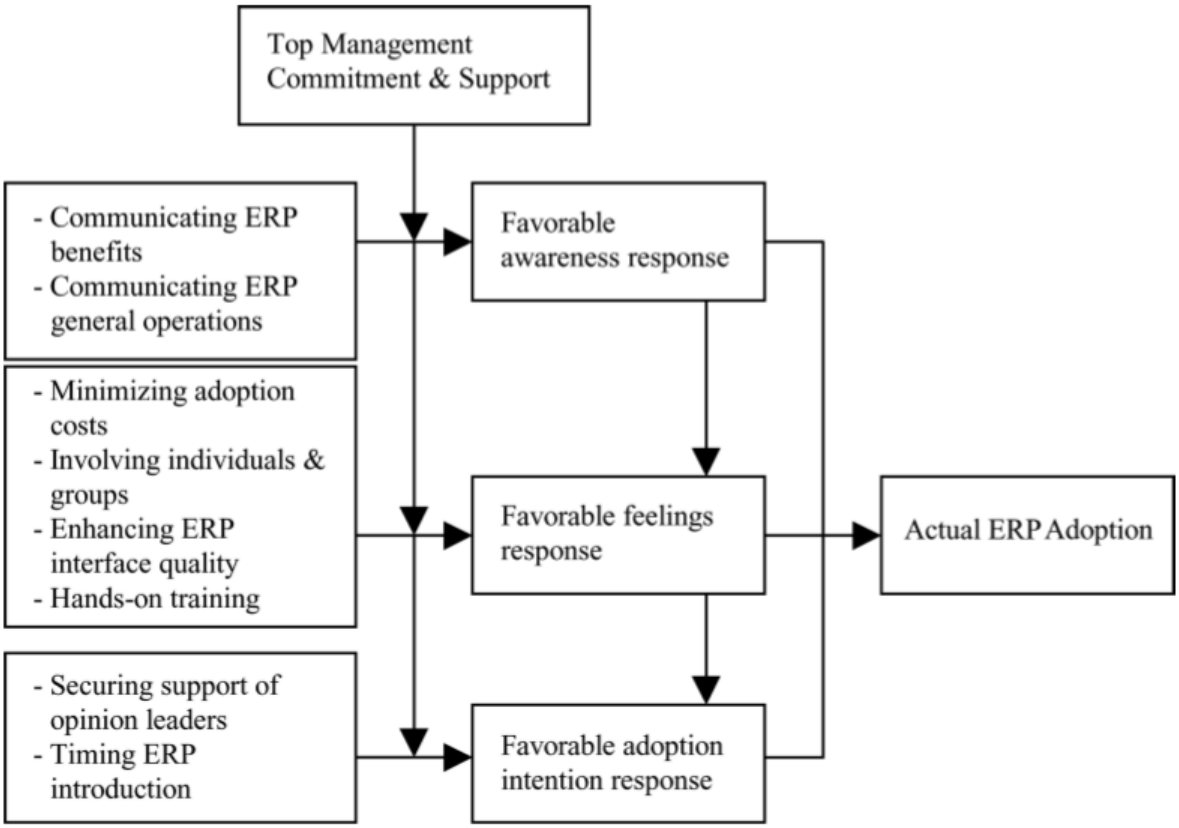
Figure 4: Framework for Managing Change Associated with ERP



Source: (Aladwani, 2001)

Based on the concept depicted in above figure, following ERP adoption model has been arrived at highlighting how it could be implemented in a successful way (Aladwani, 2001).

