ERP failure: a systematic mapping of the literature

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Failure in Enterprise Resource Planning (ERP) projects: a Systematic Mapping of the Literature

Abstract:

Context: With the development of different technologies, the use and importance of Enterprise Resource Planning (ERP) systems continue to increase day by day. In parallel with this increasing use, a lot of research is being done to successfully complete ERP implementation projects. However, despite these researches, reported case studies show that the success rates of ERP projects are very low.

Objective: Based on the examples of experienced failure, researchers determine very different failure factors with different perspectives for companies in different industry sectors, different cultures and different sizes. It is becoming increasingly difficult for many practitioners and researchers to understand these failure factors correctly. Our objective is to investigate the state-of-the-art in ERP Failure Factors which could benefit practitioners to potentially utilize that information.

Method: We review the body of knowledge related to ERP failure factors in the form of a systematic literature mapping (SLM). We pose four sets of research questions and systematically develop and refine a classification schema. The initial pool consisted of 353 articles. Systematic voting was conducted among the authors regarding the inclusion/exclusion criteria. As a result, there were 72 technical articles in our final pool.

Results: This SLM provides an overview of ERP critical failures factors (CFF) with different focused headings. These headings cover qualitative coding about CFF names, CFF rankings, relation between CFF and ERP processes, and ERP failure modes and more.

Conclusion: The results of this study would benefit three groups of stakeholders: (1) Researchers who work on ERP Failure Factors, (2) Solution implementers who provide consultancy services to companies that carry out ERP Implementation projects, and (3) ERP project implementation managers. These stakeholders could utilize the results of this SLM to catch the trend of ERP implementation challenges.

Keywords: ERP, enterprise resource planning, failure; failure factor; systematic literature mapping

1 INTRODUCTION

Efficient information flow is extremely important in terms of business management in organizations. In other words, for an organization to work properly; holistic, fast and reliable information is required in areas such as production, human resources, purchasing, financial affairs, and stock [1]. For this purpose, management information systems should be implemented efficiently. In this context, ERP (Enterprise Resource Planning) is the general name of systems and software developed to ensure or support the end-to-end management and efficient use of enterprises by bringing together human resources, physical resources and financial resources [2]. If an organization wants to gain competitive advantage by increasing its productivity, its ERP system should be implemented successfully.

There are many examples where ERP has been successfully implemented. However, understanding and implementing ERP involves high risk and costs. There are many difficulties in the implementation phase of ERP system because it affects processes, employees and even culture in an organization [3]. Moreover; organizations should change their already established systems, restructure and improve their business processes [4]. Another important challenge is that ERP must be in line with the strategic plan [5]. Apart from these, many other difficulties need to be taken into consideration. With all this in mind, no doubt that implementing a successful ERP system is a very challenging task.

A lot of research has been done in the past to identify and understand the challenges of ERP Implementation [6]. To handle the challenges of ERP Implementation, different criteria have been determined according to the field of activity, size and location of the organization. Moreover, approaches, models and frameworks have been created for a successful ERP implementation. As the ERP market grows in the world; research on a successful ERP implementation is also increasing. Despite all these researches and defined factors, the success of ERP projects is still not certain.

Despite all efforts, recent research shows that a high failure rate continues in ERP implementation projects [7], [8]. At the same time, from such a broad perspective, it is very difficult for a new researcher and practitioner to review the ERP failure factors from all aspects. From the authors' perspective, lessons learned from failed projects are more important than how success can be achieved. It is important to determine, analyze and understand the failure criteria correctly in ERP

implementation. Because, considering these failure factors, the execution of the ERP project will be beneficial for organizations, consultants and ERP vendors. However, finding and reading all related research in this field will be a very difficult task to benefit from the existing knowledge in this field. Therefore, we observed that there is a need for a comprehensive mapping paper that provides an "index" of knowledge in this area and summarizes the field from the perspective of "why did they fail" rather than "how to be successful".

Considering the failure rate in ERP projects, we are carrying out this research in the systematic literature mapping approach to meet the above need. Our review pool consists of 72 academic peer-reviewed articles. Our mapping study covers all published articles from 1999 to the end of 2020. In ERP implementation projects, while there are many review articles from "how to be successful" perspective, there are only few articles from "why did they fail" perspective. As we will give in detail in Section 2.3, considering all the 72 articles in our final pool, our study is the most up-to-date and comprehensive mapping study done in this area so far.

The paper is divided into following remaining sections. Section 2 presents background and related work. The research method is described in Section 3. The results of our mapping study is presented in Section 4. Section 5 presents the findings of this review. Lastly, conclusions and future work are provided in Section 6. Additionally, the list of the reviewed studies in this survey can be seen in the Appendix 1.

2 BACKGROUND AND RELATED WORK

In this section, firstly, a brief overview of ERP is provided and then followed by an overview of ERP failure. We then provide the related works which are the existing review papers on ERP Failure factors.

2.1 2.1. WHAT IS ERP?

"Enterprise Resource Planning" is firstly called in 1990 by The Gartner Group in order to describe the next generation of Material Requirements Planning (MRP) software. Its aim was to integrate all business processes under one application [9]. ERP system is designed to integrate and make better the business processes and transactions in a corporation [10]. Later, the definition of enterprise resource planning would be expanded to include nearly any large integrated software package [11]. However, in order to integrate business processes, organizations should re-engineer their business routines to match routines embedded in ERP systems [12]. In this way, an ERP system helps organizations to achieve and manage their business routines efficiently and effectively [13]. Moreover, cross-functional integration was a new concept for many organizations during the 1990s and 2000s [14], however, after those years, cross-functional operations became increasingly common for ERP. Gathering all information from ERP system ensures easy and fast access to the required information by eliminating the duplicate entry of information. Thus, information management and information security can be realized much more easily and reliably.

There is no doubt that the implementation of ERP systems is different from other systems [15]. Although ERP is used to manage the processes of organizations, it is more efficient than traditional systems. One of the reasons that distinguishes the ERP system from other software is that it offers a successful ROI. Thanks to the central database, it provides improved collaboration between all departments within the organization. Thanks to this "improved collaboration", ERP increases the analytics and reporting capabilities of the organization. In addition, ERP provides an advanced decision support infrastructure. In recent years, customer management has become very important and happy customers may be possible thanks to ERP. Moreover, ERP increases productivity by allowing you to automate ordinary tasks. ERP also offers integrated solutions for inventory management.

The main reason why organizations prefer ERP systems is the integration of business units with each other. This can improve the competitive position of the organization [16]. According to a survey conducted in 2017, 17% of organizations are implementing ERP to improve business performance. According to the same research, 14% of organizations implement ERP systems for ensure compliance, 14% for make employees jobs easier, and 13% better integrate systems across locations [17].

The use of ERP, which initially started in large-scale companies, is becoming widespread in small and medium-sized companies too. With the developing technology, there is no doubt that the use of ERP will continue to increase day by day. The Factory of the Future (FoF) is based on the technological concepts of cyber-physical systems, Internet of Things (IoT). With next generation ERP systems, within the modular structured of smart factories, in order to make decentralized decisions, cyber systems monitor the processes and create a virtual copy. Over the IoT, cyber-physical systems cooperate

with not only humans but also each other in real time [18]. Given all these developments, the ERP applications market size was $94 billion in 2019 and according to estimates it will approach $ 100 billion in 2024 [19].

The promises of ERP vendors continue to be attractive to organizations. However, it is uncertain how much ERP vendors and solution implementers will stick to their promises because of the high failure rate encountered in ERP implementation. We will examine this failure in the next sections.

2.2 2.2. Critical Failure Factors of ERP Systems

It is a fact that ERP systems are extremely important for organizations to survive in the competitive world. However, it is not an easy task to implement the ERP system successfully. The more expensive it is to implement ERP systems, the greater the negative financial impact of unsuccessful implementations. It is stated that many companies suffer from failed ERP system implementation [20]. In 2004, it was evaluated that 90% of ERP applications were delivered late or exceeded the budget and 67% of these applications failed to achieve expected benefits realization [21]. According to a report published in 2017, only 26% of the organizations stated that they were satisfied with their ERP vendors [17].

ERP vendors are constantly telling their success stories on their web pages and in the magazines they publish. However, it is very important to analyze unsuccessful case studies and learn lessons from these cases in order to achieve success. There are enormous case studies in which the failures in ERP applications and the losses caused by these failures are explained with all clarity. For example, Nike lost $ 100 million in sales due to the wrong ERP selection and faulty supply chain design. Another example is for Hewlett Packard. Hewlett Packard failed ERP implementation due to wrong scope planning and implementation with big bang approach rather than phased approach. On the other hand, Ingram Micro suffered great losses due to operational issues resulting from ERP implementation [22].

To be able to examine failures in ERP implementation, it is necessary to fully understand the definition of failure. Most of the organizations do not select the vendor & software again. One of the most common types of failure in ERP implementation can be seen as budget overruns. Often, budget overruns are caused by issues such as expanded scope, additional technology requirements, unanticipated organizational issues. Many ERP implementations exceeded their initial project timeline because of issues such as expanded scope and data issues. Moreover, another type of failure is that organizations are not getting the expected benefits from ERP systems.

Much of the research done in ERP implementation uses various theoretical frameworks [23]. However, there are studies in the literature on evaluation criteria for the failure of ERP application [24]. Lack of management support, poor organizational culture, communication problems, financial management problem, lack of clarity on scope, project management problems, poor project team, ERP software misfit, poor solution implementer performance, poor quality of testing, outdated it infrastructure, lack of training, highly customized ERP, poor process design, lack of user involvement, resistance to change, unrealistic expectations are the main failure factors that need to be analyzed in detail.

2.3 2.3. Review Of Secondary Studies Regarding ERP

The work we have done is a mapping of primary studies. Therefore, it is a secondary study in the field of ERP Failure. However, there is a lot of secondary work on ERP, especially related to success factors. Therefore, it will be useful to briefly mention important secondary studies on ERP. Table 1 shows a list of 10 important secondary studies in ERP.

Paper title	Publication year	Reference
Enterprise resource planning: an integrative review	2004	[25]
A survey on the recent research literature on ERP systems	2005	[26]
Enterprise Resource Planning (ERP): a review of the literature	2007	[10]
ERP implementation: a compilation and analysis of critical success factors	2007	[27]
Examining the critical success factors in the adoption of enterprise resource planning	2008	[28]
A review of critical success factors for ERP projects	2009	[29]
Manufacturing execution system - a literature review	2009	[30]

Successful enterprise resource planning implementation taxonomy of critical factors	2009	[31]
A comprehensive literature review of the ERP research field over a decade	2010	[32]
A review of ERP research: a future agenda for accounting information systems	2011	[33]
Critical success factors in enterprise resource planning systems: review of the last decade	2013	[34]

Table 1. Important secondary studies in ERP

Studies on "success factors" prepared with the "how to be successful" approach are beyond the scope of this research. However, while conducting a secondary study on "Failure Factor" prepared with the "why did they fail" approach, the studies presented in Table 1 formed the basis. For example, Shaul [34] only focused on Success Factors for implementing Enterprise Resource Planning (ERP). Dezdar [31] presented a systematic compilation of success factors and create a comprehensive taxonomy of them. Schlichter [32] presented a methodological framework for doing an extensive literature review. Botta [26] analyzed the literature according to following categories: ERP implementation, ERP optimization, ERP management, ERP software, supply chain. Shehab [25] presented a review of the ERP-focused studies between 1990-2003. Finney [27] reviewed the literature base of critical success factors to explore any gaps that might exist. Ngai [28] provided a literature review of the critical success factors in ERP implementation across 10 different regions. Ugarte [30] provided a literature review of manufacturing execution system (MES) relationships with other ERP systems.

2.4 2.4. Related Works: Review Studies Regarding ERP Failure

A comprehensive secondary study focused solely on failure factor has not yet been found in the literature. Many of the studies address the challenges encountered during the implementation of the ERP system. We were able to find 6 such studies [3, 35, 36, 37, 38, 39] and show their list in Table 2. For each related work, we include the publication year, its type (a conventional survey or systematic literature review – SLR), number of reviewed papers in the pool, and some explanatory notes.

Paper title	Publication year	Type of review	# of papers in the pool	Notes	Reference
Literature review on ERP implementation challenges	2016	A conventional survey	27	The article repository was not focused on failure. The repository consists of articles on the implementation challenges.	[3]
Benefits and challenges of cloud ERP systems–a systematic literature review	2016	SLR	31	The article repository was not focused on failure. The repository consists of articles on the challenges in cloud ERP Systems.	[35]
Identification of key success factors and challenges for ERP systems—a systematic literature review	2017	SLR	29	The article repository was not focused on failure. The repository consists of articles on the implementation challenges.	[36]
ERP systems in multinational enterprises: a literature review of post-implementation challenges	2018	SLR	20	The article repository was not focused on failure. The repository consists of articles on the post-implementation challenges.	[37]
Factors influencing enterprise resource planning system: a review	2018	A conventional survey	19	The article reviews on factors that influence ERP between 2011 and 2016.	[38]

ERP issues and challenges: a research synthesis	2019	SLR	53	The article repository was not focused on failure. The repository consists of articles on the implementation challenges.	[39]
Our study	2021	SLM	72	We review the body of knowledge related to ERP failure factors in the form of a systematic literature mapping (SLM). We pose four sets of research questions and systematically develop and refine a classification schema. The initial pool consisted of 353 articles. Systematic voting was conducted among the authors regarding the inclusion/exclusion criteria. As a result, there were 72 technical articles in our final pool.	

Table 2. Important secondary studies in ERP

3 RESEARCH METHOD

We performed a Systematic Literature Mapping (SLM) study methodology for this research work. This methodology proceeds step by step by following PICO (Population, Intervention, Comparison and Outcomes) search strategy suggested by Kitchenham and Charters [40] as shown below:

- Population: ERP Failure
- Intervention: ERP Failure Factors
- Comparison: Characteristics of ERP Failure Factors
- Outcomes: Models, attributes, metrics, and performance evaluations for ERP Failure Factors
- Context: Academia (scientific literature)

The objective of this approach is to extract all relevant literature study with the context of ERP failure for answering defined research questions (RQs). To perform SM, we follow the guidelines recommended by Kitchenham [40] and Petersen et al. [41]. We follow six steps in order to conduct this SM: (i) research goal and questions; (ii) strategy for source selection; (iii) inclusion/exclusion criteria; (iv) data extraction; (v) results; and (vi) discussion.

3.1 RESEARCH GOAL AND QUESTIONS

In this SLM study, our objective is focusing on the following research goal: "To understand and define ERP failure factors". To answer this research goal, we defined research questions specific to our study, as described in Figure 1. As shown in Figure, we identified eighteen RQs under four headings.

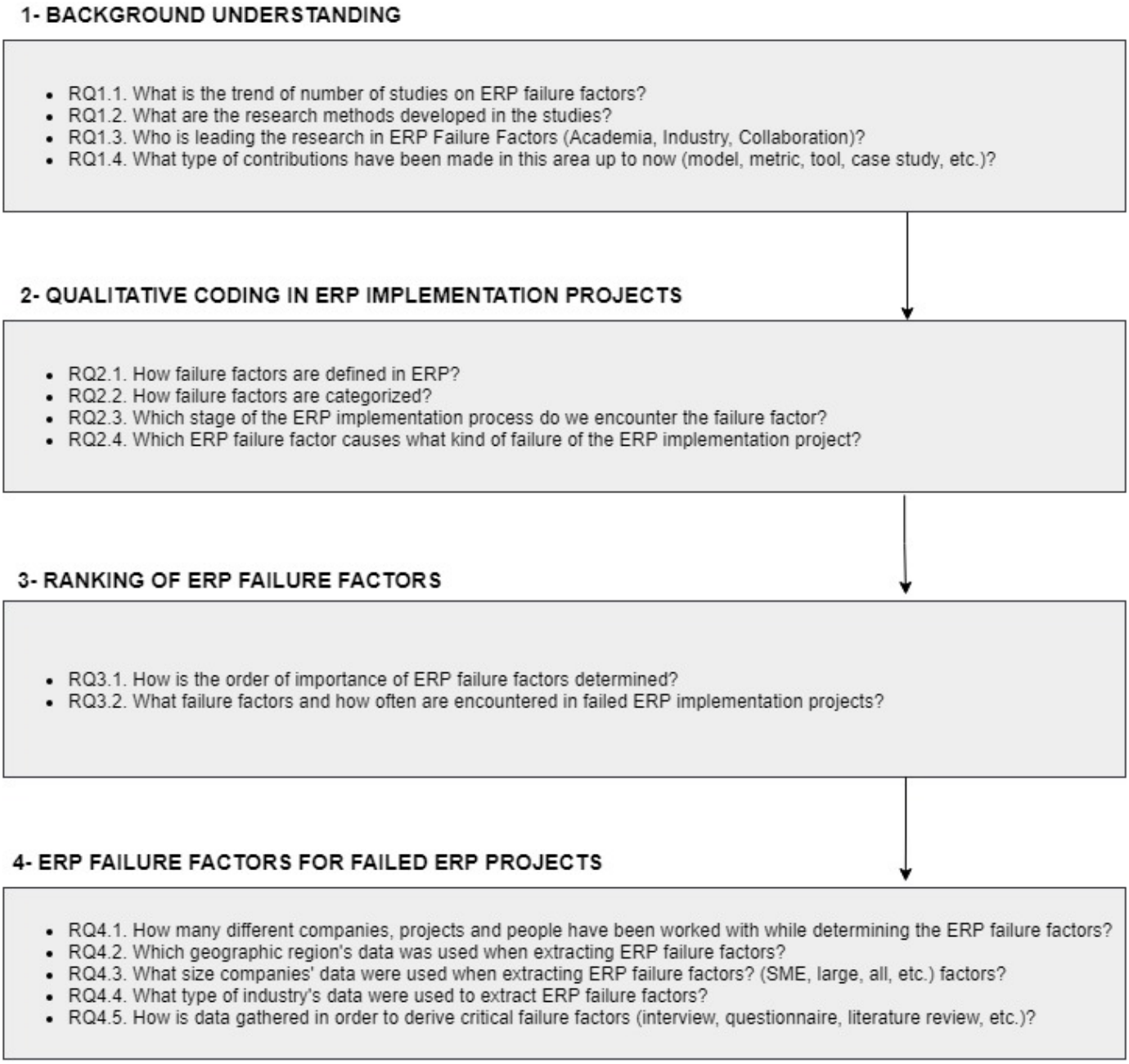


Figure 1. Research Questions identified in the SLM

3.2 Strategy for Source Selection

In this SLM study, two source selection strategy which are string-based search and snowballing were followed for selecting appropriate literature studies. The visualization of our followed procedure specific to this study is shown in Figure 2.