Figure 5: A model of successful ERP adoption

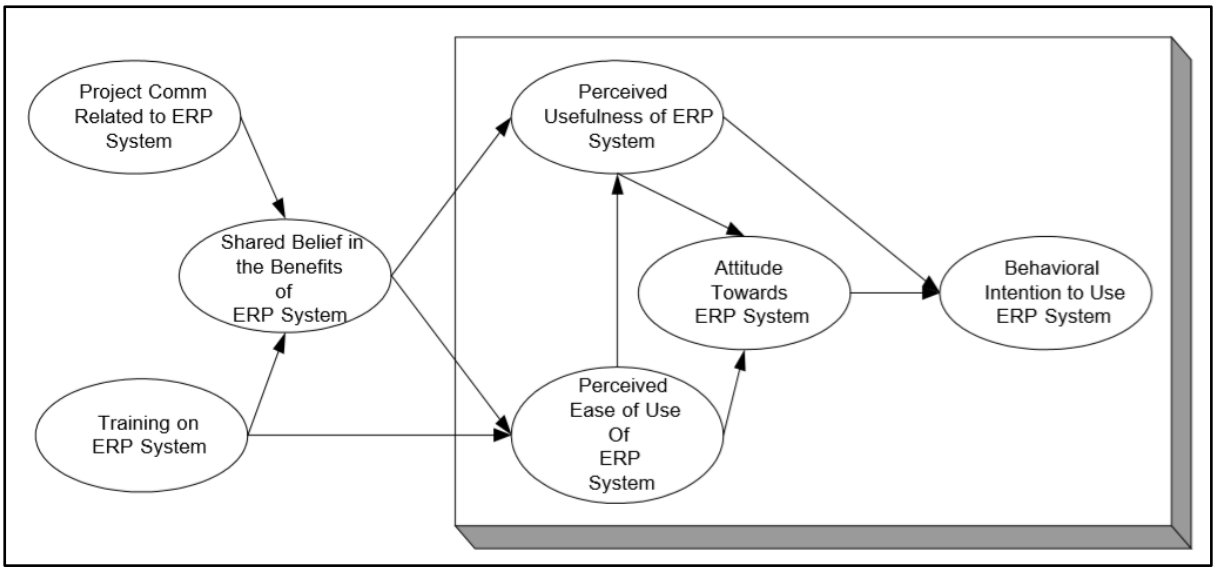


Source: (Aladwani, 2001)

Technology Adoption Model for ERP Implementation

Emphasizing the criticality of communication in system implementation, Amoako-Gyampah & Salam (2004) have also come up with a model to guide the successful ERP implementation. In order to facilitate the successful implementation, researchers have utilized shared belief in the benefits of ERP implementation which would be taken to the users by communication and training, with the ultimate hope of developing a positive behavioural intention to use ERP system through a better attitude towards ERP systems by highlighting the perceived usefulness and perceived ease of use. In a nutshell, they have enhanced the existing model of Technology Adoption (TAM) by adding shared belief in benefits of ERP system as a way of successful ERP implementation.

Figure 6: Technology Adoption Model for ERP Implementation



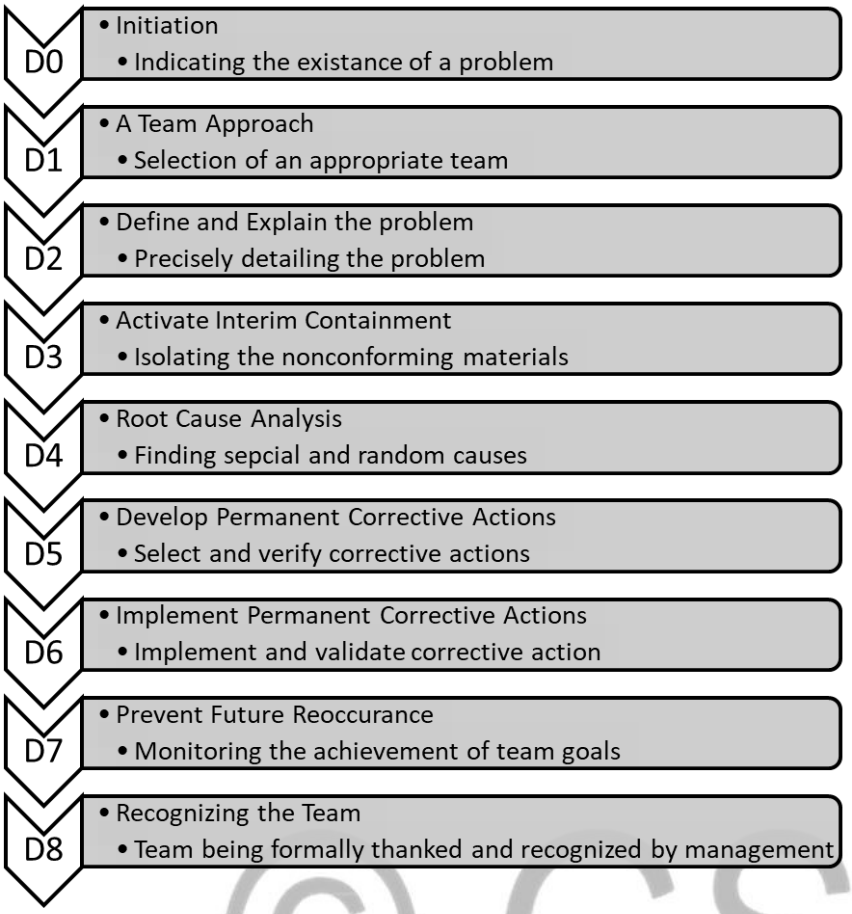
Source: (Amoako-Gyampah & Salam, 2004)

8D Problem Solving Method

Even though no specific techniques are readily available, several techniques which drive the successful problem solving could be identified in the literature. Under lean concept, the criticality of problem solving has been given a spotlight (Spear & Bowen, 1999) since the success of the end goal highly depends on the correct way of identifying the whole process accurately. Going in line, Zarghami & Benbow (2017) highlight the importance of considering multi disciplinary facts to better identify a problem and solve it in the most effective way.

Accordingly, selecting an appropriate team, formulating the problem definition, activating interim containment, finding the root cause(s), selecting and verifying correction(s), implementing and validating the corrective action(s), take necessary preventive steps and congratulating the team have been identified as the most crucial eight disciplinery steps, which are required for effective problem solving (Zarghami & Benbow, 2017).

Figure 7: 8D Problem Solving Method



Source: (Zarghami & Benbow, 2017)

Due to the extensive use of the model each 8 disciplines identified have sometimes elaborated by dividing to several more actions to give a better insight to the process. Looking at each level deeply would provide that visibility how the activities could be arranged in order to achieve the intended success.

D0 – Initiation

Even if this comes as an additional step to the eight disciplines, the researchers have identified this to be crucial since this is where everybody is made aware of the existence of a problem. Accordingly, the identified problem would be communicated and decided whether it requires to be run through 8D problem solving method or could be solved simply by an individual (Zarghami & Benbow, 2017). The importance of this phase is that rather than every simple problem being carried through a time and effort consuming large process, a filtering part would be done to categorize problems based on their severity and impact.

D1 – A Team Approach

In this phase, an extensive team would be built covering various specialties related with the problem. The objective would be to pool the expertise needed to solve the problem. In order to ensure the effectiveness of the team, the researchers suggest utilizing ample time to take the formation of team through every phase of team development i.e. "forming, norming, storming and performing" (Zarghami & Benbow, 2017) and finalize with a system champion who would provide additional support to the team.

When deciding the team members, choosing people with prior problem solving experience as well as the expertise in the related subject would be advisable. Especially, the team leader is required to have run several 8D problem solving projects in additions to the expertise and experience in the subject matter along with the necessary authority. Similarly, having maintained clear and open reporting lines, it is expected to facilitate flow of information throughout the stakeholders related with the problem as communication is the key to successful problem solving (Zarghami & Benbow, 2017).

In addition, the provision of required training sessions for the team members on problem solving would be the responsibility of the team leader along with maintaining the meeting minutes to ensure the project is well on track (Zarghami & Benbow, 2017). The learning acquired through the project would need to be documented and this would again be the responsibility of the leader to ensure that it is done in a proper manner. All in all, this phase is considered very decisive since it involves gathering one of most critical resources.

D2 – Define and Explain the Problem

This is where the identified problem is defined and explained in detail. In a nutshell, this is where the standard would be compared against the status quo to identify the exact gap which needs to be catered through the project. The importance of this phase lies on the extent to which it allows to define the problem measurably as the improvement would only be possible on a measurable fact.

This is a phase which could be broken further to better identify the problem. Accordingly, once the gap is identified, it could be broken in to further small problems systematically, allowing more visibility to prioritize the most critical problem. The most widespread technique used to define a problem is 5W and 2H tool where questions would be asked as Who, What, When, Where and Why as well as How did this problem occur and how many problems are there (Zarghami & Benbow, 2017). The last 'W' as and two 'H's are merely educated guesses which would be made at the later part of this phase.

D3 – Activate Interim Containment

At this phase, identifying the exact point of occurrence of the problem is considered. Once the problem is identified clearly and broken in to small problems, it is expected to give more visibility as to where exactly is the problem and prioritize it among other minor or supporting problems. When the exact occurrence point is evident, it would give the ability to come up with fast tracked solutions.