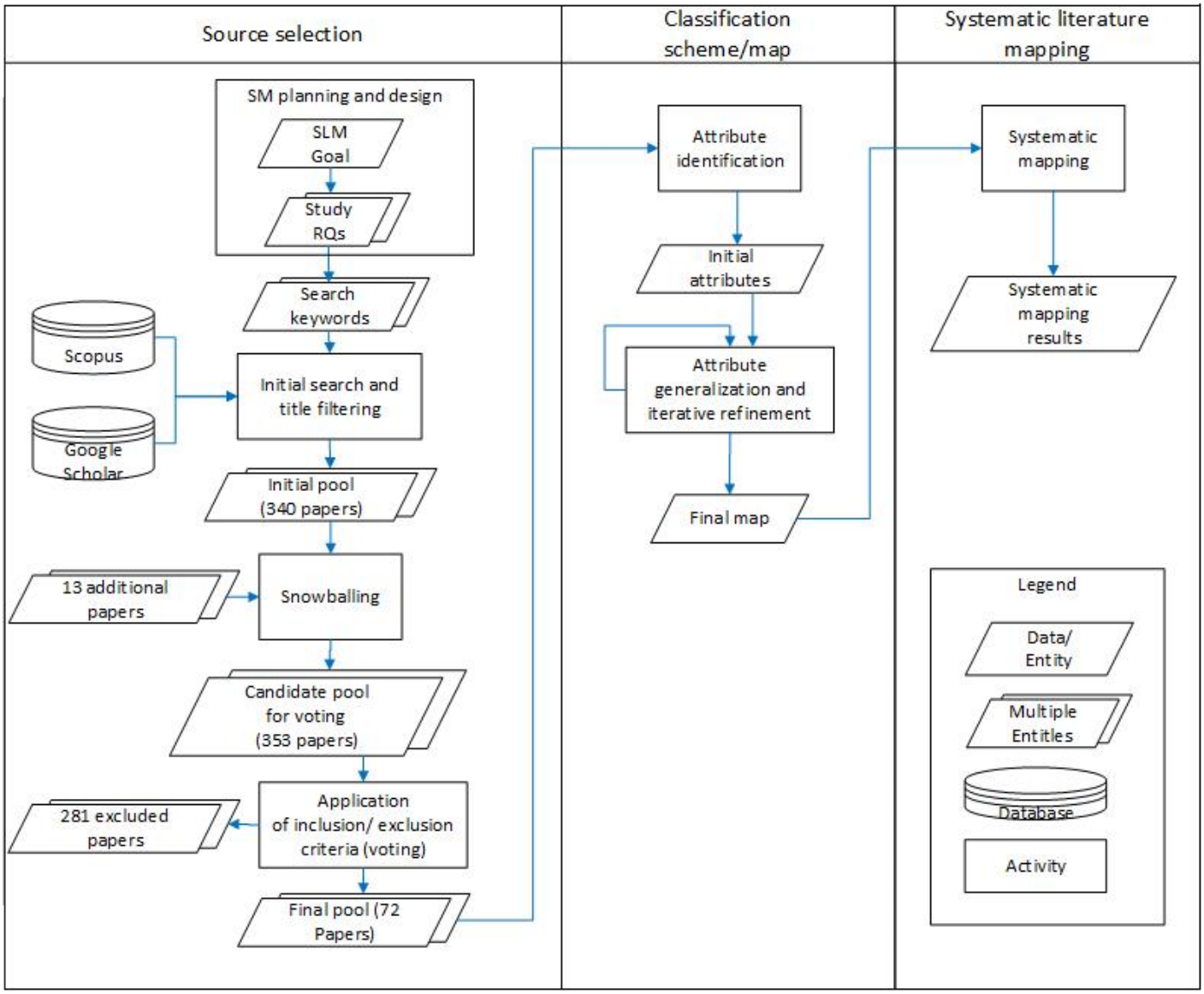


Figure 2. An overview of our research protocol

Firstly, we constructed our search key in order to perform string-based search. Our search strings are shown in Table 3.By searching with using these keywords, we look at the titles, keywords, and abstracts of papers in the literature, and we get relevant papers by searching primarily on Google scholar and Scopus database. We used keywords that were constructed on the date of April. 1, 2021 on two different databases. By using this search string, we searched in all databases separately, and listed the number of selected papers for each search string as shown in Table 3. By searching keywords by searching on title, we found 340 relevant papers. In addition, it is possible that there may be some relevant studies that are missed by string-based search. In order to ensure not to miss any relevant studies from the initial search with string-based, we applied snowballing process that is recommended besides database searches in systematic mapping studies. By applying this technique, we found 13 additional articles and included them in our study pool, and we reached 353 relevant papers as an initial set. After applying inclusion/exclusion criteria to our candidate papers, we reached 72 papers as a final pool.

Search string	*Allintitle:* Enterprise resource planning AND fail *Allintitle:* Enterprise resource planning AND fails *Allintitle:* Enterprise resource planning AND failure *Allintitle:* Enterprise resource planning AND failures *Allintitle:* Enterprise resource planning AND unsuccessful *Allintitle:* Enterprise resource planning AND insufficient *Allintitle:* Enterprise resource planning AND disappoint *Allintitle:* Enterprise resource planning AND problem *Allintitle:* Enterprise resource planning AND problems *Allintitle:* Enterprise resource planning AND challenge *Allintitle:* Enterprise resource planning AND challenges *Allintitle:* ERP AND fail *Allintitle:* ERP AND fails *Allintitle:* ERP AND failure *Allintitle:* ERP AND failures *Allintitle:* ERP AND unsuccessful *Allintitle:* ERP AND insufficient *Allintitle:* ERP AND disappoint *Allintitle:* ERP AND problem *Allintitle:* ERP AND problems *Allintitle:* ERP AND challenge *Allintitle:* ERP AND challenges
Results quantity on Google Scholar	1002
Results quantity on Scopus	215

Table 3. Results quantity on each database

3.3 INCLUSION AND EXCLUSION CRITERIA

In order to assess each candidate primary study in systematic mapping studies, it is required to consider inclusion and exclusion criteria. We defined these criteria, when the protocol is drafted. We select the potential primary studies by examining inclusion and exclusion criteria. Below, we described inclusion and exclusion criteria that we followed during the SLM study.

Inclusion Criteria

Articles on the proposed topic, published until April 1st 2021, will be included if;

- Research paper focused on ERP Failure Factors
- Research paper include a relatively sound validation
- The selected paper that is not the same or similar paper already in the pool

Exclusion Criteria

The following types of papers will be excluded if;

- The full text of the paper is not accessible
- The paper is not written in English
- The research paper is not relevant to ERP Failure
- The paper does not include a relatively sound validation
- The same or similar paper already in the pool

- The research paper's type is PhD dissertations, secondary studies (SLR/SLM), posters

In fact, the authors have faced with a certain degree of difficulty when performing the SLM study. Constructing research questions and deciding search strategies was made by two authors. By considering inclusion/exclusion criteria, the final pool reached 72 articles from 340 initial set of papers. After preparing final pool with included papers, we embedded all the articles into an Excel document and performed all of the data extraction processes on this document. In one iteration, two authors divided all the 72 articles into half, and they simultaneously extracted each of the 36 articles in order to find answers to the RQs. Then, each author checked the data extracted by the other author. If there is any conflict in this stage, authors discussed the disagreement parts together, and proposed to make an agreement on these conflicts.

3.4 Data Extraction

In order to extract useful data from primary studies, we applied date extraction process. For making an in-depth analysis, we performed this process to 72 articles in the final pool. Firstly, we gathered all the papers by downloading from the Google Scholar and Scopus databases. Then, after creating an Excel sheet, we recorded all of the required information into this sheet. In order to mitigate bias with the data extraction process, two authors conducted the data extraction process into two steps in which the first step is done by dividing all final pool into two, and each author extracted data simultaneously, and in the second step they peer reviewed. When there was any unsolved dispute between the two researchers, they firstly discussed the reasons that they support and then they met an agreement for the decision. Also, all the papers and data extracted from the papers were stored in the Google sheet for analysis by independent researchers.

4 Results

In this part, we will give the results of our proposed SLM study.

4.1 RQ1. Background Understanding

With RQ 1, we focused on the definition of failure factors in the articles, looking for the trend of this context by year/avg. citation numbers, research facets, contributions facets, and the distributions of articles made by academia, industry or collaboration that is leading to the research on ERP failure factor.

4.1.1 RQ1.1. What is the trend of number of studies on ERP failure factors?

In this section, we focused on the publication frequency by year and examined the average citation characteristics of the articles. In Figure 3, we represented the distributions of articles with respect to years. According to results, we observed that articles examining the ERP failure factors have emerged from 1999 up to 2020, and there has been an increasing trend between 2009-2019 on this research subject. However, the number of articles examined ERP failure factors decreased. We may conclude that increasing the successful ERP software implementations cause the decreasing of the articles focusing ERP failure factors.

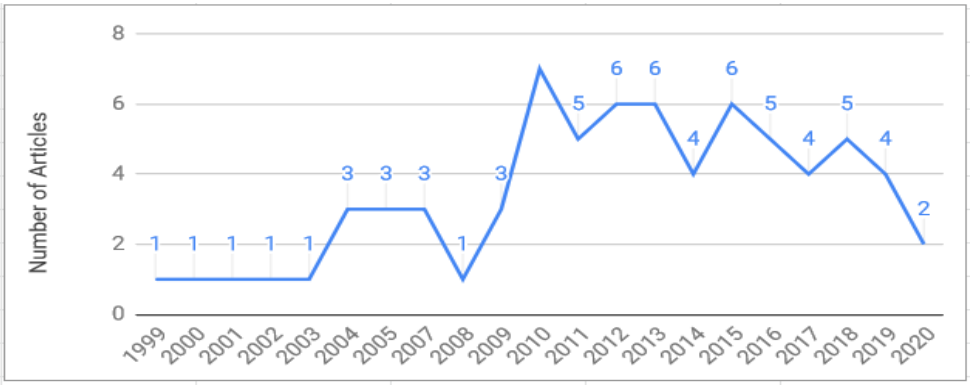


Figure 3. Distributions of articles per year

In order to see the mostly cited articles in the context of ERP failure factors between 1999-2020, we represented the visualization of number of citations and average number of citations per year in Figure 4. On the left side of Figure, we

represented citation count vs year, and on the right side of the Figure, we represented normalized citation count vs year. Normalized citation count formulized as shown below:

$$\text{Normalized citation count} = Total\ citation\ count/(2021 - publication\ year)$$

According to results, we can see that while top-cited article is the study of Gargeya and Brady [42] with 579 citation count, top-cited article according to normalized citation count belongs to Calogera [43].

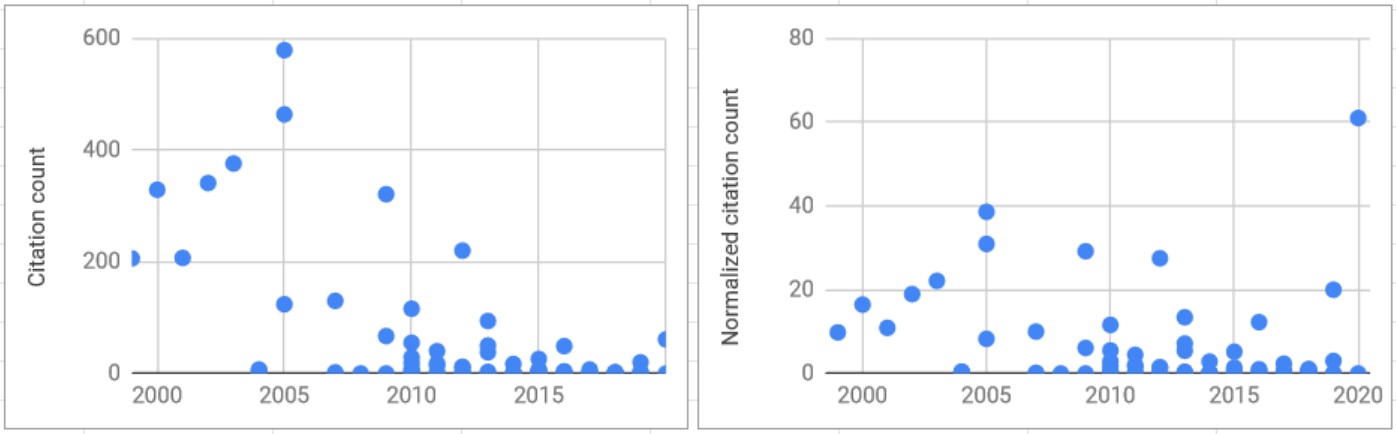
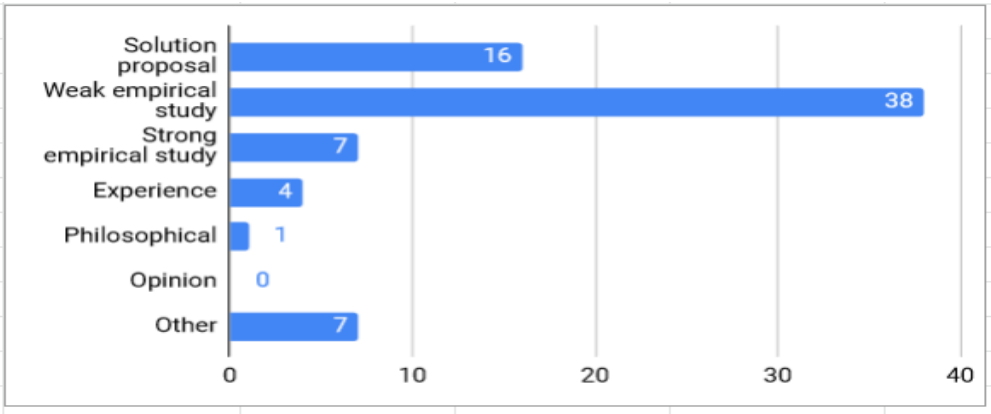


Figure 4. Citation counts vs. publication years of the studies

4.1.2 RQ1.2. What are the research methods developed in the studies?

According to Petersen guideline [41] , we extracted data with respect to solution proposals, weak empirical study, strong empirical study, experience papers, philosophical papers, opinion papers. To understand the maturity of this field, we represented the distributions of research methods developed in the studies as shown in Figure 5. While the researches made in ERP failure factor was mostly developed by weak empirical studies (38 articles, %0.52), solution proposal research method followed it by 16 articles. The fact that there are very few strong empirical studies in the literature indicates that this field is actually not very mature.



Solution Proposal: P3, P12, P19, P20, P25, P27, P32, P47, P54, P57, P61, P63, P64, P65, P67, P69

Weak Empirical Study: P1, P2, P4, P6, P8, P9, P13, P15, P17, P18, P21, P22, P23, P24, P28, P29, P30, P31, P34, P35, P37, P38, P39, P40, P41, P42, P43, P45, P48, P49, P50, P52, P53, P55, P56, P68, P71, P72

Strong Empirical Study: P5, P7, P16, P26, P33, P46, P59

Experience Paper: P10, P11, P60, P66

Philosophical Paper: P36

Other: P14, P44, P46, P51, P58, P62, P70

Figure 5. Distribution of research methods employed in the studies

4.1.3 RQ1.3. Who is leading the research in ERP Failure Factors (Academia, Industry, Collaboration)?

In Figure 6, we gave the analysis of the results by academic, industry or collaboration between these two. According to results, it was determined that 15 articles were conducted with the academy, 9 studies within the industry and 5 studies were conducted with academia-industry cooperation. The results show that the interest in software quality in the field of artificial intelligence-based software is higher in the academy area than in the industry.

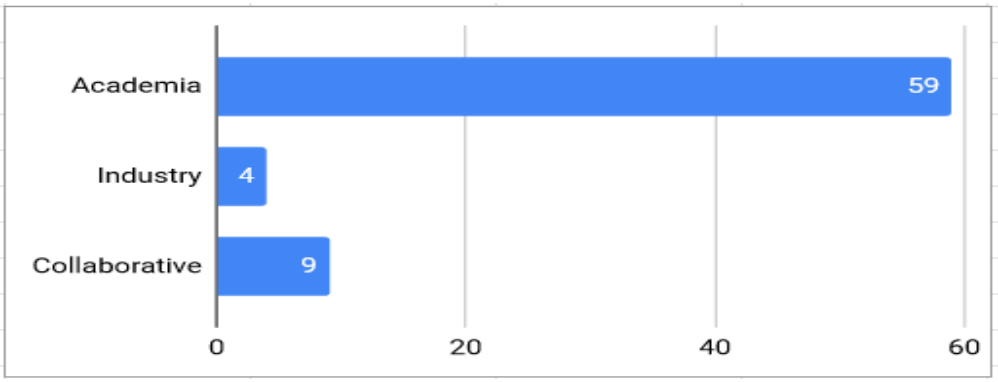


Figure 6. Distribution of author affiliations in the studies

4.1.4 RQ1.4. What type of contributions have been made in this area up to now (model, metric, tool, case study, etc.)?

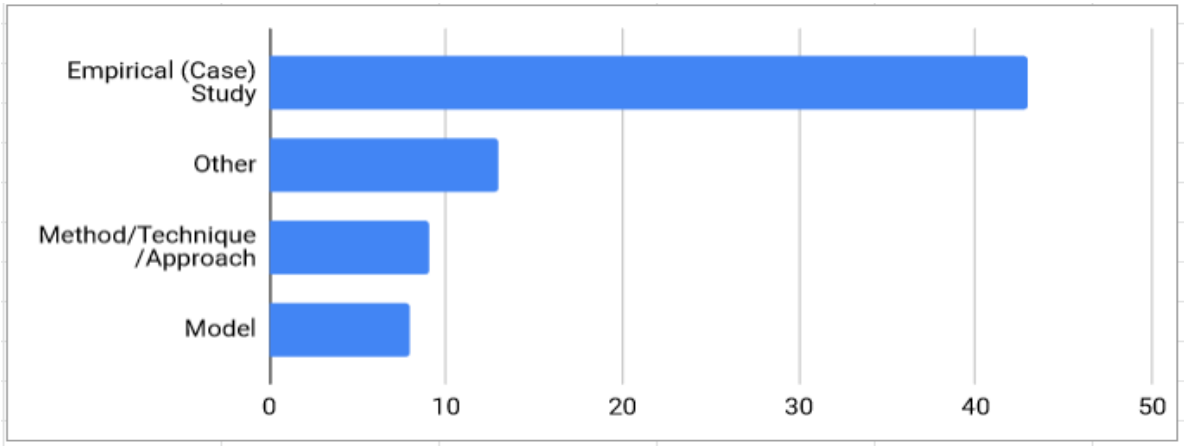
With this question, we analyzed the studies according to their contribution facets. In **Empirical (Case) Study**: P1, P2, P5, P6, P7, P8, P9, P11, P13, P15, P18, P19, P21, P24, P25, P26, P28, P29, P30, P32, P34, P35, P36, P37, P39, P40, P41, P44, P45, P50, P52, P55, P58, P59, P60, P61, P62, P64, P66, P68, P71, P72

Other: P10, P12, P16, P20, P31, P33, P38, P42, P51, P54, P57, P69, P70

Method/Technique/Approach: P14, P27, P43, P46, P47, P48, P53, P65, P67

Model: P3, P4, P17, P22, P23, P49, P56, P63

Figure 7, the distribution of contribution facets by studies was represented. According to results, while 43 articles contributed an empirical (case) study, there are 13 articles that we could not put into under any categorization column. These articles were in general review studies, guidelines, etc.



Empirical (Case) Study: P1, P2, P5, P6, P7, P8, P9, P11, P13, P15, P18, P19, P21, P24, P25, P26, P28, P29, P30, P32, P34, P35, P36, P37, P39, P40, P41, P44, P45, P50, P52, P55, P58, P59, P60, P61, P62, P64, P66, P68, P71, P72

Other: P10, P12, P16, P20, P31, P33, P38, P42, P51, P54, P57, P69, P70

Method/Technique/Approach: P14, P27, P43, P46, P47, P48, P53, P65, P67

Model: P3, P4, P17, P22, P23, P49, P56, P63

Figure 7. Distribution of contribution facets by studies

4.2 RQ2. Qualitative Coding in ERP Implementation Projects

4.2.1 RQ2.1. How failure factors are defined in ERP?

In order to understand the researchers' perspectives on ERP failure factors, we proposed to extract the definition of these failure factors identified in the articles.

Within the scope of this study, a total of 806 CFFs were identified in 72 articles examining the causes of failure in ERP projects. The full list of 806 CFFs can be viewed in Appendix 2. When this list is examined carefully, it will be seen that very different words are used for failure factors that have approximately the same meaning. For example, Tsai [44] defines it as "Reach" for the project team to interact with end users to understand the requirements, while Malaurent [45] defines it as "communication matters". In different articles, the same words are used with different meanings. For example, according to Sahran [46], "Lack of internal communication" is seen as a subset of "Change Management".

Correct classification is very important to make a good analysis using 806 CFF extracted from 72 articles. Qualitative coding approach has been carefully applied for this accurate classification. Because there is no doubt that the qualitative data coding process is an important part of this systematic literature mapping.

Qualitative coding can be described as creating classifications from the interpretation of data [47]. During this study, inductive and deductive approaches were combined. First of all, we did the first-round pass at coding. After this stage, our codes were organized into categories. After that, we did further rounds of coding. At the last stage, we turned the codes into our final 17 categories. Word clouds related to these seventeen factors can be seen in Figure 8. Also, Figure 8.s shows the word cloud created by 806 CFFs. This word cloud proves how wrong it is to see ERP projects as an IT project. In other words, ERP should be considered as business and management projects that affect all processes and ways of doing business.

a. Project Management Problems b. Lack of Top Management Support c. Lack of Training

d. Poor Project Team

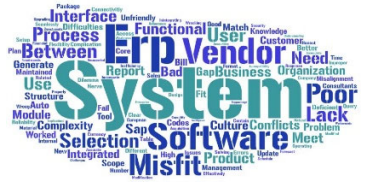
e. Poor Organizational Culture

f. Lack of Clarity on Scope

g. ERP Software Misfit

h. Poor Solution Implementer

i. Communication Problems



j. Poor quality of BPR

k. Financial Management Problems

l. Highly Customized ERP

m. Resistance to change

n. Outdated IT infrastructure

o. Poor Quality of Testing

p. Lack of User Involvement

r. Data Quality

s. Critical Failure Factors

p. Lack of User Involvement

r. Data Quality

s. Critical Failure Factors

Figure 8. The word clouds of failure factors

4.2.2 RQ2.2. How failure factors are categorized?

In the article pool of this study, there are 24 articles that examine articles from different perspectives by categorizing them. A complete list of CFFs and their categorization can be found in Appendix 3. 13 of these 24 articles that categorize CFFs used the titles "Organization" and "Technology". This is followed by the "Personal" category with 9 articles. The main categories of failure factors can be seen in Figure 9.

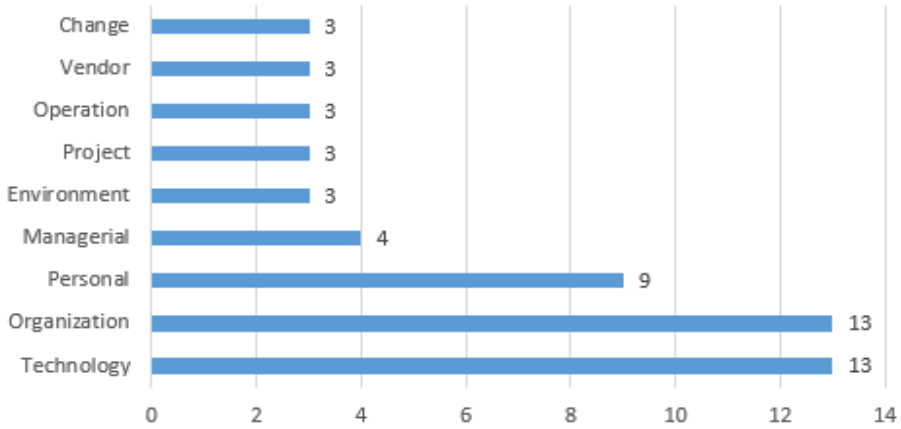


Figure 9. The main categories of failure factors

Many articles use traditional categories such as "Organization" and "Technology"; Tsai [44] sees the earth orbiting moon as a great metaphor for an ERP system. With this approach, Tsai classified the failure factors as centripetal forces and centrifugal forces. Khanna [48], on the other hand, classified the failure factors as functional and non-functional. From a different perspective, Thiak [49] has made its classification as cost/time and customization. Original classifications of failure factors in articles can be seen in Table 4.

Article	Original Classification Schema
P01	Change Management
P02	Organization, Personal issue
P05	Employee/Personnel/HR & Process related, End-user Related, Enterprise related, Performance related, Project related, Strategy related, Technology & Vendor related
P06	Environmental Context, Organizational Environment, Technology Context
P07	Centrifugal Forces, Centripetal Forces
P08	Cost, Operational, People, Strategic, Tactical, Technology
P09	Functional, Non-Functional
P17	Human resources, Managerial, Organization, Technical, Vendors and Consultants
P23	ERP post-implementation Failure, Lack of external supports, Managerial, Operational, Technical, Top management, User's inefficiency
P30	Change Management, Customer Mindset, Process Flow, Software
P31	Cost and time, Customization
P34	Culture, Environment, Technical issues
P36	Macro level (organization), Micro level (individuals)
P37	Managerial, Technical
P42	Human, Organization, Technology
P46	Human resources, Managerial, Organizational, Processes, Project Management, Technical, Vendor and Consultant
P47	Customer related, Vendor related
P48	Characteristic of the project, Organization characteristics, Organizational learning
P55	Knowledge Challenges, Organizational Challenges
P56	Actor, Change, Fit, Plan
P57	Architecture and design, Implementation, Operational, Organizational
P63	Climate for implementation, Innovation-values fit
P67	Human and Organization, Technical
P72	IT experts, System, Top Management

Table 4. Original classifications of failure factors in articles

4.2.3 RQ2.3. Which stage of the ERP implementation process do we encounter the failure factor? (Pre-Implementation, Implementation, Post-Implementation)

Only 5 of the 72 articles in the pool of this study associated failure factors with the steps of the ERP project. The full list of the relationship of the failure factors with the steps in the ERP project can be seen in Appendix 4. When these 5 articles are analyzed, failure factors can be divided into 3 steps as Pre-Implementation, Implementation and Post-Implementation. While failure factors such as "ERP Software Misfit", "Lack of Top Management Support", "Lack of Training" are important for each step, factors such as "Outdated IT infrastructure" can only be important in "Implementation" and "Post-Implementation" steps. Relationship of failure factors with project steps can be seen at Table 5.

Pre-Implementation	Implementation	Post-Implementation
Communication Problems	ERP Software Misfit	ERP Software Misfit
Data Quality	Highly Customized ERP	Lack of Clarity on Scope
ERP Software Misfit	Lack of Clarity on Scope	Lack of Top Management Support
Financial Management Problems	Lack of Top Management Support	Lack of Training
Lack of Clarity on Scope	Lack of Training	Lack of User Involvement
Lack of Top Management Support	Outdated IT infrastructure	Outdated IT infrastructure
Lack of Training	Poor Organizational Culture	Poor Organizational Culture
Poor Organizational Culture	Poor Quality of BPR	Poor Project Team
Poor Project Team	Poor Quality of Testing	Project Management Problems
Poor Quality of BPR		Resistance to Change
Poor Solution Implementer Performance		
Project Management Problems		
Resistance to Change		

Table 5. Relationship of failure factors with project steps.

4.2.4 RQ2.4. Which ERP failure factor causes what kind of failure of the ERP implementation project? (Process Failure, Expectation Failure, etc.)

Failure in ERP Projects does not occur in a single way. There are many different effects and modes of failure. According to the data extracted from the articles in the pool of this study, there are 12 different failure effects and 4 different failure modes. Ravasan [50] and Shirouyehzad [51], identified the modes of failures and stated which factors caused what mode of failure. Ravasan [50] revealed 4 different modes of failure, namely "process failure", "expectation failure", "interaction failure" and "correspondence failure". As can be seen in Table 6, for example, "Outdated IT infrastructure" causes "Interaction Failure", while "Lack of Training" causes "Expectation Failure" and Correspondence Failure. Shirouyehzad [51] presents the FMEA approach which is used to identify the potential failure effects and control failure factors which effect to implementation of ERP. For example, "Lack of User Involvement" causes "Customer & Employee Dissatisfaction". The full list of failures factors and their main effects on ERP projects can be seen in Appendix 5.

Type	Potential Failure
PFM*	**Process Failure:** Poor Solution Implementer Performance, Lack of Top Management Support, Communication Problems
PFM	**Expectation Failure:** Lack of Training, Poor Solution Implementer Perf, Communication Problems
PFM	**Interaction Failure:** Communication Problems, Lack of Top Management Support, Outdated IT infrastructure
PFM	**Correspondence Failure:** Lack of Training, Lack of Top Management Support, Poor Solution Implementer Perf
PFE*	**Budget Exceed:** Poor Solution Implementer Perf, Lack of Top Management Support, Communication Problems
PFE	**Time Exceed:** Poor Solution Implementer Perf, Lack of Top Management Support, Communication Problems
PFE	**Project Stop:** Communication Problems, Poor Solution Implementer Perf, Lack of Top Management Support
PFE	**Poor Business Performance:** Lack of Training, Poor Solution Implementer Perf, Lack of Top Management Support
PFE	**Inadequate System Reliability and Stability:** Highly Customized ERP, Outdated IT infrastructure, Poor Solution Implementer Perf
PFE	**Low Organization Process Fitting:** Lack of Training, Poor Solution Implementer Perf, Communication Problems
PFE	**Low User friendliness:** Poor Solution Implementer Perf, Lack of Top Management Support, Communication Problems
PFE	**Low Degree of Integration and Flexibility:** Poor Solution Implementer Perf, Outdated IT infrastructure, Highly Customized ERP
PFE	**Low Strategic Goals Fitting:** Communication Problems, Poor Organizational Culture, Poor Solution Implementer Perf
PFE	**Bad Financial Performance Organization:** Communication Problems, Lack of Top Management Support, Poor Organizational Culture
PFE	**Cost increasing:** Financial Management Problems, Lack of Top Management Support, Communication Problems
PFE	**Customer & Employee Dissatisfaction:** Poor Project Team, Lack of User Involvement, Lack of Training
	* PFM: Potential Failure Mode
	** PFE: Potential Failure Effect

Table 6. Relationship of failure factors with failure modes and effects

4.3 RQ3. RANKING OF ERP FAILURE FACTORS

4.3.1 RQ3.1. How is the order of importance of ERP failure factors determined?

20 of the 72 articles in the pool prioritized the failure factors according to their order of importance. The common purpose of these articles, which use various prioritization methods such as "survey for ranking", "occurrences in the projects", "prioritized failure factors", is to prioritize the factors that cause failure. Some articles have multiple rankings for different

reasons. For example, P19 made two different rankings for two different projects. P65, on the other hand, made different sequences for different failure types. The full list of detailed rankings is available in Appendix 6.

In Table 7, the top five most important failure factors in each article can be seen in order of importance. While the number "5" is the most important failure factor, the number "1" is the 5th most important failure factor. Failure factors with the same order of importance are given the same order number. For example, in article P05, both "Lack of Top Management Support" and "Lack of Clarity on Scope" have the same order of importance.

"Project Management Problems" draws attention as the most important failure factor in ERP projects. It should be explained very clearly here that ERP projects are specialized projects with long-term and serious project management needs. It should not be confused that many factors such as "budget", "communication", "project team" are not examined in the "Project Management Problems" category since they are examined in separate categories. Because many articles analyzed in this study show that project management is handled as project coordination. Therefore, unrealistic project scheduling, implementation strategy, and change management, which is generally mentioned in some articles, are included in project management.

	P03	P04	P05	P08	P09	P09	P15	P18	P19	P19	P33	P37	P38	P40	P42	P49	P53	P56	P59	P65	P65	P65	P69	P71	T
Project Management Problems			1	1	1			3	3		5	4	5	1	4		4	1	4	3			5		**45**
Lack of Top Management Support		4	3	2	4			1	5	3						3		3	1	4	5			4	**42**
Poor Project Team	1			5	3		5		4								5	5	1	2		5			**36**
Poor Organizational Culture		1							2	4	2	2		1	1		3			5	3	3	1		**28**
Lack of Training		3											3	1	5			4	5				4	1	**26**
ERP Software Misfit			1			4	3	1					2								3	4	1		**19**
Poor Quality of Testing			5			1	3	1		5									3					1	**19**
Communication Problems	5	2				5				1				1					2	1	1				**18**
Resistance to change	3		1	3	5		1					2			2		1								**18**
Lack of Clarity on Scope			3			3		1						1		3		2	1				3		**17**
Poor quality of BPR	4							3	1	2	1		4											1	**16**
Financial Management Problems	1				2							5			3		2				1				**14**
Poor Solution Implementer Perf…		5	1					3				1		1					1						**12**
Lack of User Involvement				4			1				4											1			**10**
Highly Customized ERP						2					3													4	**9**
Data Quality													1			3									**4**
Outdated IT infrastructure																						1			**1**

Table 7. Ranking of failure factors

"Project Management Problems" are followed by "Lack of Top Management Support", "Poor Project Team", "Poor Organizational Culture", "Lack of Training" in order of importance. "ERP Software Misfit", which includes subheadings such as "ERP software selection", is only important in the 6th place. These data reveal that ERP projects should not be considered as an ordinary software project.

4.3.2 RQ3.2. What failure factors and how often are encountered in failed ERP implementation projects?

With this question, we aimed to see the distribution of failure factors in each year interval by dividing the period between 1999-2020 into five-year periods as shown in Figure 10.

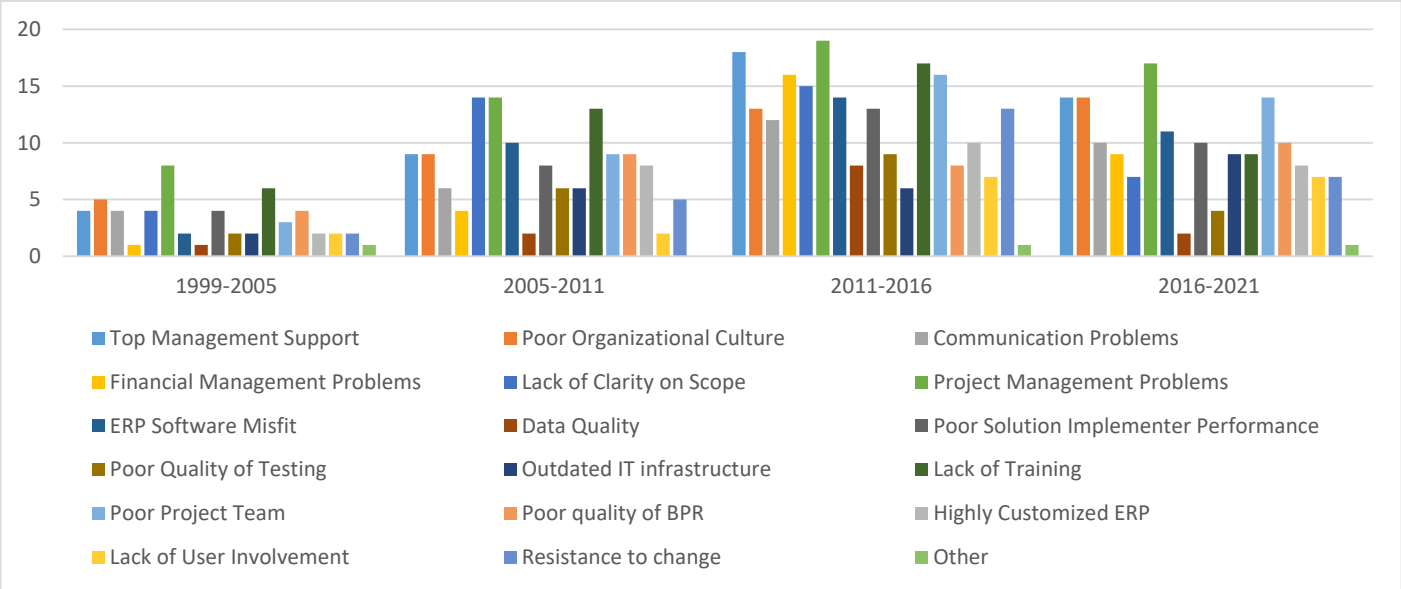


Figure 10. Distribution of failure factors into five-years periods

According to results, more attempts on failure factors in ERP projects were performed in the years between 2011-2016 and there is an increasing trend after 2010 with the context of ERP failure factors. While "Project Management Problems" mostly studied factor within all year periods, "Lack of Training" was the second most studied factor until 2016. After 2016, "Top Management Support", "Poor Organizational Culture", and "Poor Project Team" had the same and second mostly encountered factors with 14 articles.

4.4 RQ4. ERP Failure Factors for Failed ERP Projects

4.4.1 RQ4.1. How many different companies, projects and people have been worked with while determining the ERP failure factors?

The 45 articles in the pool collected data from one or more organizations. In this study, there are data from 369 organizations in total. Only 18 of the articles in the pool stated how many different ERP projects they collected data from. In this systematic literature mapping, data were collected from a total of 265 different ERP projects. Finally, 19 articles addressed how many different personnel they interviewed in organizations to extract failure factors. Data were collected through questionnaires and interviews with a total of 1090 personnel who have different responsibilities in the organization.

4.4.2 RQ4.2. Which geographic region's data was used when extracting ERP failure factors?

In order to get an overview of most active region in this context, we analyzed the data used in the articles according to geographic regions. First, we analyzed the countries to which the data belongs according to the related continents as shown in Figure 11. There are seven categories as a continent. In Asia category, there were thirty-three articles and mostly observed countries in this region were China, India, and Iran. In America category, there were nine articles which belongs to USA, Canada, and Brazil. In All category, there were seven articles, and in these articles, the authors specified the countries as global. In Europe category, there were six articles, and they used data belongs to UK, UN, Romania, Norway, and Ireland. There were just two articles which used the data belongs to Middle Eastern countries. It is observed that while it is observed that the data belonging to the countries in the Asian continent is used at the highest rate with 46%, this is followed by the NA category with 15%, that is, the category of articles that do not indicate which country the data belongs to.

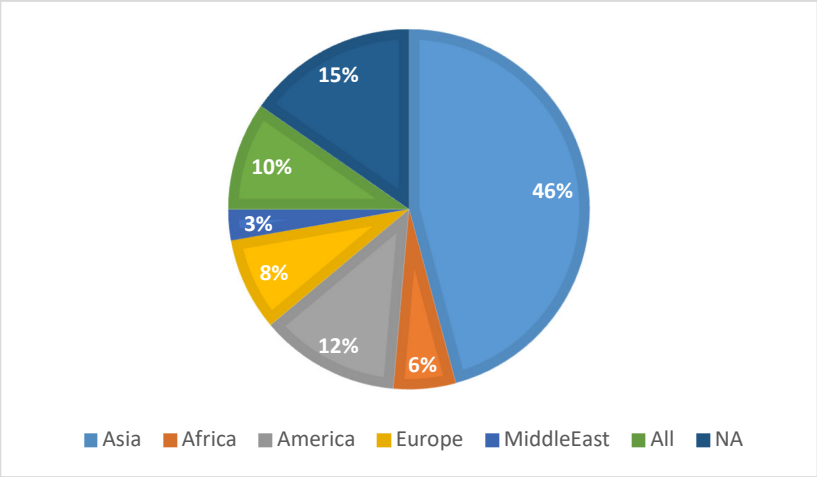


Figure 11. Distribution of articles according to the continents to which the data belongs

Secondly, we made observations on which failure factor was used more than which continent as shown in Figure 12. According to results, in Asia, while mostly studied failure factor was "Project Management Problems" with twenty-three articles, "Poor Organizational Culture" followed it with twenty-two articles. In America, Europe, All, and NA category, the articles mostly focused on "Project Management Problems" same with Asia. Even if there are very few articles in the Middle East, the failure factor "Poor Solution Implementer Performance" was the most studied factor in this region.

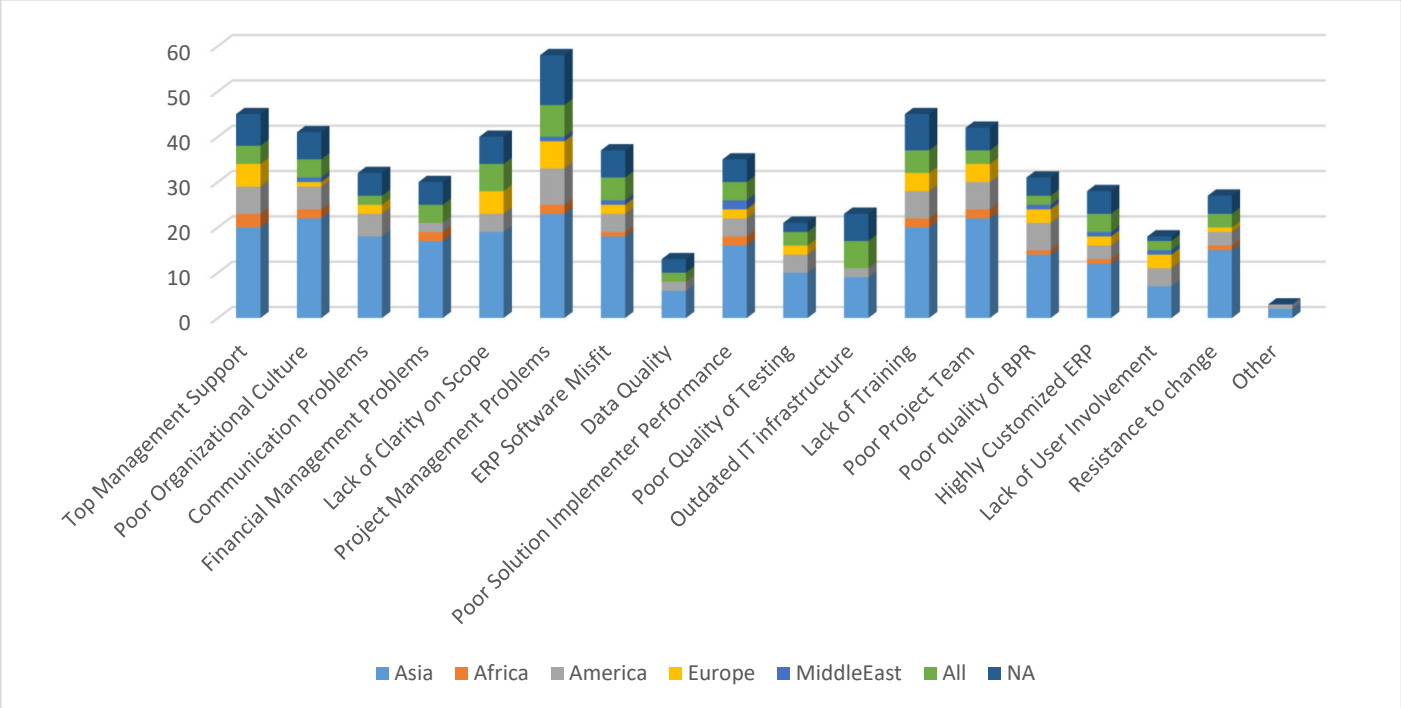


Figure 12. Distributions of failure factors according to continents

4.4.3 RQ4.3. What size companies' data were used when extracting ERP failure factors? (SME, large, all, etc.) factors?

With this question, we propose to understand the frequency of failure factors with respect to the size of the company data. We categorized the size as SME (small-medium enterprise), large, all, and NA (Not assigned). In Figure 13 , we can see the distribution of failure factors with respect to the size of companies. If we look at the figure, we can see that in all size of company, "Project Management Problems" factor was mostly considered factor among all failure factors. In addition, in large companies, "Poor Organizational Culture" is the second most studied factor.