After this identification of the point of occurrence, an action would be taken to temporarily bypass the problem with the hope of reducing further intensity. Communication of the findings up to this level as well as the interim containment adopted would be crucial as awareness of every stakeholder allows achieve the expected suppression. Once this containment is finalized, it is also required to document it under 8D problem solving project and keep a continuous track on the to make sure the issue is not soaring.

D4 – Root Cause Analysis

This is the most critical and most complicated step of the 8D problem solving process. Because, the formed team is required to identify the most special cause of the problem which is hidden deep inside rather than ending up with the random causes which are readily available in the surface. As the first step in root cause analysis, the researchers suggest to observe the actual process in the point of occurrence of the problem. It is highlighted that when a thorough observation is done, the observer should not jump in to preconceived notions rather absorb the process as it is to the tiniest part possible.

Once the observation is done, various techniques could be employed to arrive at the special cause which is deep hidden. Even though sophisticated 'Hard' tools which provide more statistical results are available, most commonly used tools are the soft tools for root cause analysis due to their simplicity. Hard tools such as hypothesis testing, analysis of variance (ANOVA) and design of experiments (DOE) are usually employed to tackle more complex problems and having an expert of such statistical tool handling in the team would be a must to go ahead with them.

Due to the ease of learning and handling, soft tools such as brainstorming, five why process, flow charts and fishbone diagrams as well as checklists or check sheets are more popular in root cause analysis process.

The effectiveness of the analysis is however highly depending on the input from all or most stakeholders, especially the whole team, since it would allow more insight to the problem in

hand with various aspects. Hence, active involvement and similar contribution of all the team members in carrying out whatever the tool employed would lead to identify the actual special cause which needs to be tackled. Similarly, it is important to keep the root cause solution documented and reviewed throughout the project.

D5 – Develop Permanent Corrective Actions

After detecting the root cause, team itself would need to come up with various solutions to overcome the problem. Out of the gathered suggestions, selection of the best solution would have to be done employing a systematic technique considering the financial feasibility, feasibility with the existing processes and overall organizational strategy and practicability to ensure that the corrective actions would not lead to any unexpected circumstances in the future. By getting the involvement of all the stakeholders in the process of solution generation, the team would be able to grasp a better insight leading to select the most appropriate solution.

Out of various scientific ways of screening the best option, using a matrix seems very popular due its simplicity and understandability. Accordingly, each option would be assessed considering the effort, financial cost/benefit, workability, technical requirements, safety and quality as well as the impact on other existing processes. The selected option would then have to be tested in very small scale as a trial run along with the documentation and continuous reviewing to ensure minimal deviation.

D6 – Implement Permanent Corrective Actions

The actual validation or the implementation of the adopted solution would be done under this phase of 8D problem solving method. Based on the trial carried out under development stage of the solution, the chosen best option would be validated on a larger scope in a way which does not interrupt or bring about unexpected issues in the current processes. A clear communication line would highly be recommended at this point with a free flow of information as fast communication of issues and prompt actions to remedy to them is crucial for the effectiveness as users might find the solution alienated to their current processes. Welcoming the feedback and involving them in the total change process after a thorough review for validation would enhance the user friendliness as well as the credibility of the users about the new solution. As there is a risk involved with the implementation of a new solution, it is also recommended to have a contingency plan at this level in order to bypass any potential failures.

D7 – Prevent Future Reoccurrence

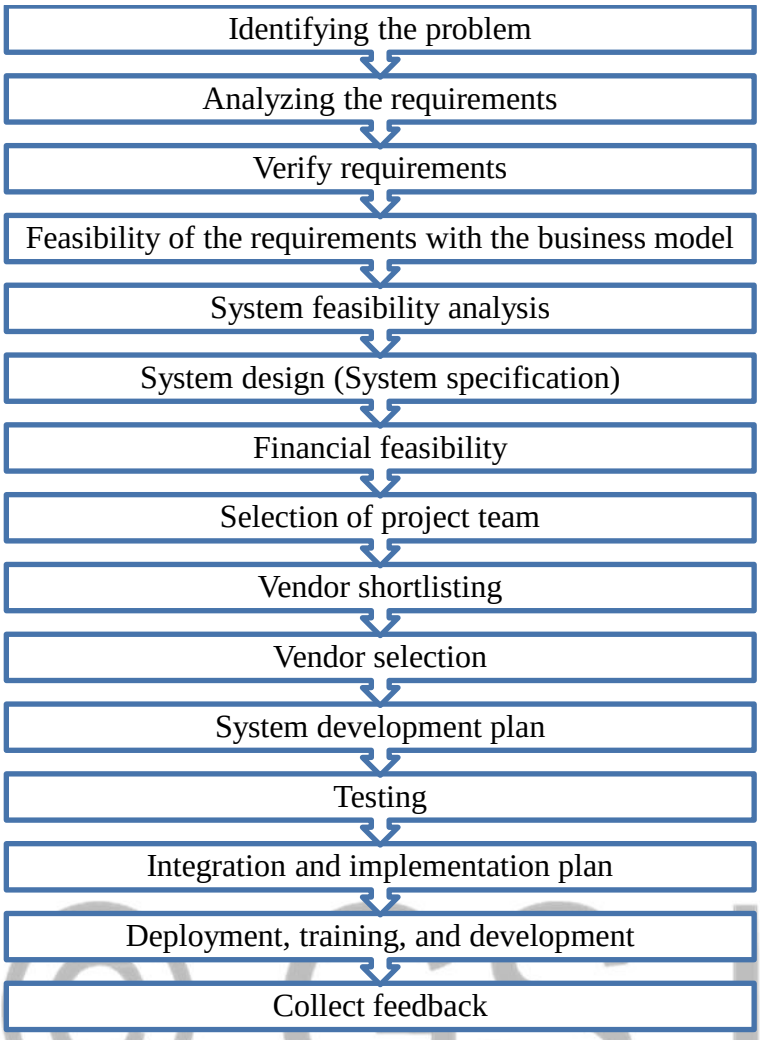
This is the phase where implemented process as well as the results is continuously monitored to ensure that achievement of set goals. The importance of this phase is that it allows identifying the points for future reference as lessons learnt while enabling to concrete the solution as a standardization which could be employed in similar future circumstances. Rather than continuous change, continuous improvement is encouraged at this level through the standardization of the best option identified through problem solving process. By proper communication of the standards, it is expected to maintain the awareness even among the future resources rather than having to start all over in similar situations.

D8 – Recognizing the Team

At the end of the successful completion of whole problem solving process, the team would be appreciated for their massive contribution in bringing about the deep hidden special causes for the thriving problem along with the best corrective actions. Documenting the whole process and publishing them for future reference is an important task which needs to be done at this stage.

Based on the above 8D problem solving method, the author is proposing a checklist which elaborates the ERP implementation process embedding the importance of communication throughout. Defining the problem, root cause analysis and development of corrective actions stages are further broken in to several more activities related to system development in order to ensure the systematic sequence of the implementation process. Throughout the development of the checklist, the main focus is given to ensure the connectivity between all the involved parties while making sure that the responsibilities and accountabilities are clearly defined (Spear & Bowen, 1999). The proposed checklist is as follows.

***Figure 8**: Proposed ERP implementation Checklist*



Source: Proposed by the Author

Conclusion

With the thriving need of integrating business processes across the organization, owners and managers are eagerly seeking to adopt technology, in order to be in par with the rivalry. As a means Enterprise Resource Planning system is a widely preferred option, due to its ability to manage all resources through one platform while enabling the data visibility. However, the implementation has posed to be a nightmare for some organizations due to various issues, leading the whole investment to be a waste. Even though the past studies conducted bring

forward various reasons for the failure of ERP implementation, identification of the key factor seems a bit vague. As a result, less or no studies had been carried out reflecting a systematic way to drive the implantation to a success. However, through this study, a simple check list would be proposed, which could be used as a guideline to follow up the implementation process, making sure that most critical concern of connectivity is achieved at each level of the implementation. Accordingly, the checklist for ERP implementation looks at critical activities related with all the stakeholders of the implementation process, from project team, solution providing supplier to final user who comes up with the final feedback. In order to ensure the creditability and comprehensiveness, each activity is enriched with minor tasks, so that the achievement of each activity is realistic and measureable. Even though the proposed checklist could be used as a standard guideline, it should not be limited to the same rather it opens up the door for further research spectrums in order come up with improvements for the betterment of users. Given that, the further researches could be conducted based on specific industries and going further to case studies to articulate the validity.

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