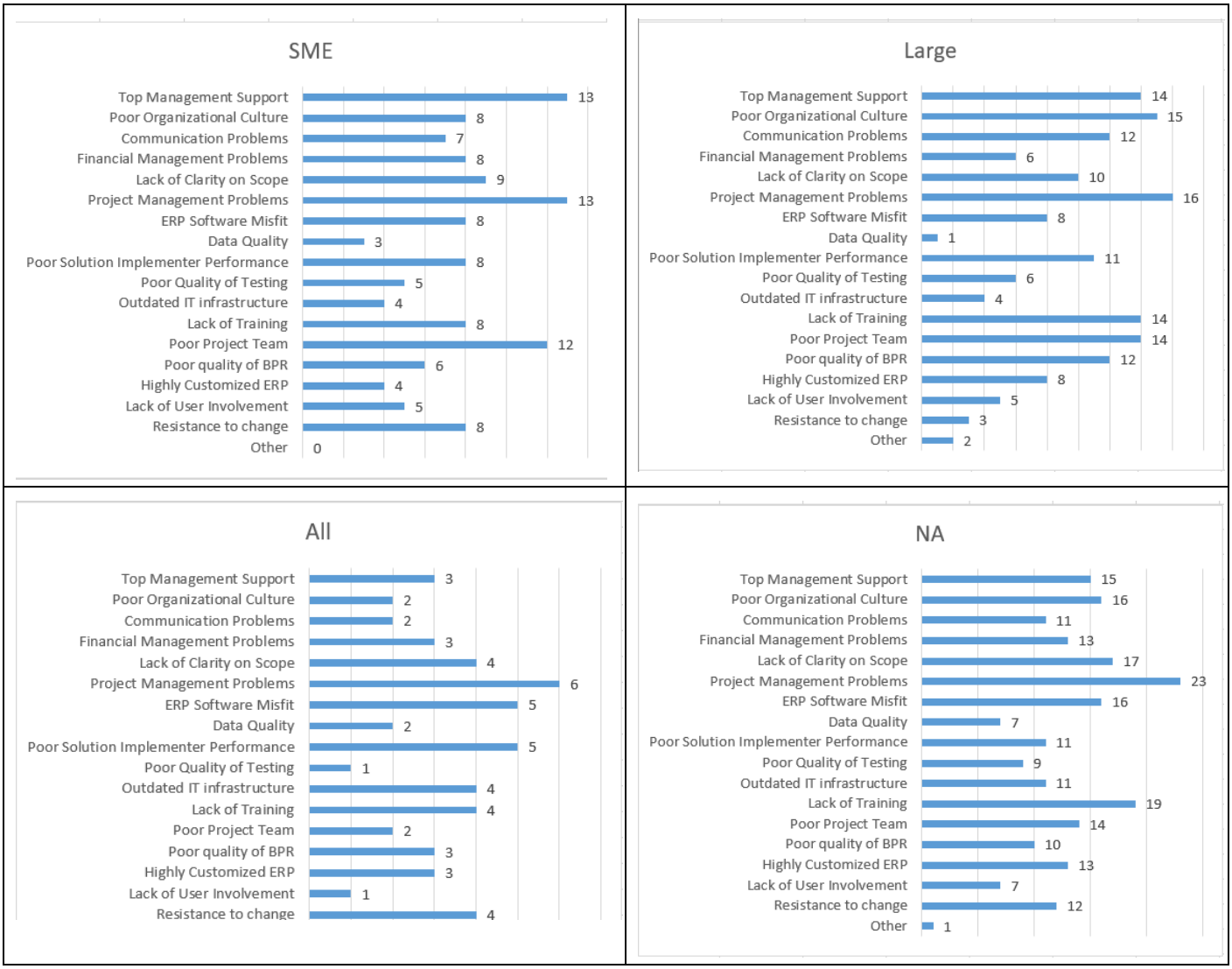


Figure 13. Distribution of failure factors with respect to size of companies' data

4.4.4 RQ4.4. What type of industry's data were used to extract ERP failure factors?

According to our experience and the research we have done in the literature, ERP systems are not specific to any type of industry, they are for the use of all industries. When the articles in the pool of this study are examined, 23 articles do not mention which type of industry they contain, while only 5 articles indicate that the failure factors are valid for all types of industry. As can be seen in **Non-profit org.:** P71

Logistic: P56, P64

Telecom: P19, P53

Retail: P08, P35

Automotive: P09, P17

University / Education: P13, P45, P51

Professional Services: P22, P39, P51

Financial / insurance: P02, P51, P53, P56

High-tech / IT: P01, P39, P52, P60, P63

All: P37, P38, P49, P57, P59

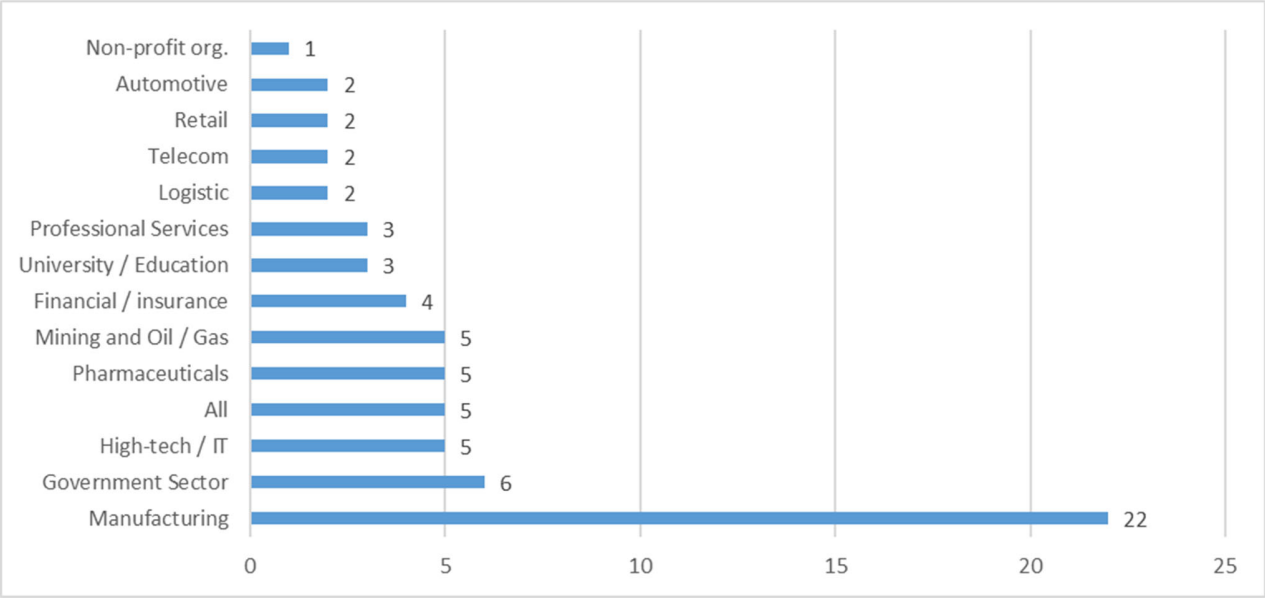
Pharmaceuticals: P09, P34, P48, P51, P66

Mining and Oil / Gas: P15, P24, P33, P36, P53

Government Sector: P19, P24, P28, P33, P55, P61

Manufacturing: P01, P06, P07, P09, P11, P18, P22, P23, P29, P30, P32, P34, P40, P42, P53, P56, P62, P63, P65, P67, P69, P72

Figure 14, the area of industry where the failure factors are most extracted is "Manufacturing". This is followed by the Government sector.



Non-profit org.: P71

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Manufacturing: P01, P06, P07, P09, P11, P18, P22, P23, P29, P30, P32, P34, P40, P42, P53, P56, P62, P63, P65, P67, P69, P72

Figure 14. Types of industry

4.4.5 RQ4.5. How is data gathered in order to derive critical failure factors (interview, questionnaire, literature review, etc.)?

In this part, we proposed to extract the data sources such as interview, personal experience, literature review, archived records/documents, survey, other (opinions, observations, etc.) to derive the critical failure factors in the articles. In **Interview**: P2, P6, P9, P15, P18, P23, P25, P28, P31, P33, P34, P35, P39, P42, P50, P52, P53,

P55, P56, P61, P63, P64, P68 P71, P72

Personal Experience: P1, P3, P10, P11, P13, P21, P24, P29, P30, P32, P36, P39, P40, P43, P44,

P46, P47, P48, P49, P51, P57, P60, P62, P66, P71

Literature Review: P4, P5, P8, P12, P14, P19, P20, P23, P27, P33, P37, P38, P39, P40, P43, P46,

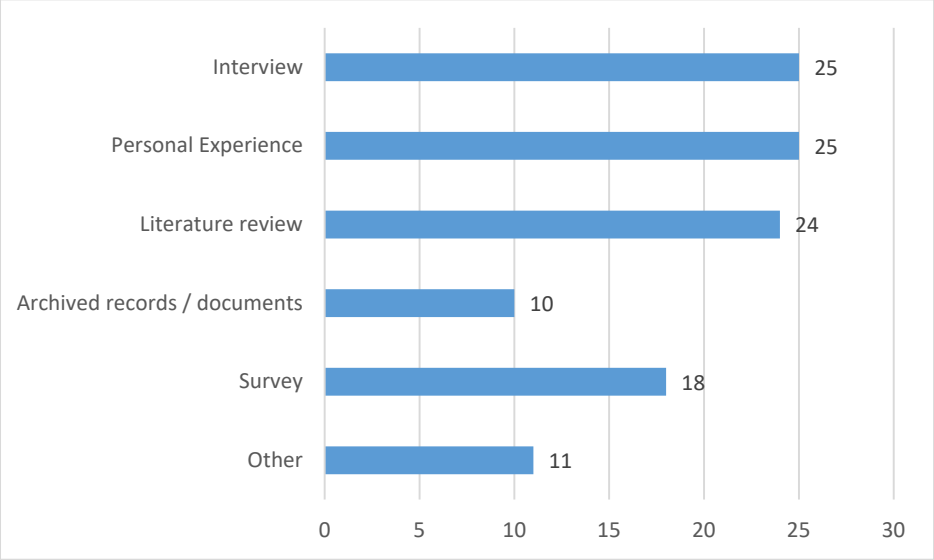
P49, P51, P54, P57, P59, P65, P67, P69

Archived records/documents: P2, P6, P15, P28, P34, P39, P50, P56, P67, P68

Survey: P5, P7, P8, P9, P16, P17, P22, P23, P26, P28, P33, P37, P42, P45, P46, P50, P63, P69

Other: P6, P9, P26, P28, P34, P37, P41, P44, P50, P67, P70

Figure 15, we represented the distribution of each data source, and results showed that top three data source used in the articles were interview, literature review, and personal experience.



Interview: P2, P6, P9, P15, P18, P23, P25, P28, P31, P33, P34, P35, P39, P42, P50, P52, P53,

P55, P56, P61, P63, P64, P68 P71, P72

Personal Experience: P1, P3, P10, P11, P13, P21, P24, P29, P30, P32, P36, P39, P40, P43, P44,

P46, P47, P48, P49, P51, P57, P60, P62, P66, P71

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P49, P51, P54, P57, P59, P65, P67, P69

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Survey: P5, P7, P8, P9, P16, P17, P22, P23, P26, P28, P33, P37, P42, P45, P46, P50, P63, P69

Other: P6, P9, P26, P28, P34, P37, P41, P44, P50, P67, P70

Figure 15. Data sources to derive critical failure factors

5 DISCUSSION

5.1 BENEFITS OF THIS STUDY

This study, ERP implementation failure systematic literature mapping, set sight on ERP implementation project managers, consultants, organizations and researchers. ERP implementation project managers and consultants can take advantage of this study while they implement their ERP projects on organizations. This study is the most comprehensive research in the literature in terms of identification and classification of ERP failure factors. Moreover, this study reveals the relationship between failure factors and ERP implementation stages. With this study, important results were obtained such as the relationship between failure factors and failure types, the trend of failure factors by years, the order of importance of failure factors, whether failure factors differ according to regions, sizes and fields of activity of organizations. ERP project managers can use this information and can reduce the risk of failure. Moreover, using this information, organizations can better interpret the data of the ERP implementation project.

Additionally, solution implementers can use all these information and results to perform their consultancy more efficiently. Consultants can improve their communication and solution implementation process with all this information. Also, researchers can extend this mapping study with their research. They can extend result questions and exhibit new research.

5.2 THREATS TO VALIDITY

The most important validation threats in such systematic literature mapping studies can be listed as follows: reliability of data extraction, missing article pool due to insufficient search terms, selection of article databases, correct definition and application of exclusion/inclusion criteria. These validation threats are discussed based on a standard checklist adopted from (Claes et al., 2012).

Internal validity: The strategy used for source selection is discussed in detail in Section 3.2. The purpose of this strategic approach is to ensure that this systematic literature mapping research is reproducible. With this approach, search terms and engines as well as inclusion and exclusion criteria are defined and recorded in full detail. In this context, incomplete definition of search terms and engines is one of the biggest internal validity risks. In addition, the careless application of inclusion and exclusion criteria by the authors is another major internal validity risk.

Inadequate search engines may cause deficiencies in the created article pool. In addition, to create a complete article pool, search terms must also be determined completely. Different authors have independently developed their own search terms on different search engines. Then these search engines and words were reviewed and consolidated, and then a systematic search was performed. After all, the references of the articles included in the pool were also examined to further reduce the risk of missing related articles.

Another internal validity risk is that the inclusion and exclusion criteria may be interpreted differently by the authors for various reasons. In order to prevent this threat and to create a high-quality article pool, a comprehensive and systematic peer review process has been applied.

Construct validity: In our study, special attention was paid to the research questions in order to ensure construct validity. The authors determined the research questions by discussing them in detail. In addition, categorization schemes were developed using previously used and proven classification schemes to eliminate construct validity risks.

Conclusion validity: This sort of validity of SLM is related with the getting of appropriate conclusions by means of strict and repeatable analysis. Each paper within the pool was assessed by means of least two authors to decrease mistake for data extraction. Contrasts of assessment between the authors were settled with agreement. Following standard procedure provided repeatability of this mapping study. Moreover, this process guaranteed that results of similar research will not have critical divergences from our findings.

External validity: In such systematic literature mapping studies, external validity can be defined as the validity of applying the results of the research outside the context of the study. Data were extracted from all academic and industrial articles related to ERP Failure. These data were turned into sufficient information for industry and academia. The most important point to remember here is that the results in this research focused only on lessons learned in failed ERP projects. We are not inclined to extend our findings beyond this scope.

6 Conclusion and future work

In this study, we presented a systematic literature mapping in order to analyze the state of the art in the failure factors of ERP projects and distinguish what we have about this area. Our intent is to benefit practitioners and analysts by providing the most comprehensive research in the field of critical failure factors of ERP.

In this systematic literature mapping, a very comprehensive pool of articles was created from studies investigating why ERP projects fail. This paper mainly examines types of failure factors, common names of failure factors, the main categories of failure factors, relationship of failure factors with project steps, failure modes/effects on a systematic literature mapping including 72 papers. In addition, this article investigated the trend of failure factors, the variation of critical failure factors according to the area/size of the organization, the effect of the organization's geolocation on failure factors. With the developing technologies, ERP is a growing research and application area which is not only for industrial companies but also for all organizations that want to use their resources efficiently. We recommend that all organizations that use or will use ERP consider the information generated from this comprehensive analysis study. In addition, we have seen with our study that; there are many studies on the importance of failure factors. However, the number of studies on the effects of these factors on each other and how to reduce these negative effects are very few. Lastly, the lack of studies on the systematic measurement of failure factors draws attention.

The direction of our future work is to develop industry-academy collaboration by utilizing the results of this systematic literature mapping. In addition, our future research includes studies that can systematically measure the value of each failure factor. The studies that model the relationships of these failure factors with each other and the ability to control these failure factors will be the continuation of this study.

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APPENDIX 1- LIST OF THE PRIMARY STUDIES

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APPENDIX 2- A FULL LIST OF THE ORIGINAL NAMES OF CRITICAL FAILURE FACTORS STUDIED IN THE ARTICLES

Lack of Top Management Support

1: P23; 2: P47; 3: P58; 4: P55; 5: P26; 6: P69; 7: P03; 8: P69; 9: P08; 10: P33; 11: P51; 12: P32; 13: P49, P50; 14: P72; 15: P15; 16: P15; 17: P15; 18: P15; 19: P46; 20: P57; 21: P26, P39, P42, P66; 22: P6; 23: P15; 24: P63; 25: P53; 26: P58; 27: P56; 28: P06; 29: P36; 30: P10; 31: P09; 32: P04, P05, P18, P46; 33: P56; 34: P16, P19; 35: P41, P59; 36: P62; 37: P17; 38: P02; 39: P27; 40: P30; 41: P23; 42: P01, P19, P35, P43, P60, P65; 43: P46; 44: P55; 45: P71.	1: "Changing top management position"; 2: "Do not give ERP system required priority"; 3: "Do not pay enough attention to the implementation"; 4: "Executive management lack of business knowledge"; 5: "Executive support, participation, and understanding"; 6: "Inappropriate level of management commitment"; 7: "Lack of awareness"; 8: "Lack of business management support"; 9: "Lack of top management commitment"; 10: "Lack of senior management commitment"; 11: "Lack of senior management commitment and support."; 12: "Lack of management support"; 13: "Lack of top management support"; 14: "Lack of top management support, short-term thinking, do not empower IT manager"; 15: "Leader has to champion stability"; 16: "Leadership changes during project"; 17: "Leadership commitment to the standard global template was lacking"; 18: "Leadership didn't understand the complexities"; 19: "Low degrees of management tendency to long and midterm planning "; 20: "Management and cost issue"; 21: "Management commitment"; 22: "Management commitment & support"; 23: "Management did not want to hear bad news"; 24: "Management needed to align multiple stakeholders (non-homogeneous groups)"; 25: "Managerial variable"; 26: "Managers have misunderstandings about ERP"; 27: "Mindset change and attitude to learning"; 28: "Perceived ERP benefits (indirect & direct) "; 29: "Political environment, existence of a local partner, strength of the partner, and distribution of authority"; 30: "Poor leadership from top management"; 31: "Poor top management"; 32: "Poor top management support"; 33: "Priority project"; 34: "Project champion"; 35: "Project team/management support/consultants"; 36: "Senior management's primary goal"; 37: "Support of top management"; 38: "Top management"; 39: "Top management commitments"; 40: "Top management does not want to learn from experience"; 41: "Top management make decision to find solutions without external experts/consultant"; 42: "Top management support"; 43: "Unstable managerial positions"; 44: "Weak leadership"; 45: "Weak top management support".
Poor Organizational Culture	
1: P52; 2: P19; 3: P58; 4: P53; 5: P44; 6: P19; 7: P16; 8: P23; 9: P01; 10: P06; 11: P21; 12: P33; 13: P57; 14: P37; 15: P42; 16: P32, P39; 17: P15; 18: P24; 19: P59; 20: P07; 21: P11; 22: P48; 23: P04; 24: P06; 25: P46; 26: P61; 27: P69; 28: P08; 29: P40; 30: P37; 31: P04, P23; 32: P12, P54; 33: P17; 34: P72; 35: P30; 36: P36; 37: P29; 38: P23; 39: P16; 40: P04, P46; 41: P43, P65; 42: P12, P14, P26, P54; 43: P61; 44: P21; 45: P23; 46: P69; 47: P08; 48: P20; 49: P55; 50: P53.	1: "Alignment between business strategy and ERP enabled IT strategy"; 2: "Appropriate business and legacy systems"; 3: "Backwards management foundation"; 4: "Both parties should work together with a partnership spirit and synergy (collaborative)"; 5: "Change in management"; 6: "Change management program and culture"; 7: "Change management programme and culture"; 8: "Changing team members position (key users' replacement) after training"; 9: "Company culture"; 10: "Competitive pressure"; 11: "Complicated legal & tax requirements and their frequent changes ."; 12: "Conflict between user departments"; 13: "Conflicting of business perspective"; 14: "Conflicts with business strategy"; 15: "Corporate & IT governance alignment"; 16: "Corporate culture"; 17: "Cultural differences"; 18: "Culture organisational politics"; 19: "Deal with organizational diversity"; 20: "Decentralization"; 21: "Delegation of authorities was not proper (centralized)"; 22: "Difference in organizational culture"; 23: "Environmental pressures"; 24: "Government policy"; 25: "Governmental structure of the organization"; 26: "High rate of changes in state and international trade laws."; 27: "Hostile company culture"; 28: "Ineffective organizational change management"; 29: "Insufficient organizational readiness"; 30: "Internal conflicts"; 31: "Internal conflicts between departments"; 32: "IT organizational problems"; 33: "Lack of alignment of the company's organizational strategy with the suitability of the ERP system"; 34: "Lack of cross-functional collaboration"; 35: "Lack of internal cooperation"; 36: "Local structural properties, local culture, type of organization"; 37: "Management systems and structures"; 38: "Market and competitive pressures"; 39: "Massive re-organization before an ERP implementation"; 40: "Misfits between the IT and business strategies"; 41: "Organization fit"; 42: "Organizational culture"; 43: "Organizational culture is largely traditional and it is too difficult to change it with current human resources"; 44: "Over-cost conscious approach"; 45: "Political and governmental pressures"; 46: "Political pressures"; 47: "Poor interdepartmental alignment"; 48: "Poor organizational culture"; 49: "Pre-existing organizational challenges"; 50: "The type of the company culture (socio-cultural)".
Communication Problems	
1: P57; 2: P15, P65; 3: P50; 4: P43; 5: P32; 6: P44; 7: P52; 8: P26; 9: P19; 10: P15; 11: P23; 12: P63; 13: P33; 14: P03; 15: P46; 16: P04; 17: P38; 18: P07; 19: P16; 20: P20; 21: P05, P09; 22: P23; 23: P30; 24: P34; 25: P04; 26: P58; 27: P23; 28: P71; 29: P08, P35; 30: P40; 31: P15; 32: P07; 33: P47; 34: P13; 35: P25.	1: "Bad communication"; 2: "Communication"; 3: "Communication challenges"; 4: "Communication expectations"; 5: "Communication issues"; 6: "Communication matters"; 7: "Communications management"; 8: "Cross-functional communication skills"; 9: "Effective communication"; 10: "Ensuring external stakeholders are aware of the change"; 11: "ERP related problem are not reported to managers"; 12: "Inadequate information sharing among consultants, outsourcers and users"; 13: "Ineffective communication with the users"; 14: "Ineffective communication with user"; 15: "Ineffective communication with users"; 16: "Ineffective communications system"; 17: "Insufficient cooperation between project teams"; 18: "Interaction"; 19: "Interdepartmental cooperation, effective communication"; 20: "Lack of effective communication between developers and the users"; 21: "Lack of formal communication"; 22: "Lack of information sharing between suppliers and buyers to coordinate transactions and processes"; 23: "Lack of internal communication"; 24: "Language". 25: "Language barriers"; 26: "Lower granularity communications"; 27: "Managers do not get relevant and needed information from users"; 28: "No communication strategy"; 29: "Poor communication"; 30: "Poor communication between consultants and internal staff"; 31: "Pressure to be "green" on the dashboards"; 32: "Reach"; 33: "Reliance on end user's feedback"; 34: "The different technical languages"; 35: "Unclear concept of the nature and use of ERP system from the users' perspective".
Financial Management Problems	
1: P22; 2: P09; 3: P51; 4: P53; 5: P65; 6: P05; 7: P08;	1: "Annual op cost"; 2: "Budget issues"; 3: "Budget overruns."; 4: "Budgetary resources (financial)"; 5: "Cost increasing"; 6: "Cost over runs"; 7: "Cost overrun"; 8: "Economic reform and price"; 9: "ERP implementations are not cheap"; 10:

8: P34; 9: P15; 10: P31; 11: P55; 12: P06; 13: P42; 14: P49; 15: P20; 16: P13; 17: P14; 18: P03; 19: P22; 20: P23; 21: P22; 22: P57; 23: P47; 24: P29; 25: P30; 26: P41, P59; 27: P62; 28: P15; 29: P27; 30: P40; 31: P58; 32: P22; 33: P08; 34: P46; 35: P47.	"Expensive"; 11: "Financial crisis"; 12: "Financial readiness"; 13: "Financial support"; 14: "Hidden cost"; 15: "High costs"; 16: "High costs of implementation"; 17: "Huge amount of funds are required"; 18: "Inadequate financial management"; 19: "Interface systems"; 20: "Maintenance costs surpass the budget"; 21: "Maintenance fee"; 22: "Management and cost issue"; 23: "No enough budget"; 24: "Other resources"; 25: "Over budget"; 26: "Planning/development/budgeting"; 27: "Project budget"; 28: "Project cost overruns"; 29: "Reliable financial proposal"; 30: "Returns on investment"; 31: "Thin line on budget"; 32: "Time and cost exceeding expectations"; 33: "Unfeasible budget design"; 34: "Unrealistic KOI"; 35: "Upgrading cost".
Lack of Clarity on Scope	
1: P23; 2: P66; 3: P18; 4: P33; 5: P60; 6: P60; 7: P15; 8: P47; 9: P25; 10: P04; 11: P59; 12: P27; 13: P46; 14: P23; 15: P30; 16: P15; 17: P54; 18: P51; 19: P04; 20: P46; 21: P13; 22: P56; 23: P56; 24: P40; 25: P13; 26: P41; 27: P12; 28: P08, P19; 29: P10; 30: P09; 31: P05; 32: P49; 33: P38; 34: P11; 35: P57; 36: P52; 37: P71; 38: P16; 39: P08; 40: P14, P72; 41: P07, P23, P39; 42: P41, P69; 43: P15; 44: P03; 45: P18; 46: P05, P64, P67.	1: "Business plan and vision"; 2: "Change in business goals during the project"; 3: "Change request controls are very strict"; 4: "Changing scope & reactive management"; 5: "Clear definition of business objectives"; 6: "Clear requirements on the functionality of the integrated system"; 7: "Communicate and manage expectations"; 8: "Control of the project scope"; 9: "Define the company's needs"; 10: "Difficulties in estimating project requirements"; 11: "Direction for further ERP development and improvement is unclear"; 12: "ERP post-implementation development plan is misfit with business strategy"; 13: "Frequent changes in requirements"; 14: "Functionality problems"; 15: "Implemented modules, scope"; 16: "Inadequate expectations management"; 17: "Inadequate functional requirements "; 18: "Inadequate system requirement specifications"; 19: "Ineffective definition of ERP scope"; 20: "Irrational demands"; 21: "Lack of detailed requirement analysis"; 22: "Lack of understanding of business requirements"; 23: "Managing user expectations"; 24: "Misunderstanding of change requirements"; 25: "Misunderstanding of scope"; 26: "No clear aim of implementing ERP system and no clear requirements"; 27: "No scope management"; 28: "Not clearly defined strategic goals"; 29: "Organizational goals"; 30: "Poor understanding of business implications and requirements"; 31: "Project scope and object of project"; 32: "Requirement analysis was not done properly"; 33: "Scope definitional"; 34: "Scope management"; 35: "Strategic planning"; 36: "Superordinate goal"; 37: "Unclear concept of the nature and use of ERP system from the users' perspective"; 38: "Unclear concept of the nature and use of the ERP system from the users perspective"; 39: "Unclear strategic direction and vision for the use of ERP"; 40: "Unrealistic expectation"; 41: "Unrealistic expectations"; 42: "Unrealistic expectations from top management concerning the ERP system"; 43: "Unrealistic expectations from top management concerning the ERP systems"; 44: "Unrealistic expectations of users about the system features"; 45: "Unreasonable demands"; 46: "Worked with SAP functionality/maintained scope".
Project Management Problems	
1: P66; 2: P46; 3: P40; 4: P30; 5: P09; 6: P15; 7: P50; 8: P71; 9: P66; 10: P15; 11: P31; 12: P10; 13: P32; 14: P54; 15: P12; 16: P70; 17: P60; 18: P62; 19: P39; 20: P56; 21: P04; 22: P67; 23: P23; 24: P08; 25: P15; 26: P05; 27: P12; 28: P31; 29: P70; 30: P46; 31: P43, P46, P49; 32: P24, P71; 33: P33; 34: P04; 35: P04; 36: P64; 37: P43; 38: P63; 39: P17; 40: P11; 41: P19; 42: P63; 43: P47; 44: P47; 45: P62; 46: P08; 47: P47; 48: P30; 49: P47; 50: P62; 51: P66; 52: P67; 53: P39; 54: P57; 55: P41, P59; 56: P20; 57: P25; 58: P69; 59: P04, P08, P10, P46; 60: P51; 61: P40; 62: P05, P18, P25; 63: P62; 64: P04, P46; 65: P52; 66: P56; 67: P37; 68: P37, P46; 69: P38; 70: P63; 71: P07; 72: P01, P16, P19, P35, P50, P52; 73: P66; 74: P62; 75: P24; 76: P15; 77: P53;	1: "A schedule for the entire implementation to be completed in 18 months was totally unrealistic"; 2: "Absence of an ERP readiness assessment before project implementation "; 3: "Absence of sharp and fast improvement "; 4: "Adopt the big bang method"; 5: "Change in management"; 6: "Change management"; 7: "Change management challenges"; 8: "Contextually weak project manager, project plan/schedule"; 9: "Customers should be aware of the risks"; 10: "Data readiness "; 11: "Delayed approval"; 12: "ERP implementation is viewed as an IT"; 13: "Excellent planning"; 14: "Flexible schedule"; 15: "Flexible schedule"; 16: "Focusing on technology"; 17: "Following the steps in project management"; 18: "Implementation date was not feasible"; 19: "Implementation decision"; 20: "Implementation methodology"; 21: "Inadequate change management"; 22: "Inadequate management of stakeholder politics"; 23: "Inadequate measurement/tools for testing the system"; 24: "Inappropriate timing of go live"; 25: "Inconsistent KPI reporting across the organization"; 26: "Informal strategy"; 27: "Inherent complexity of implementing ERP"; 28: "Initial challenge and delayed time"; 29: "Jumping from the requirements definition to the development phase."; 30: "Lack of a performance measurement system"; 31: "Lack of change management"; 32: "Lack of change management strategy"; 33: "Lack of effective project management"; 34: "Lack of ERP readiness assessment initiatives"; 35: "Lack of performance measurement system"; 36: "Lack of plan and execution of all phases"; 37: "Lack of project management"; 38: "Management practices and shared experiences"; 39: "Managerial"; 40: "Manual system was running in parallel with ERP which requires more human resources"; 41: "Monitoring and evaluation of performance"; 42: "No attempt to measure or increase commitment or address misalignment with ERP"; 43: "No clear implementation methodology"; 44: "No clear implementation plan"; 45: "No decision making authority"; 46: "No empowered decision-makers"; 47: "No process owner is defined for each and every business process,"; 48: "No project management"; 49: "No reliable project plan"; 50: "Not clear who the project manager"; 51: "Objective audit"; 52: "Perspective of ERP as just a technical system"; 53: "Planning and change management"; 54: "Planning issue"; 55: "Planning/development/budgeting"; 56: "Poor evaluation of ERP"; 57: "Poor go live support"; 58: "Poor planning or poor management"; 59: "Poor project management"; 60: "Poor project management and control"; 61: "Poor project management capability"; 62: "Poor project management effectiveness"; 63: "Poor project planning"; 64: "Poor risk management"; 65: "Procurement management"; 66: "Proactive approach "; 67: "Project cost overruns "; 68: "Project delays"; 69: "Project design and management, timing"; 70: "Project incentives should have been explicit in contracts for consultants and outsourcers"; 71: "Project leader expertise"; 72: "Project management"; 73: "Project management has little or no control "; 74: "Project management issues"; 75: "Project management work inefficiencies"; 76: "Project was too long"; 77: "Projects managers' expertise (interpersonal qualitative)"; 78: "Prolongation of the project"; 79: "Proper approach is not done toward

78: P61; 79: P14; 80: P17; 81: P53; 82: P52; 83: P12, P54; 84: P39; 85: P51; 86: P72; 87: P47; 88: P27; 89: P07; 90: P53; 91: P61; 92: P58; 93: P14; 94: P65; 95: P02; 96: P05, P18; 97: P08; 98: P51; 99: P57; 100: P71; 101: P48; 102: P23.	implementation"; 80: "Readiness"; 81: "Required time to prepare, drive and commission the system (strategic) "; 82: "Risk management"; 83: "Risk process and its limitations "; 84: "Rollout strategy"; 85: "Simultaneous module rollout and bad go live timing."; 86: "Stabilization time is overlong"; 87: "Standard operating procedures (sop) are not available"; 88: "Taking ERP casually"; 89: "Temporal pacing"; 90: "The lack of a clear and well-examined approach (methodological)"; 91: "The weaknesses in risk management."; 92: "Time and cost exceeding expectations"; 93: "Time consuming"; 94: "Time exceed"; 95: "Timeframes and scheduling"; 96: "Too tight project schedule"; 97: "Unrealistic project scheduling"; 98: "Unreasonable timelines"; 99: "Using regular conventional application implementation approaches and techniques that do not usually work for EAI implementation"; 100: "Weak implementation strategy"; 101: "Well-planned actions, outcome uncertainty, speedy action cycles, domain relevance"; 102: "Wrong estimating resources business needs and requirements".
ERP Software Misfit	
1: P10; 2: P45; 3: P22; 4: P30; 5: P42; 6: P04; 7: P46; 8: P37; 9: P38; 10: P45; 11: P30; 12: P23; 13: P67; 14: P20; 15: P49; 16: P05; 17: P18; 18: P39; 19: P37; 20: P31; 21: P05; 22: P22; 23: P46; 24: P69; 25: P20; 26: P42; 27: P14; 28: P15; 29: P45; 30: P15; 31: P14; 32: P30; 33: P14; 34: P72; 35: P49; 36: P50; 37: P04, P46; 38: P04; 39: P45; 40: P31; 41: P22; 42: P53; 43: P24; 44: P08; 45: P09; 46: P04; 47: P46; 48: P45; 49: P37; 50: P27; 51: P62; 52: P64; 53: P30; 54: P05; 55: P65; 56: P23; 57: P23; 58: P23; 59: P24; 60: P34; 61: P64; 62: P26; 63: P31; 64: P09; 65: P38; 66: P31; 67: P45; 68: P23; 69: P47; 70: P61; 71: P44; 72: P41, P59; 73: P47.	1: "A bad match"; 2: "Auto update"; 3: "Better package"; 4: "Complexity of software"; 5: "Complication"; 6: "Conflicts between organization and consultants/ vendor"; 7: "Conflicts between organization and vendors"; 8: "Conflicts with vendors"; 9: "Connectivity, codes, reliability"; 10: "Customize report generation"; 11: "Deficient process"; 12: "Different modules of the ERP system are not seamlessly integrated"; 13: "Difficulties in operating effectively with systems functionality"; 14: "Difficulties in integrating ERP system with business processes"; 15: "Dilemma of internal integration"; 16: "ERP software misfit"; 17: "ERP system misfit"; 18: "ERP vendor selection"; 19: "European currency"; 20: "Flexibility problem"; 21: "Functionality problems with the system "; 22: "Gap"; 23: "High system complexity"; 24: "Improper reporting structure"; 25: "Incompatibility with company needs (misfits)"; 26: "Inefficiency"; 27: "Integration"; 28: "Interface issues"; 29: "Knowledge management tool in ERP"; 30: "Lack of access to the system"; 31: "Lack of good vendor"; 32: "Lack of product"; 33: "Lack of software acquisition processed complexities"; 34: "Misalignment between system and user needs"; 35: "Misalignment of IT with business"; 36: "Misfit"; 37: "Misfit between organization culture and ERP system"; 38: "Misfit between organization structure and ERP system"; 39: "Need of knowledge management module in the ERP system"; 40: "Nerve wracking interface"; 41: "No fit"; 42: "Not related to the core of its business (functional)"; 43: "Number of interfaces"; 44: "Poor ERP product selection "; 45: "Poor ERP selection"; 46: "Poor vendor"; 47: "Poor vendors "; 48: "Query solving response time"; 49: "Security"; 50: "Selection of ERP package"; 51: "Setup errors"; 52: "Software adherence"; 53: "Software does not meet to business process"; 54: "Software modification"; 55: "Software system design"; 56: "System contain inaccurate or incomplete bill of material and production schedule plan"; 57: "System fail to use the ERP system to generate accurate sales and forecast"; 58: "System is not properly modified to meet new business requirements"; 59: "System selection"; 60: "The report and table format"; 61: "The selection of product"; 62: "Understanding of implications and constraints of integrated enterprise systems"; 63: "Unfriendly interface"; 64: "Unfriendly user interface"; 65: "Unsupported process"; 66: "Upgrading challenges"; 67: "User interface "; 68: "Using poor accounting systems and financial software"; 69: "Vendor should be honest and clear with customer about ERP functionality and capability."; 70: "Weakness in ERP selection process"; 71: "Workarounds are a natural development from misfits: "; 72: "Worked with SAP functionality/maintained scope"; 73: "Wrong ERP selection".
Data Quality	
1: P23; 2: P15; 3: P62; 4: P30; 5: P04; 6: P38; 7: P15; 8: P15; 9: P57; 10: P08, P10, P46; 11: P29; 12: P13; 13: P23; 14: P15; 15: P49; 16: P23; 17: P23; 18: P30; 19: P23; 20: P23.	1: "Data access right is authorized to inappropriate users"; 2: "Data cleanse"; 3: "Data conversion"; 4: "Data is not accurate"; 5: "Data management issues"; 6: "Data migration"; 7: "Data migration across different systems"; 8: "Data quality issues"; 9: "Data sense"; 10: "Inaccurate data"; 11: "Information"; 12: "Information unfit for the system"; 13: "Invalid data is not automatically detected when getting new information"; 14: "No accountability or checks in place to get the right data"; 15: "Poor data quality"; 16: "Poor data quality and documentation"; 17: "System contain inaccurate records (supplier/inventory record)"; 18: "The quality of data is bad"; 19: "Users are not able to obtain needed data and information"; 20: "Users input incorrect data and stored into the system".
Poor Solution Implementer Performance	
1: P09; 2: P02; 3: P46; 4: P04; 5: P37; 6: P66; 7: P50; 8: P55; 9: P62; 10: P15; 11: P12, P54; 12: P34; 13: P39; 14: P13; 15: P40; 16: P51; 17: P23; 18: P36; 19: P20; 20: P31; 21: P23; 22: P01; 23: P48; 24: P36; 25: P04; 26: P05, P18; 27: P46; 28: P30; 29: P23; 30: P22; 31: P41, P59; 32: P24; 33: P08; 34: P35; 35: P68; 36: P17; 37: P47.	1: "Absence of consultant"; 2: "Completely rely on consultants"; 3: "Conflicts between organization and consultants"; 4: "Conflicts between organization and consultants/ vendor"; 5: "Conflicts with consultants"; 6: "Consultant"; 7: "Consultant challenges"; 8: "Consultant's lack of process knowledge"; 9: "Consultants"; 10: "Consultants lack of knowledge of other systems"; 11: "Consultants outside the organization outcomes"; 12: "Foreign ERP vendors' partnership with local service providers."; 13: "Implementation partner"; 14: "Incompetent consultant"; 15: "Incorrect system configuration"; 16: "Inexperienced consultants."; 17: "Insufficient support for ERP post-implementation maintenance"; 18: "Knowledgeability of agents"; 19: "Lack of experience and knowledge by vendors"; 20: "Lack of faith in the consultants' advice"; 21: "Lack of strong support from vendor"; 22: "Lack of understanding of business processes by SAP consultants"; 23: "Learn from failure with consultants"; 24: "Political environment, existence of a local partner, strength of the partner, and distribution of authority"; 25: "Poor consultant"; 26: "Poor consultant effectiveness"; 27: "Poor consultants"; 28: "Poor leverage of partner vendor"; 29: "Poor timeline delivery and sales services"; 30: "Poor vendor support"; 31: "Project team/management support/consultants"; 32: "Selection of consultants"; 33: "Unavailability of subject matter experts"; 34: "Use of consultants"; 35: "Vendor-partner terms and conditions."; 36: "Vendors and consultants"; 37: "Wrong implementer selection".

Poor Quality of Testing	
1: P59; 2: P66; 3: P14; 4: P15; 5: P01; 6: P27; 7: P40; 8: P15; 9: P15; 10: P15; 11: P57; 12: P62; 13: P23; 14: P04, P05, P08, P18; 15: P40; 16: P16, P19; 17: P09; 18: P41; 19: P56; 20: P71; 21: P64; 22: P08.	1: "Adequate testing"; 2: "Adequately test"; 3: "Data collection"; 4: "Data validation without understanding the data "; 5: "Error in input to database"; 6: "Implementation and testing"; 7: "Insufficient testing"; 8: "Issues after go-live were like a tsunami"; 9: "Lack of integrated testing & real live simulations"; 10: "No proper testing"; 11: "No specialized tools for stress testing EAI exist."; 12: "No testing"; 13: "Poor establishment of the standards to measure the quality of system"; 14: "Poor quality of testing"; 15: "Problem with system bugs "; 16: "Software development, testing and troubleshooting"; 17: "Software modification"; 18: "Sufficient testing"; 19: "Technical infrastructure"; 20: "Testing plan not comprehensive"; 21: "Tests"; 22: "Unavailability of right users during UAT".
Outdated IT infrastructure	
1: P33; 2: P06; 3: P47; 4: P34; 5: P14, P38; 6: P27; 7: P57; 8: P65; 9: P12, P54; 10: P57; 11: P37; 12: P04; 13: P11; 14: P15; 15: P20; 16: P26; 17: P05, P08, P18; 18: P10; 19: P29; 20: P65; 21: P43.	1: "Attempts to build bridge to legacy application"; 2: "Available technology"; 3: "Bad infrastructure"; 4: "Cost control module"; 5: "Hardware"; 6: "IT infrastructure"; 7: "Inappropriate technologies"; 8: "Information technology & legacy system"; 9: "Infrastructure"; 10: "Integration architecture"; 11: "Integration with existing systems"; 12: "IT technical issues"; 13: "It was an isolated ERP not a web based ERP"; 14: "Lack of integration"; 15: "Low IT maturity"; 16: "Need for integrated systems"; 17: "Poor IT infrastructure"; 18: "Significant technical difficulties"; 19: "Technology"; 20: "Technology planning"; 21: "Technology planning configuring".
Lack of Training	
1: P14; 2: P56; 3: P42; 4: P15; 5: P56; 6: P07; 7: P04, P10, P46; 8: P51; 9: P01, P12, P54, P71; 10: P08; 11: P69; 12: P55; 13: P30; 14: P40; 15: P33; 16: P38; 17: P41, P59; 18: P72; 19: P55; 20: P13; 21: P47; 22: P23; 23: P15, P43, P62; 24: P23; 25: P15; 26: P49; 27: P57; 28: P15; 29: P30; 30: P47; 31: P04, P05, P08, P18, P25; 32: P50; 33: P35; 34: P45; 35: P32; 36: P57; 37: P02; 38: P34, P64; 39: P16; 40: P02; 41: P63; 42: P66; 43: P40; 44: P65; 45: P39; 46: P57; 47: P15.	1: "Adequate training is not given"; 2: "Approach to training"; 3: "Awareness/training, experience"; 4: "Consultants did not share knowledge"; 5: "Education on ERP"; 6: "Free flow of information "; 7: "Inadequate education and training"; 8: "Inadequate employee training."; 9: "Inadequate training"; 10: "Inadequate training and education"; 11: "Inappropriate training methods"; 12: "Ineffective KM practices"; 13: "Insufficient training"; 14: "Insufficient training and reskilling of the IT workforce"; 15: "Insufficient training of the end users"; 16: "Insufficient training, lack of qualified personal"; 17: "Internal readiness/training"; 18: "IT experts lack ERP and PM knowledge"; 19: "Knowledge drain"; 20: "Knowledge gap between implementers and users"; 21: "Lack of experience (keep continuous training for partners.) "; 22: "Lack of sufficient training program regularly"; 23: "Lack of training"; 24: "Lack of transfer significant knowledge and information by the vendors to company"; 25: "Learning new system was challenging to end users "; 26: "Limited training"; 27: "Most enterprises try to do integration projects depending on their own people with no experience."; 28: "No knowledge transfer from project team to business"; 29: "No user manual"; 30: "Not enough user training."; 31: "Poor knowledge transfer"; 32: "Poor training"; 33: "Poor-quality users' training"; 34: "Previous work experience with educational ERP system"; 35: "Proper training"; 36: "Providing inadequate training."; 37: "Staff do not know what to do with the information"; 38: "Training"; 39: "Training and education"; 40: "Training and education processes"; 41: "Training for users inadequate"; 42: "Training the employees"; 43: "Unclear concept of the nature and use of ERP system from the users' perspective"; 44: "User involvement and training"; 45: "User training"; 46: "Writing documentation is a time- consuming and expensive process."; 47: "Zero experience with SAP".
Poor Project Team	
1: P14; 2: P56; 3: P06; 4: P56; 5: P55; 6: P16, P19; 7: P65; 8: P40; 9: P53; 10: P40; 11: P05, P18; 12: P08; 13: P52; 14: P34; 15: P08; 16: P08; 17: P08; 18: P55; 19: P30; 20: P39; 21: P46; 22: P15; 23: P03; 24: P40; 25: P46; 26: P58; 27: P09, P61; 28: P15; 29: P72; 30: P30; 31: P15; 32: P26; 33: P15; 34: P23; 35: P47; 36: P30; 37: P71; 38: P05; 39: P15; 40: P46; 41: P04; 42: P51; 43: P15; 44: P41, P59; 45: P32; 46: P32; 47: P17; 48: P47; 49: P66; 50: P21; 51: P55; 52: P29; 53: P43;	1: "Allocation of resources"; 2: "Best business personnel"; 3: "Competency of the IT department"; 4: "Cross-functional team"; 5: "End users' lack of process knowledge"; 6: "ERP teamwork and composition"; 7: "ERP teamwork and skill mix"; 8: "Excessive stress and high turnover of IT personnel "; 9: "Failure to clearly define roles and responsibilities, project team size (organizational)"; 10: "Failure to retain trained IT staff "; 11: "High turnover rate of project team members"; 12: "Higher attrition rate of project team members"; 13: "HR management"; 14: "Human resources"; 15: "Inadequate legacy system knowledge"; 16: "Inadequate project team composition"; 17: "Inadequate resources"; 18: "In-house trainers' & end users' lack of technical skills"; 19: "Insufficient education level"; 20: "Internal implementation team"; 21: "Lack of a full time and balanced project team"; 22: "Lack of access to people who know the information "; 23: "Lack of adequate knowledge of technology"; 24: "Lack of business analyst"; 25: "Lack of employees' morale and motivation "; 26: "Lack of ERP expertise"; 27: "Lack of experience"; 28: "Lack of experienced subject matter experts"; 29: "Lack of in-house IT experts"; 30: "Lack of IT/IS knowledge"; 31: "Lack of resources"; 32: "Lack of staffing resources"; 33: "Local management didn't pull the right people"; 34: "Loss qualified IT/ERP experts"; 35: "No IT staff within the company, who have an idea about ERP system"; 36: "No recruitment for IT staff / technician "; 37: "Not addressing readiness of employees"; 38: "Part-time dedication"; 39: "People are not working towards the same goal "; 40: "Poor key users"; 41: "Poor project team"; 42: "Project team turnover."; 43: "Project team was disbanded very quickly"; 44: "Project team/management support/consultants"; 45: "Proper project team"; 46: "Recognition and retention"; 47: "Recruiting, selecting, placing and developing the right employees"; 48: "Resigning of stakeholders during ERP implementation"; 49: "Shortage of skilled and knowledgeable personnel."; 50: "Skilled and experienced professionals"; 51: "Staff shortage"; 52: "Staffing and skills"; 53: "Technical and business experts

54: P35; 55: P13; 56: P13; 57: P01; 58: P50; 59: P62.	cooperation"; 54: "The poor project team"; 55: "Turnover of key project persons"; 56: "Unavailability of skilled project people"; 57: "Understanding of SAP functions by key users"; 58: "Weak team"; 59: "Without adding significant resources".
Poor quality of BPR	
1: P16, P34, P38, P56, P65; 2: P50; 3: P43; 4: P24, P33; 5: P01, P71; 6: P19; 7: P64; 8: P01; 9: P40; 10: P48; 11: P70; 12: P54; 13: P03; 14: P61; 15: P46; 16: P46; 17: P55; 18: P29; 19: P15; 20: P04, P46; 21: P05, P08; 22: P18; 23: P29; 24: P52; 25: P66; 26: P32; 27: P61; 28: P35.	1: "BPR"; 2: "BPR and customization challenges"; 3: "Business process reengineer (BPR)"; 4: "Business process reengineering"; 5: "Business process re-engineering"; 6: "Business process reengineering (BPR) and minimum customization"; 7: "Changed and standardized its processes"; 8: "Complex business processes"; 9: "Failure to redesign business process"; 10: "Focus must be on the process not product"; 11: "Ignore the need to define an optimal process and then use the technology as an enabler for the process"; 12: "Inherent complexity of implementing ERP"; 13: "Lack of business process interrelationship"; 14: "Lack of experience in this area re-engineering processes"; 15: "Lack of organization transforms to fit the ERP system"; 16: "Lack of process oriented vision"; 17: "Lack of uniform practices"; 18: "Objective and values"; 19: "Perception that new system should behave like old system"; 20: "Poor business process reengineering"; 21: "Poor quality of BPR"; 22: "Poor quality of business process re-engineering"; 23: "Processes"; 24: "Redesign of business process"; 25: "Reengineered its business practices"; 26: "Reengineering"; 27: "The lack of clear and collective processes in the organizations"; 28: "Work routines were also not performed correctly".
Highly Customized ERP	
1: P10; 2: P50; 3: P19; 4: P16, P24, P37, P45, P64; 5: P28; 6: P12, P54; 7: P15, P49; 8: P51; 9: P04; 10: P46; 11: P35; 12: P52; 13: P47; 14: P33; 15: P71; 16: P09; 17: P17; 18: P05, P08, P18, P25; 19: P23.	1: "Automating existing redundant or non-value added processes in the new system"; 2: "BPR and customization challenges"; 3: "Business process reengineering (BPR) and minimum customization"; 4: "Customization"; 5: "Customization failure"; 6: "Excessive changes in software"; 7: "Excessive customization"; 8: "Excessive software customization."; 9: "Heavy customization"; 10: "High rate of system customization"; 11: "Minimal customization"; 12: "Minimization of customization"; 13: "Minimum customizations"; 14: "Misestimated need for customization"; 15: "No or minimal ERP customization"; 16: "Over realization on heavy customization"; 17: "Over-modification and customization"; 18: "Over-reliance on heavy customization"; 19: "Pressures from high rate of customization".
Lack of User Involvement	
1: P32, P35; 2: P15; 3: P33; 4: P46; 5: P04; 6: P15; 7: P15; 8: P23; 9: P43; 10: P24; 11: P71; 12: P72; 13: P08; 14: P20; 15: P23; 16: P16, P60; 17: P65; 18: P62; 19: P66.	1: "Employee involvement"; 2: "Engagement with users didn't provide a whole lot of detail"; 3: "Failure to gain user support"; 4: "Inadequate employee involvement"; 5: "Inadequate user involvement"; 6: "Lack of business buy-in from internal stakeholders"; 7: "Lack of business ownership"; 8: "Lack of ownership and release responsibilities"; 9: "Lack of user involvement"; 10: "Lack of user's cooperation and involvement"; 11: "Leaving user involvement till the end"; 12: "Low user involvement"; 13: "Poor user involvement"; 14: "The late involvement of users in the ERP project"; 15: "Unwilling to take up additional responsibilities"; 16: "User involvement"; 17: "User involvement and training"; 18: "Users' concerns may be ignored"; 19: "Users were not as committed".
Resistance to change	
1: P47; 2: P47; 3: P13; 4: P09; 5: P20; 6: P62; 7: P37; 8: P23; 9: P46; 10: P53; 11: P20; 12: P20; 13: P30; 14: P15; 15: P38; 16: P15; 17: P39; 18: P61; 19: P11; 20: P57; 21: P03; 22: P42; 23: P14; 24: P36; 25: P61; 26: P10; 27: P01; 28: P05, P08, P18, P25; 29: P26.	1: "Change resistance"; 2: "Customer team usually shows resistance and delay to response to vendor requirements "; 3: "Difficulties in changing to new from old system"; 4: "Employee's resistance"; 5: "Employees resistance"; 6: "Employees' resistance"; 7: "Employees resistance to change"; 8: "Front-line managers refuse to use the system"; 9: "High employee's resistance to change"; 10: "It would be useless to involve players who do not believe in the project utility (motivation)"; 11: "Lack of user acceptance of the ERP system"; 12: "Lack of willingness by users to use ERP "; 13: "No initiative from users to change their way of working"; 14: "People are resistant to change"; 15: "Personal rejection"; 16: "Personality issues "; 17: "Project opposition"; 18: "Resist against implementation of new systems. "; 19: "Resistance of employees"; 20: "Resistance of user"; 21: "Resistance to change"; 22: "Resistance to change, attitude"; 23: "Resistant staff / employees buy in"; 24: "Routine"; 25: "Some opposition of managers with changing in processes due to inability to adapt to new processes."; 26: "Trying to maintain the status quo"; 27: "Users' resistance"; 28: "Users' resistance to change"; 29: "Willingness to adopt change management".
Other	
1: P15; 2: P15; 3: P15; 4: P15; 5: P40; 6: P44; 7: P15; 8: P15; 9: P15; 10: P15; 11: P15; 12: P15.	1: "Bad feelings about how employees were dealt with"; 2: "Implementation causes stress on people "; 3: "Manual interventions "; 4: "Offshoring causes delays"; 5: "Receiving complaints from customers and suppliers"; 6: "Research in practice"; 7: "Respecting no-fly zone"; 8: "Short hyper-care support period"; 9: "Time zone limitations"; 10: "Took long time to address the backlog"; 11: "Unable to deploy resources back to business"; 12: "Use of too many templates".

APPENDIX 3- A FULL LIST OF CRITICAL FAILURE FACTORS AND RELATED CATEGORIES

Parent Name	Original Failure Factor	Qualitative Coding Name
P01 Change management	Company culture	Poor organizational culture

Change management	Project management	Project management problems
Change management	Inadequate training	Lack of training
Change management	Understanding of sap functions by key users	Poor project team
Change management	Users 'resistance	Resistance to change
P02		
Organization	Top management	Lack of top management support
Organization	Timeframes and scheduling	Project management problems
Organization	Completely rely on consultants	Poor solution implementer performance
Organization	Training and education processes	Lack of training
Personal issue	Staff do not know what to do with the information	Lack of training
P05		
Employee/Personnel/HR & Process related	Poor IT Infrastructure	Outdated IT infrastructure
Employee/Personnel/HR & Process related	High turnover rate of project team members	Poor Project Team
Employee/Personnel/HR & Process related	Poor quality of BPR	Poor quality of BPR
End-user Related	Poor quality of testing	Poor Quality of Testing
End-user Related	Users' resistance to change	Resistance to change
Enterprise related	Poor top management support	Lack of Top Management Support
Enterprise related	Software modification	ERP Software Misfit
Performance related	Lack of formal communication	Communication Problems
Performance related	Unclear Concept of the Nature and Use of the ERP	Lack of Clarity on Scope
Performance related	Too tight project schedule	Project Management Problems
Performance related	ERP Software misfit	ERP Software Misfit
Performance related	Part-time dedication	Poor Project Team
Project related	Poor project management effectiveness	Project Management Problems
Project related	Poor knowledge transfer	Lack of Training
Strategy related	Cost over runs	Financial Management Problems
Strategy related	Informal strategy	Project Management Problems
Technology & Vendor related	Unrealistic expectations	Lack of Clarity on Scope
Technology & Vendor related	Functionality problems with the system	ERP Software Misfit
Technology & Vendor related	Poor consultant effectiveness	Poor Solution Implementer Performance
Technology & Vendor related	Over-reliance on heavy customization	Highly Customized ERP
P06		
Environmental context	Competitive pressure	Poor organizational culture
Environmental context	Government policy	Poor organizational culture
Organizational environment	Perceived ERP Benefits (indirect & direct)	Lack of Top Management Support
Organizational environment	Management commitment & Support	Lack of Top Management Support
Organizational environment	Financial readiness	Financial Management Problems
Technology context	Available technology	Outdated IT infrastructure
Technology context	Competency of the it department	Poor project team
P07		
Centrifugal forces	Decentralization	Poor organizational culture
Centrifugal forces	Interaction	Communication problems
Centrifugal forces	Reach	Communication problems
Centrifugal forces	Free flow of information	Lack of training
Centripetal forces	Superordinate goal	Lack of clarity on scope
Centripetal forces	Temporal pacing	Project management problems
Centripetal forces	Project leader expertise	Project management problems
P08		
Cost	Cost overrun	Financial Management Problems
Cost	Unrealistic KOI	Financial Management Problems
Operational	Inappropriate timing of go live	Project Management Problems
Operational	Unavailability of right users during UAT	Poor Quality of Testing
Operational	Poor quality of testing	Poor Quality of Testing
Operational	Poor knowledge transfer	Lack of Training
People	Inadequate resources	Poor Project Team
People	Higher attrition rate of project team members	Poor Project Team
People	Poor user involvement	Lack of User Involvement
People	1- Users' resistance to change	Resistance to change
Strategic	Lack of lop management commitment	Lack of Top Management Support
Strategic	Ineffective organizational change management	Poor Organizational Culture
Strategic	Poor project management	Project Management Problems
Strategic	Unrealistic project scheduling	Project Management Problems

Strategic	Inadequate project team composition	Poor Project Team
Tactical	Poor interdepartmental alignment	Poor Organizational Culture
Tactical	Poor communication	Communication Problems
Tactical	Inadequate functional requirements	Lack of Clarity on Scope
Tactical	Unrealistic expedition	Lack of Clarity on Scope
Tactical	No empowered decision-makers	Project Management Problems
Tactical	Unavailability of subject matter experts	Poor Solution Implementer Performance
Tactical	Inadequate training and education	Lack of Training
Technology	Poor ERP product selection	ERP Software Misfit
Technology	Inaccurate data	Data Quality
Technology	Poor IT infrastructure	Outdated IT infrastructure
Technology	Inadequate legacy system knowledge	Outdated IT infrastructure
Technology	Poor quality of BPR	Poor quality of BPR
Technology	Over-reliance on heavy customization	Highly Customized ERP
P09		
Functional	Lack of formal communication	Communication Problems
Functional	Functionality problems	Lack of Clarity on Scope
Functional	Poor ERP SELECTION	ERP Software Misfit
Functional	Software modification	Poor Quality of Testing
Functional	Over realization on heavy customization	Highly Customized ERP
Non functional	Unfriendly user interface	ERP software misfit
Non functional	Absence of consultant	Poor solution implementer performance
Non-functional	Poor top management	Lack of top management support
Non-functional	Budget issues	Financial management problems
Non-functional	Change in management	Project management problems
Non-functional	Lack of experience	Poor project team
Non-functional	Employee's resistance	Resistance to change
P17		
Human resources	Recruiting, selecting, placing and developing the right …	Poor project team
Managerial	Managerial	Project management problems
Organization	Lack of alignment of the company's organizational strategy	Poor organizational culture
Organization	Over-modification and customization	Highly customized ERP
Technical	Support of top management	Lack of top management support
Technical	Readiness	Project Management Problems
Vendors and Consultants	Vendors and Consultants	Poor Solution Implementer Performance
P23		
ERP post-implementation Failure	Lack of strong support from vendor	Poor Solution Implementer Performance
ERP post-implementation Failure	Insufficient support for ERP post-implementation maint…	Poor Solution Implementer Performance
ERP post-implementation Failure	Lack of sufficient training program regularly	Lack of Training
ERP post-implementation Failure	Front-line managers refuse to use the system	Resistance to change
Lack of external supports	Market and competitive pressures	Poor Organizational Culture
Lack of external supports	Political and Governmental pressures	Poor Organizational Culture
Lack of external supports	Lack of information Sharing	Communication Problems
Lack of external supports	Poor timeline delivery and sales services	Poor Solution Implementer Performance
Lack of external supports	Lack of transfer significant knowledge and information	Lack of Training
Lack of external supports	Pressures from high rate of customization	Highly Customized ERP
Managerial	Managers do not get relevant and needed information	Communication Problems
Managerial	Maintenance costs surpass the budget	Financial Management Problems
Managerial	Direction for further ERP development and improvement	Lack of Clarity on Scope
Managerial	Plan is misfit with business strategy	Lack of Clarity on Scope
Managerial	Wrong estimating resources business needs and require…	Project Management Problems
Managerial	Inadequate measurement/tools for testing the system	Project Management Problems
Managerial	Data access right is authorized to inappropriate users	Data Quality
Managerial	Loss qualified IT/ERP experts	Poor Project Team
Operational	System contain inaccurate or incomplete bill of material …	ERP Software Misfit
Operational	System fail to use the ERP system to generate accurate sales	ERP Software Misfit
Operational	System contain inaccurate records	Data Quality
Technical	Modules of the ERP system are not seamlessly integrated	ERP Software Misfit
Technical	System is not properly modified to meet new business req…	ERP Software Misfit
Technical	Using poor accounting systems and financial software	ERP Software Misfit
Technical	Modules of the ERP system are not seamlessly integrated	ERP Software Misfit
Technical	Invalid data is not automatically detected when getting new	Data Quality

Technical	Poor data quality and documentation	Data Quality
Top management	Man. Make decision to find solutions without external ex…	Lack of Top Management Support
Top management	Changing top management position	Lack of Top Management Support
Top management	Internal conflicts between departments	Poor Organizational Culture
Top management	Changing team members position after training	Poor Organizational Culture
User's inefficiency	ERP related problem are not reported to managers	Communication Problems
User's inefficiency	Unrealistic expectations of users about the system features	Lack of clarity on scope
User's inefficiency	Users input incorrect data and stored into the system	Data quality
User's inefficiency	Users are not able to obtain needed data and information	Data quality
User's inefficiency	Users input incorrect data and stored into the system	Data quality
User's inefficiency	Lack of ownership and release responsibilities	Lack of user involvement
User's inefficiency	Unwilling to take up additional responsibilities	Lack of user involvement
P30		
Change management	Top management does not want to learn from experience	Lack of top management support
Change management	Lack of internal communication	Communication problems
Change management	No initiative from users to change their way of working	Resistance to change
Customer mindset	Lack of internal cooperation	Poor organizational culture
Customer mindset	No recruitment for it staff / technician	Poor project team
Customer mindset	Lack of it/is knowledge	Poor project team
Customer mindset	Insufficient education level	Poor project team
Process flow	Over budget	Financial management problems
Process flow	No scope management	Lack of clarity on scope
Process flow	No project management	Project management problems
Process flow	Adopt the big bang method	Project management problems
Process flow	Deficient process	ERP software misfit
Process flow	Data is not accurate	Data quality
Process flow	The quality of data is bad	Data quality
Process flow	Insufficient training	Lack of training
Software	Software does not meet to business process	ERP Software Misfit
Software	Lack of product	ERP Software Misfit
Software	Complexity of Software	ERP Software Misfit
Software	Poor leverage of partner vendor	Poor Solution Implementer Performance
Software	No user manual	Lack of Training
P31		
Cost and time	Expensive	Financial Management Problems
Cost and time	Initial challenge and delayed time	Project Management Problems
Cost and time	Delayed approval	Project Management Problems
Customization	Flexibility problem	ERP Software Misfit
Customization	Upgrading challenges	ERP Software Misfit
Customization	Unfriendly interface	ERP Software Misfit
Customization	Nerve wracking interface	ERP Software Misfit
P34		
Culture	Language	Communication problems
Culture	Foreign ERP vendors' partnership with local service pro…	Poor Solution Implementer Performance
Culture	Training	Lack of Training
Culture	Human resources	Poor Project Team
Culture	BPR	Poor quality of BPR
Environment	Economic reform and price	Financial management problems
Environment	Cost control module	Outdated IT infrastructure
Technical issues	Language	Communication problems
Technical issues	Cost control module	Outdated IT infrastructure
P36		
Macro level (organization)	Political environment, existence of a local partner, strengt…	Lack of top management support
Macro level (organization)	Political environment, existence of a local partner, strengt…	Poor solution implementer performance
Macro level (organization)	Local structural properties, local culture, type of organiz…	Poor organizational culture
Micro level (individuals)	Knowledgeability of agents	Poor solution implementer performance
Micro level (individuals)	Routine	Resistance to change
P37		
Managerial	Conflicts with business strategy	Poor organizational culture
Managerial	Internal conflicts	Poor organizational culture
Managerial	Project cost overruns	Financial management problems
Managerial	Project delays	Project management problems

Managerial	Conflicts with consultants	Poor solution implementer performance
Managerial	Employees resistance to change	Resistance to change
Technical	Conflicts with Vendors	ERP Software Misfit
Technical	European currency	ERP Software Misfit
Technical	Security	ERP Software Misfit
Technical	Integration with existing systems	Outdated IT infrastructure
Technical	Customization	Highly Customized ERP
P42		
Human	Awareness/Training, experience	Lack of Training
Human	Resistance to change, attitude	Resistance to change
Organization	Management commitment	Lack of top management support
Organization	Corporate & it governance alignment	Poor organizational culture
Organization	Financial support	Financial management problems
Organization	Management commitment	Project management problems
Technology	Complication	ERP Software Misfit
Technology	Inefficiency	ERP Software Misfit
P46		
Human resources	Ineffective communication with users	Communication problems
Human resources	Unrealistic expectations	Lack of clarity on scope
Human resources	Lack of change management	Project management problems
Human resources	Inadequate education and training	Lack of training
Human resources	Lack of employees' morale and motivation	Poor project team
Human resources	Poor key users	Poor project team
Human resources	Inadequate employee involvement	Lack of user involvement
Human resources	High employee's resistance to change	Resistance to change
Managerial	Poor top management support	Lack of top management support
Managerial	Management tendency to long and midterm planning	Lack of top management support
Managerial	Absence of an ERP readiness assessment	Project management problems
Managerial	Lack of a performance measurement system	Project management problems
Organizational	Unstable managerial positions	Lack of top management support
Organizational	Governmental structure of the organization	Poor organizational culture
Organizational	Internal conflicts among departments	Poor organizational culture
Organizational	Misfits between the it and business strategies	Poor organizational culture
Organizational	Not clearly defined strategic goals	Lack of clarity on scope
Organizational	Misfit between organization culture and ERP system	ERP Software Misfit
Organizational	Lack of organization transforms to fit the ERP system	Poor quality of BPR
Processes	Lack of process oriented vision	Poor quality of ERP
Processes	Poor business process reengineering	Poor quality of ERP
Project management	Project cost overruns	Financial management problems
Project management	Scope creep	Lack of clarity on scope
Project management	Poor project management	Project management problems
Project management	Poor risk management	Project management problems
Project management	Project delays	Project management problems
Project management	Conflicts between organization and vendors	ERP software misfit
Project management	Conflicts between organization and consultants	Poor solution implementer performance
Project management	Lack of a full time and balanced project team	Poor project team
Technical	High system complexity	ERP software misfit
Technical	Inaccurate data	Data quality
Technical	High rate of system customization	Highly customized ERP
Vendor and Consultant	Poor vendors	ERP Software Misfit
Vendor and Consultant	Poor consultants	Poor Solution Implementer Performance
P47		
Customer related	Reliance on end user's feedback	Communication problems
Customer related	No enough budget	Financial management problems
Customer related	No clear aim of implementing ERP system	Lack of clarity on scope
Customer related	No clear implementation plan.	Project management problems
Customer related	No process owner is defined for each … process	Project management problems
Customer related	Standard operating procedures (SOP) are not available	Project management problems
Customer related	Wrong ERP selection	ERP software misfit
Customer related	Wrong implementer selection	Poor solution implementer performance
Customer related	Bad infrastructure	Outdated it infrastructure
Customer related	Not enough user training.	Lack of training

Customer related	No it staff within the company	Poor project team
Customer related	Resigning of stakeholders during ERP implementation	Poor project team
Customer related	Change resistance	Resistance to change
Vendor related	Vendor should be honest and clear with customer	ERP software misfit
Vendor related	Lack of experience (keep continuous training for partners.)	Lack of training
Vendor related	Minimum customizations	Highly customized ERP
Vendor related	Customer team usually shows resistance	Resistance to change
Vendor related	Reliable financial proposal	Financial management problems
Vendor related	No reliable project plan.	Project management problems
Vendor related	No clear implementation methodology	Project management problems
P48		
Characteristic of the project	Well-planned actions, outcome uncertainty, speedy action...	Project management problems
Organization characteristics	Difference in organizational culture	Poor organizational culture
Organization characteristics	Focus must be on the process not product	Poor quality of ERP
Organizational learning	Learn from failure with consultants	Poor solution implementer performance
P55		
Knowledge challenges	Executive management lack of business knowledge	Lack of top management support
Knowledge challenges	Consultant's lack of process knowledge	Poor solution implementer performance
Knowledge challenges	Ineffective km practices	Lack of training
Knowledge challenges	Knowledge drain	Lack of training
Knowledge challenges	In-house trainers' & end users' lack of technical skills	Poor project team
Knowledge challenges	End users' lack of process knowledge	Poor project team
Organizational challenges	Weak leadership	Lack of top management support
Organizational challenges	Pre-existing organizational challenges	Poor organizational culture
Organizational challenges	Financial crisis	Financial management problems
Organizational challenges	Staff shortage	Poor project team
Organizational challenges	Lack of uniform practices	Poor quality of ERP
P56		
Actor	Approach to training	Lack of training
Actor	Best business personnel	Poor project team
Change	Approach to Training	Lack of Training
Change	Cross-Functional Team	Poor Project Team
Fit	Priority project	Lack of Top Management Support
Fit	Mindset Change and Attitude to Learning	Lack of Top Management Support
Fit	Communicate and Manage Expectations	Lack of Clarity on Scope
Fit	Organizational Goals	Lack of Clarity on Scope
Fit	Proactive Approach	Project Management Problems
Fit	Implementation Methodology	Project Management Problems
Fit	Education on ERP	Lack of Training
Fit	BPR	Poor quality of BPR
Plan	Implementation Methodology	Project Management Problems
Plan	Cross-Functional Team	Poor Project Team
Plan	BPR	Poor Quality of BPR
P57		
Architecture and design	Conventional application implementation approaches	Project management problems
Architecture and design	Data sense	Data quality
Architecture and design	Integration architecture	Outdated IT infrastructure
Implementation	No specialized tools for stress testing EAI exist.	Poor Quality of Testing
Implementation	Inappropriate Technologies	Outdated IT infrastructure
Operational	Management and Cost Issue	Lack of Top Management Support
Operational	Lower granularity communications	Communication problems
Operational	Management and Cost Issue	Financial Management Problems
Operational	Providing inadequate training.	Lack of Training
Operational	Writing documentation is a time- consuming and expensive	Lack of Training
Organizational	Conflicting of Business Perspective	Poor Organizational Culture
Organizational	Planning issue	Project management problems
Organizational	Resistance of user	Resistance to change
Organizational	Bad communication	Communication problems
Organizational	Scope definitional	Lack of clarity on scope
P63		
Climate for implementation	Inadequate information sharing	Communication Problems
Climate for implementation	Management practices and shared experiences	Project Management Problems

Climate for implementation	Explicit in contracts for consultants	Project Management Problems
Climate for implementation	Training for users inadequate	Lack of Training
Innovation-values fit	Management needed to align multiple stakeholders	Lack of Top Management Support
Innovation-values fit	No attempt to measure or increase commitment	Project Management Problems
P67		
Human and Organization	Inadequate management of stakeholder politics	Project Management Problems
Human and Organization	Perspective of ERP as just a technical system	Project Management Problems
Technical	Frequent changes in requirements	Lack of Clarity on Scope
Technical	Difficulties in operating effectively with systems function…	ERP Software Misfit
P72		
IT experts	Lack of in-house IT experts	Poor Project Team
IT experts	IT experts lack ERP and PM knowledge	Poor Project Team
System	Lack of detailed requirement analysis	Lack of clarity on scope
System	Stabilization time is overlong	Project management problems
System	Misalignment between system and user needs	ERP software misfit
System	Inappropriate system usage	Lack of Training
System	Low user involvement	Lack of User Involvement
System users	Lack of cross-functional collaboration	Poor organizational culture
Top management	Lack of top management support	Lack of top management support
Top management	Short-term thinking	Lack of top management support
Top management	Do not empower it manager	Lack of top management support

APPENDIX 4- A FULL LIST OF THE ORIGINAL NAMES OF CRITICAL FAILURE FACTORS AND RELATED STEPS

Stage Name	Original Name	Qualitative Coding Name
P03		
Planning Stage	Lack of Awareness	Lack of Top Management Support
Planning Stage	Ineffective Communication With User	Communication Problems
Planning Stage	Inadequate Financial Management	Financial Management Problems
Planning Stage	Ineffective Definition of ERP Scope	Lack of Clarity On Scope
Planning Stage	Lack of Adequate Knowledge of Technology	Poor Project Team
Planning Stage	Lack of Business Process Interrelationship	Poor Quality of BPR
Planning Stage	Resistance to Change	Resistance to Change
P04		
Project Preparation Phase	Conflicts Between Organization And Consultants/ Vendor	ERP Software Misfit
Project Preparation Phase	Poor Top Management Support	Lack of Top Management Support
Project Preparation Phase	Inadequate Expectations Management	Lack of Clarity On Scope
Business Blueprint Phase	Conflicts Between Organization And Consultants/ Vendor	ERP Software Misfit
Business Blueprint Phase	Inadequate Expectations Management	Lack of Clarity On Scope
Business Blueprint Phase	Internal Conflicts Between Departments	Poor Organizational Culture
Realization Phase	Conflicts Between Organization And Consultants/ Vendor	ERP Software Misfit
Realization Phase	Internal Conflicts Between Departments	Poor Organizational Culture
Realization Phase	Inadequate Expectations Management	Lack of Clarity On Scope
Realization Phase	Poor Top Management Support	Lack of Top Management Support
Realization Phase	IT Technical Issues	Outdated IT Infrastructure
Final Preparation Phase	Internal Conflicts Between Departments	Poor Organizational Culture
Final Preparation Phase	Poor Top Management Support	Lack of Top Management Support
Final Preparation Phase	Conflicts Between Organization And Consultants/ Vendor	ERP Software Misfit
Go Live & Support Phase	IT Technical Issues	Outdated IT Infrastructure
Go Live & Support Phase	Conflicts Between Organization And Consultants/ Vendor	ERP Software Misfit
Go Live & Support Phase	Internal Conflicts Between Departments	Poor Organizational Culture
P013		
Pre-Implementation	The Different Technical Languages	Communication Problems
Pre-Implementation	High Costs of Implementation	Financial Management Problems
Pre-Implementation	Difficulties In Estimating Project Requirements	Lack of Clarity On Scope
	Unclear Strategic Direction And Vision For The Use of ERP	
Pre-Implementation	Information Unfit For The System	Data Quality
Pre-Implementation	Incompetent Consultant	Poor Solution Implementer Performance
Pre-Implementation	Knowledge Gap Between Implementers And Users	Lack of Training
Pre-Implementation	Unavailability of Skilled Project People	Poor Project Team
	Turnover of Key Project Persons	
Pre-Implementation	Difficulties In Changing to New From Old System	Resistance to Change
P64		

Implementation	Define The Company's Needs	Lack of Clarity On Scope
Pre-Implementation	Lack of Plan And Execution of All Phases	Project Management Problems
Pre-Implementation	The Selection of Product	ERP Software Misfit
Implementation	Software Adherence	ERP Software Misfit
Implementation	Tests	Poor Quality of Testing
Implementation	Training	Lack of Training
Post-Implementation	Training	Lack of Training
Implementation	Changed And Standardized Its Processes	Poor Quality of BPR
Implementation	Customization	Highly Customized ERP
Post-Implementation	Substantial Resistance to ERP	Resistance to Change
P72		
Post-Implementation	Lack of Top Management Support, Short-Term Thinking, Do Not Empower IT Manager	Lack of Top Management Support
Post-Implementation	Lack of Cross-Functional Collaboration	Poor Organizational Culture
Post-Implementation	Lack of Detailed Requirement Analysis	Lack of Clarity On Scope
Post-Implementation	Stabilization Time Is Overlong	Project Management Problems
Post-Implementation	Misalignment Between System And User Needs	ERP Software Misfit
Post-Implementation	Inappropriate System Usage	Lack of Training
Post-Implementation	Lack of In-House IT Experts IT Experts Lack ERP And PM Knowledge	Poor Project Team
Post-Implementation	Low User Involvement	Lack of User Involvement

APPENDIX 5- A FULL LIST OF CRITICAL FAILURE FACTORS AND RELATED FAILURE EFFECTS/MODES

Type	Original Effect Name	Original Failure Factor	Qualitative Coding Name
P04			
Potential Failure Effect	Budget Exceed	Poor consultant	Poor Solution Implementer Perf…
		Poor top management support	Lack of Top Management Support
		Ineffective communications system	Communication Problems
	Time Exceed	Poor consultant	Poor Solution Implementer Perf…
		Poor top management support	Lack of Top Management Support
		Ineffective communications system	Communication Problems
	Project Stop	Language barriers	Communication Problems
		Poor consultant	Poor Solution Implementer Perf…
		Poor top management support	Lack of Top Management Support
	Poor Business Performance	Poor knowledge transfer	Lack of Training
		Poor consultant	Poor Solution Implementer Perf…
		Poor top management support	Lack of Top Management Support
	Inadequate System Reliability & Stability	Heavy customization	Highly Customized ERP
		IT Technical issues	Outdated IT infrastructure
		Poor consultant	Poor Solution Implementer Perf…
	Low Organization Process Fitting	Poor knowledge transfer	Lack of Training
		Poor consultant	Poor Solution Implementer Perf…
		Ineffective communications system	Communication Problems
	Low User Friendliness	Poor consultant	Poor Solution Implementer Perf…
		Poor top management support	Lack of Top Management Support
		Language barriers	Communication Problems
	Low Degree of Integration and Flexibility	Poor consultant	Poor Solution Implementer Perf…
		IT Technical issues	Outdated IT infrastructure
		Heavy customization	Highly Customized ERP
	Low Strategic Goals Fitting	Ineffective communications system	Communication Problems
		Misfits between the IT and business str…	Poor Organizational Culture
		Poor consultant	Poor Solution Implementer Perf…
	Bad Financial/ Economic Perf. Org.	Ineffective communications system	Communication Problems
		Poor top management support	Lack of Top Management Support
		Misfits between the IT and business str…	Poor Organizational Culture
Potential Failure Mode	Process Failure	Poor consultant	Poor Solution Implementer Perf…
		Poor top management support	Lack of Top Management Support
		Language barriers	Communication Problems
	Expectation Failure	Poor knowledge transfer	Lack of Training

		Poor consultant	Poor Solution Implementer Perf…
		Ineffective communications system	Communication Problems
		Poor top management support	Lack of Top Management Support
	Interaction Failure	Language barriers	Communication Problems
		Poor top management support	Lack of Top Management Support
		IT Technical issues	Outdated IT infrastructure
		Heavy customization	Highly Customized ERP
	Correspondence Failure	Poor knowledge transfer	Lack of Training
		Poor top management support	Lack of Top Management Support
		Poor consultant	Poor Solution Implementer Perf…
		Ineffective communications system	Communication Problems
		Misfits between the IT and business str…	Poor Organizational Culture
P65			
Potential Failure Effect	Time exceed	Project management & control	Project Management Problems
		Top management support	Lack of Top Management Support
		Organization Fit	Poor Organizational Culture
	Cost increasing	Financial support	Financial Management Problems
		Top management support	Lack of Top Management Support
		Communication	Communication Problems
	Customer & Employee Dissatisfaction	Team work	Poor Project Team
		User Involvement & training	Lack of User Involvement
		User Involvement & training	Lack of Training
		Project management & control	Project Management Problems

APPENDIX 6- A COMPLETE LIST OF FAILURE FACTORS IN ORDER OF IMPORTANCE

Article	Original Failure Factor	Qualitative Coding Name
P03 – Ranking Type: Risk Value		
1/6	Ineffective communication with user	Communication Problems
2/6	Lack of business process interrelationship	Poor quality of BPR
3/6	Resistance to change	Resistance to change
5/6	Inadequate financial management	Financial Management Problems
5/6	Lack of adequate knowledge of technology	Poor Project Team
6/6	Lack of awareness	Lack of Top Management Support
P04 – Ranking Type: CFF Effect Value		
1/27	Poor consultant	Poor Solution Implementer Performance
2/27	Poor top management support	Lack of Top Management Support
3/27	Poor knowledge transfer	Lack of Training
4/27	Ineffective communications system	Communication Problems
5/27	Language barriers	Communication Problems
6/27	Misfits between the IT and business strategies	Poor Organizational Culture
7/27	Poor business process reengineering	Poor quality of BPR
9/27	Heavy customization	Highly Customized ERP
9/27	Poor project management	Project Management Problems
10/27	Poor project team	Poor Project Team
11/27	IT Technical issues	Outdated IT infrastructure
13/27	Conflicts between organization and consultants/ vendor	ERP Software Misfit
13/27	Environmental pressures	Poor Organizational Culture
15/27	Inadequate user involvement	Lack of User Involvement
15/27	Inadequate change management	Project Management Problems
16/27	Poor risk management	Project Management Problems
17/27	Inadequate education and training	Lack of Training
18/27	Lack of performance measurement system	Project Management Problems
19/27	Internal conflicts between departments	Poor Organizational Culture
20/27	Data management issues	Data Quality
21/27	Poor quality of testing	Poor Quality of Testing
22/27	Misfit between organization culture and ERP system	ERP Software Misfit
23/27	Misfit between organization structure and ERP system	ERP Software Misfit
25/27	Poor vendor	ERP Software Misfit
25/27	Lack of ERP readiness assessment initiatives	Project Management Problems
27/27	Not clearly defined strategic goals	Lack of Clarity on Scope
27/27	Inadequate expectations management	Lack of Clarity on Scope
P05 – Ranking Type: CFF Score		

1/20	Poor quality of testing	Poor Quality of Testing
3/20	Unrealistic expectations	Lack of Clarity on Scope
3/20	Poor top management support	Lack of Top Management Support
8/20	Poor consultant effectiveness	Poor Solution Implementer Performance
8/20	Too tight project schedule	Project Management Problems
8/20	Users' resistance to change	Resistance to change
8/20	Software modification	ERP Software Misfit
8/20	Functionality problems	ERP Software Misfit
11/20	ERP Software misfit	ERP Software Misfit
11/20	Heavy customization	Highly Customized ERP
11/20	Lack of formal communication	Communication Problems
13/20	Poor project management	Project Management Problems
14/20	Poor knowledge transfer	Lack of Training
14/20	Part-time dedication	Poor Project Team
16/20	Unclear Concept of the Nature	Lack of Clarity on Scope
16/20	Cost over runs	Financial Management Problems
18/20	Poor quality of BPR	Poor quality of BPR
18/20	Poor IT Infrastructure	Outdated IT infrastructure
19/20	High turnover rate	Poor Project Team
20/20	Informal strategy	Project Management Problems
P08 – Ranking Type: Percentage of occurrences		
1/28	Inadequate resources	Poor Project Team
2/28	Poor User involvement	Lack of User Involvement
3/28	Users' resistance to change	Resistance to change
4/28	Higher Attrition rate of project team members	Poor Project Team
5/28	Lack of top management commitment	Lack of Top Management Support
6/28	Poor project management	Project Management Problems
7/28	Inadequate project team composition	Poor Project Team
8/28	Ineffective organizational change management	Poor Organizational Culture
9/28	Unrealistic project scheduling	Project Management Problems
10/28	Poor quality of testing	Poor Quality of Testing
11/28	Inadequate functional requirements	Lack of Clarity on Scope
12/28	Unavailability of right users during UAT	Poor Quality of Testing
13/28	Inappropriate timing of go live	Project Management Problems
14/28	Unavailability of subject matter export	Poor Solution Implementer Performance
15/28	Unrealistic ROI	Financial Management Problems
16/28	Poor IT knowledge transfer	Lack of Training
17/28	Poor IT infrastructure	Outdated IT infrastructure
18/28	Cost over run	Financial Management Problems
19/28	Inaccurate data	Data Quality
20/28	Poor communication	Communication Problems
21/28	Over-reliance on heavy customization	Highly Customized ERP
22/28	Unrealistic expectation	Lack of Clarity on Scope
23/28	Inadequate legacy system knowledge	Outdated IT infrastructure
24/28	Poor ERP product selection	ERP Software Misfit
25/28	Poor quality of BPR	Poor quality of BPR
26/28	Inadequate training and education	Lack of Training
27/28	No empowered decision-makers	Project Management Problems
28/28	Poor interdepartmental alignment	Poor Organizational Culture
P09 – Ranking Type: Percentage		
1/7	Employee's resistance	Resistance to change
2/7	Poor top management	Lack of Top Management Support
3/7	Lack of experience	Poor Project Team
4/7	Budget issues	Financial Management Problems
5/7	Change in management	Project Management Problems
6/7	Unfriendly user interface	ERP Software Misfit
7/7	Absence of consultant	Poor Solution Implementer Performance
1/5	Lack of formal communication	Communication Problems
2/5	Poor ERP SELECTION	ERP Software Misfit
3/5	Functionality problems	Lack of Clarity on Scope
4/5	Over realization on heavy customization	Highly Customized ERP
5/5	Software modification	Poor Quality of Testing

P15 – Ranking Type: Frequency Count		
1/60	Project team was disbanded very quickly	Poor Project Team
4/60	Interface issues	ERP Software Misfit
4/60	No proper testing	Poor Quality of Testing
4/60	Time zone limitations	Other
9/60	Implementation causes stress on people	Other
9/60	Lack of business buy-in from internal stakeholders	Lack of User Involvement
9/60	Offshoring causes delays	Other
9/60	People are resistant to change	Resistance to change
9/60	Short hyper-care support period	Other
14/60	Cultural differences	Poor Organizational Culture
14/60	Data cleanse	Data Quality
14/60	Excessive customization is sub-optimal	Highly Customized ERP
14/60	Leadership didn't understand the complexities	Lack of Top Management Support
14/60	Unable to deploy resources back to business	Other
60/60	Change management	Project Management Problems
60/60	Communication	Communication Problems
60/60	Data quality issues	Data Quality
60/60	Data readiness	Project Management Problems
60/60	Data validation without understanding the data	Poor Quality of Testing
60/60	Inconsistent KPI reporting across the organization	Project Management Problems
60/60	Lack of access to people who know the information	Poor Project Team
60/60	Lack of access to the system	ERP Software Misfit
60/60	Lack of business ownership	Lack of User Involvement
60/60	Lack of experienced subject matter experts	Poor Project Team
60/60	Lack of integrated testing & real live simulations	Poor Quality of Testing
60/60	Lack of training	Lack of Training
60/60	Learning new system was challenging to end users	Lack of Training
60/60	Manual interventions	Other
60/60	Project was too long	Project Management Problems
60/60	Bad feelings about how employees were dealt with	Other
60/60	Change request controls are very strict	Lack of Clarity on Scope
60/60	Consultants did not share knowledge	Lack of Training
60/60	Consultants lack of knowledge of other systems	Poor Solution Implementer Performance
60/60	Data migration across different systems	Data Quality
60/60	Engagement with users didn’t provide a whole lot of detail	Engagement with users
60/60	Ensuring external stakeholders are aware of the change	Communication Problems
60/60	ERP implementations are not cheap	Financial Management Problems
60/60	Issues after go-live were like a tsunami	Poor Quality of Testing
60/60	Lack of integration	Outdated IT infrastructure
60/60	Lack of resources	Poor Project Team
60/60	Lack of understanding of business requirements	Lack of Clarity on Scope
60/60	Leader has to champion stability	Lack of Top Management Support
60/60	Leadership changes during project	Lack of Top Management Support
60/60	Leadership commitment to the standard global template was lacking	Lack of Top Management Support
60/60	Local management didn’t pull the right people	Poor Project Team
60/60	Management did not want to hear bad news	Lack of Top Management Support
60/60	Massive re-organization before an ERP implementation	Poor Organizational Culture
60/60	Misunderstanding of scope	Lack of Clarity on Scope
60/60	No accountability or checks in place to get the right data	Data Quality
60/60	No knowledge transfer from project team to business	Lack of Training
60/60	People are not working towards the same goal	Poor Project Team
60/60	Perception that new system should behave like old system	Poor quality of BPR
60/60	Personality issues	Resistance to change
60/60	Pressure to be “green” on the dashboards	Communication Problems
60/60	Respecting no-fly zone	Other
60/60	Thin line on budget	Financial Management Problems
60/60	Took long time to address the backlog	Other
60/60	Use of too many templates	Other
60/60	Zero experience with SAP	Lack of Training
P18 – Ranking Type: Occurrences in the projects		
2/14	Poor project management effectiveness	Project Management Problems

2/14	Poor consultant effectiveness	Poor Solution Implementer Performance
2/14	Poor quality of Business Process Re-engineering	Poor quality of BPR
7/14	Poor top management support	Lack of Top Management Support
7/14	Unclear concept of the nature	Lack of Clarity on Scope
7/14	Too tight project schedule	Project Management Problems
7/14	ERP system misfit	ERP Software Misfit
7/14	Poor quality of testing	Poor Quality of Testing
10/14	Over-reliance on heavy customization	Highly Customized ERP
10/14	Users' resistance to change	Resistance to change
14/14	Unrealistic expectations	Lack of Clarity on Scope
14/14	Poor IT infrastructure	Outdated IT infrastructure
14/14	Poor knowledge transfer	Lack of Training
14/14	High turnover rate of project team members	Poor Project Team
P19 – Ranking Type: Ranking – Project 1		
1/11	Top management support	Lack of Top Management Support
2/11	ERP teamwork and composition	Poor Project Team
3/11	Project management	Project Management Problems
4/11	Project champion	Lack of Top Management Support
5/11	Change management program and culture	Poor Organizational Culture
6/11	Business process reengineering (BPR) and minimum customiza…	Poor quality of BPR
7/11	Appropriate business and legacy systems	Outdated IT infrastructure
8/11	Effective communication	Communication Problems
9/11	Business plan and vision	Lack of Clarity on Scope
10/11	Monitoring and evaluation of performance	Project Management Problems
11/11	Software development, testing and troubleshooting	Poor Quality of Testing
P19 – Ranking Type: Ranking – Project 2		
1/11	Software development, testing and troubleshooting	Poor Quality of Testing
2/11	Change management program and culture	Poor Organizational Culture
3/11	Top management support	Lack of Top Management Support
4/11	Business process reengineering (BPR) and minimum customiz…	Poor quality of BPR
5/11	Effective communication	Communication Problems
6/11	Project champion	Lack of Top Management Support
7/11	Project management	Project Management Problems
8/11	ERP teamwork and composition	Poor Project Team
9/11	Appropriate business and legacy systems	Outdated IT infrastructure
10/11	Business plan and vision	Lack of Clarity on Scope
11/11	Monitoring and evaluation of performance	Project Management Problems
P33 – Ranking Type: Survey for ranking		
1/10	Lack of effective project management	Project Management Problems
2/10	Failure to gain user support	Lack of User Involvement
3/10	Misestimated need for customization	Highly Customized ERP
4/10	Conflict between user departments	Poor Organizational Culture
5/10	Business process reengineering	Poor quality of BPR
6/10	Lack of senior management commitment	Lack of Top Management Support
7/10	Ineffective communication with the users	Communication Problems
8/10	Misunderstanding of change requirements	Lack of Clarity on Scope
9/10	Insufficient training of the end users	Lack of Training
10/10	Attempts to build bridge to legacy application	Outdated IT infrastructure
P37 – Ranking Type: Survey for ranking – Non functional		
1/7	Project Cost Overruns	Financial Management Problems
2/7	Project Delays	Project Management Problems
4/7	Conflicts with business strategy	Poor Organizational Culture
4/7	Employees Resistance to Change	Resistance to change
5/7	Conflicts with Consultants	Poor Solution Implementer Performance
6/7	Internal Conflicts	Poor Organizational Culture
7/7	Conflicts with Vendors	ERP Software Misfit
P37 – Ranking Type: Survey for ranking – Functional		
1/5	Integration with existing systems	Outdated IT infrastructure
2/5	Customization	Highly Customized ERP
3/5	Integration with other applications	ERP Software Misfit
4/5	European currency	ERP Software Misfit
5/5	Security	ERP Software Misfit

P38 – Ranking Type: Survey for ranking		
1/13	Project design	Project Management Problems
2/13	BPR	Poor quality of BPR
3/13	Project management	Project Management Problems
4/13	Insufficient training	Lack of Training
5/13	Connectivity, codes, reliability	ERP Software Misfit
6/13	Data migration	Data Quality
7/13	Insufficient cooperation between project teams	Communication Problems
8/13	Project scope	Lack of Clarity on Scope
9/13	Unsupported process	ERP Software Misfit
9/13	Lack of qualified personal	Lack of Training
9/13	personal rejection	Resistance to change
12/13	Timing	Project Management Problems
13/13	Hardware	Outdated IT infrastructure
P40 – Ranking Type: Survey for ranking		
6/6	Poor communication	Communication Problems
6/6	Poor consultant	Poor Solution Implementer Performance
6/6	Insufficient organizational readiness	Poor Organizational Culture
6/6	Unrealistic expectations	Lack of Clarity on Scope
6/6	Unclear concept of the nature	Lack of Training
6/6	Poor project management capability	Project Management Problems
P42 – Ranking Type: Survey for ranking		
1/9	Awareness/Training	Lack of Training
2/9	Management Commitment	Project Management Problems
3/9	Financial Support	Financial Management Problems
4/9	Resistance to change	Resistance to Change
5/9	Corporate & IT Governance Alignment	Poor Organizational Culture
6/9	Experience	Lack of Training
7/9	Complication	ERP Software Misfit
8/9	Inefficiency	ERP Software Misfit
9/9	Attitude	Resistance to change
P49 – Ranking Type: Survey for ranking		
3/3	poor understanding of business implications	Lack of Clarity on Scope
3/3	poor data quality	Data Quality
3/3	lack of top management support	Lack of Top Management Support
P53 – Ranking Type: Occurrences in the projects		
1/10	Organizational	Poor Project Team
3/10	Strategic	Project Management Problems
3/10	Interpersonal qualitative	Project Management Problems
4/10	Socio-cultural	Poor Organizational Culture
6/10	Financial	Financial Management Problems
6/10	Collaborative	Poor Organizational Culture
7/10	Motivation	Resistance to change
10/10	Functional	ERP Software Misfit
10/10	Managerial	Lack of Top Management Support
10/10	Methodological	Project Management Problems
P56 – Ranking Type: Occurrences in the projects		
1/11	Best Business Personnel	Poor Project Team
2/11	Approach to Training	Lack of Training
5/11	Mindset Change and Attitude to Learning	Lack of Top Management Support
5/11	Organizational Goals	Lack of Clarity on Scope
5/11	Implementation Methodology	Project Management Problems
7/11	priority project	Lack of Top Management Support
7/11	Cross-Functional Team	Poor Project Team
8/11	Technical Infrastructure	Poor Quality of Testing
10/11	Communicate and Manage Expectations	Lack of Clarity on Scope
10/11	Proactive Approach	Project Management Problems
11/11	Education on ERP	Lack of Training
P59 – Ranking Type: Occurrences in the projects		
1/6	Internal readiness/training	Lack of Training
2/6	Planning/development/budgeting	Project Management Problems
3/6	Adequate testing	Poor Quality of Testing

4/6	Deal with organizational diversity	Communication Problems
6/6	Worked with SAP functionality/maintained scope	Lack of Clarity on Scope
6/6	Project team/management support/consultants	Poor Project Team
6/6	Project team/management support/consultants	Lack of Top Management Support
6/6	Project team/management support/consultants	Poor Solution Implementer Performance
P65 – Ranking Type: Occurrences in the projects - Time exceed		
1/10	Organization Fit	Poor Organizational Culture
2/10	Top management support	Top Management Support
3/10	Project management & control	Project Management Problem
5/10	Team work	Poor Project Team
5/10	Communication	Communication Problems
6/10	Change management	Project Management Problem
7/10	Software system design	ERP Software Misfit
8/10	User Involvement & training	Lack of User Involvement
9/10	Financial support	Cost increasing
10/10	IT	Outdated IT infrastructure
P65 – Ranking Type: Occurrences in the projects - Cost increasing		
1/10	Top management support	Top Management Support
3/10	Organization Fit	Poor Organizational Culture
3/10	Software system design	ERP Software Misfit
5/10	Financial support	Cost increasing
5/10	Communication	Communication Problems
6/10	Team work	Poor Project Team
8/10	Change management	Project Management Problem
8/10	IT	Outdated IT infrastructure
9/10	Project management & control	Project Management Problem
10/10	User Involvement & training	Lack of User Involvement
P65 – Ranking Type: Occurrences in the projects - Customer & Employee dissatisfaction		
1/10	Team work	Poor Project Team
2/10	Software system design	ERP Software Misfit
3/10	Organization Fit	Poor Organizational Culture
5/10	User Involvement & training	Lack of User Involvement
5/10	IT	Outdated IT infrastructure
6/10	Project management & control	Project Management Problem
8/10	Top management support	Top Management Support
8/10	Communication	Communication Problems
10/10	Financial support	Cost increasing
10/10	Change management	Project Management Problem
P69 – Ranking Type: Survey for ranking		
1/8	Poor planning or poor management	Project Management Problems
2/8	Inappropriate training methods	Lack of Training
3/8	Change in business goals during the project	Lack of Clarity on Scope
5/8	Hostile company culture	Poor Organizational Culture
5/8	Improper reporting structure	ERP Software Misfit
6/8	Lack of business management support	Lack of Top Management Support
7/8	Inappropriate level of management commitment	Lack of Top Management Support
8/8	Political pressures	Poor Organizational Culture
P71 – Ranking Type: Survey for ranking		
2/13	Weak top management support	Lack of Top Management Support
2/13	No or minimal ERP customization	Highly Customized ERP
5/13	Testing Plan not comprehensive	Poor Quality of Testing
5/13	Inadequate training	Lack of Training
5/13	Not taking opportunity of business Process reengineering	Poor quality of BPR
11/13	Lack of change management strategy	Project Management Problems
11/13	Not addressing readiness of employees	Poor Project Team
11/13	Changing scope & reactive management	Lack of Clarity on Scope
11/13	Contextually weak project manager	Project Management Problems
11/13	Project Plan/Schedule	Project Management Problems
11/13	Weak implementation strategy	Project Management Problems
13/13	Leaving user involvement till the end	Lack of User Involvement
13/13	No communication strategy	Communication Problems