



## POST-IMPLEMENTATION CHALLENGES OF ERP ADOPTION IN APPAREL INDUSTRY OF DEVELOPING COUNTRY

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**ABSTRACT. Background:** In the current tenure of fourth industrial revolution (Industry 4.0), time has come to revisit the issues of post-implementation challenges of Enterprise Resource Planning (ERP) systems in the apparel industry of developing countries around the globe. This bibliometric review aims to identify the post-implementation challenges of ERP in apparel industry of a developing country.

**Methods and procedures:** Total 4854 published papers during the period 2000-2021 from the databases of Scopus and ScienceDirect were scanned to identify the relevant 52 publications using PRISMA flow diagram. Full bibliometric information was synthesized to create term co-occurrence network map using VOSviewer1.6.16. Later, cross-mapping the bibliometric terms from the meta-analyses with the six in-depth qualitative interviews conducted in a developing country, authors established themes through three levels of association.

**Results:** Results of this study have portrayed three themes; technical, operational, and human. Apparel industry of developing country faces technical, operational, and human challenges at the post-implementation phase of ERP adoption.

**Conclusions:** Technical, operational, and human are the major categories of challenges that need to be addressed to sustain the ERP implementation for developing countries. So, practitioners at the industry level, consultants, policymakers in the apparel industry, IT experts along with other knowledge workers should pay attention to these issues to build ERP systems more stable. Finally, the qualitative paper ends with the direction for further research in this specific field of enterprise information systems.

**Keywords:** ERP, post-implementation, challenges; apparel, industry, bibliometric, qualitative.

### INTRODUCTION

Enterprise Resource Planning (ERP) systems are designed to unite different functional areas of business. ERP solution integrates the segmented parts of data and information under a common database with the user interface. Thus, information becomes readily accessible on-demand to assist in the synchronization of business tasks as diverse as human resource management, accounting and finance, manufacturing and production, and supply chain management [Bjelland, Haddara, 2018]. ERP is the centralized and assimilated management of core business functionalities, habitually in real-time and eased by software

and communication technology. ERP system can be defined as “an assimilated software suite that facilitates firms to attain a holistic sight of the business enterprise” [Ehie and Madsen, 2005]. ERP is a configurable information systems solution that incorporates data and information-based procedures within and across the functional extents of a firm [Parthasarathy, Sharma, 2017, Boza et al., 2015, Seethamraju, 2015]. With these features of ERP, it is clear that it has good potential to have been applied in the apparel industry. To enhance information sharing and other significant operations, many textile and apparel companies in developing countries employed centralized ERP systems as a solution for their

day-to-day business operations [Ahmad et al., 2020, Nayak et al., 2019, Loon et al., 2016].

The prime objective of implementing the ERP solutions is to attain integration and coordination both within the firm and across the industry. This will in turn lead to cost reduction and profitability enhancement [Christopher, 2018, Lemonakis et al., 2018]. However, there is no certainty of success. Ruivo et al. [2020] argued that effective implementation of ERP systems is thoroughly related to a change in existing business processes. Specifically, firms that have implemented the ERP systems should have re-focused and relocated from a functional to a cross-functional and inter-organizational mode.

Rapid changes in the fashion and apparel industry compel firms in developing economies to adopt ERP though the total systems are costly, and once ERP systems are executed successfully, major benefits such as enhanced customer service, robust production arrangement, and condensed manufacturing costs can be attained [Syafira et al., 2020, Kamal, Mostafa, 2018 Majeed, Rupasinghe, 2017].

However, the success rate regarding the implementation is still squat and many firms that have obtained some advantages from ERP are yet to exploit the full potentials of ERP in their respective organizations. Gartner predicted that 90 percent of firms will face post-implementation problems regarding ERP [Sternad Zabukovšek et al., 2019]. Hence, for the developing countries, it has already been a big challenge.

Contemporary research suggests that the developing countries around the globe are emphasizing more on Information and Communication Technologies (ICTs), IT-enabled services (ITES), web, and mobile apps-based services, computer, and cloud-based information systems. To support this type of ICT based services, companies and SMEs have started adopting centralized information systems [Jayeola et al., 2020, Alsharari, Al-Shboul, Alteneiji, 2020, Razzaq, Mohammed, 2020, Moh'd Anwer, 2019, Kazmi, Mäntymäki, 2018, Rahman et al.,

2017, Hoque et al., 2016, Venkatraman, Fahd, 2016]. Centralized information systems have also been implemented as ERP in the apparel manufacturing industry of a developing country, Bangladesh [Bashar, Hasin, Adnan, 2021; Chowdhury, Umme, Nuruzzaman, 2018, Bashar, Hasin, 2018, Asif, 2017].

Previous studies have been conducted basically on the adoption or pre-adoption stages of ERP in this specific field, especially in the context of developing countries. Studies have identified challenges regarding the pre-adoption of ERP in the apparel industry [Ahmad et al., 2020, Mahmud, Ramayah, Kurnia, 2017]. There is a dearth of enough literature on the post-implementation phase of ERP adoption in this field though challenges identification is very critical for any adopted information systems. Hence, identification of challenges at the post-implementation stage of information systems is required [Gcora, Chigona, 2019, Osnes et al., 2018]. In line with these studies, Lin et al. [2021], Domagała et al. [2021]; Hietala, Päivärinta [2021], Perera, Munasinghe [2020], Behera, Dhal [2020] have called for further research to explore and investigate the post-implementation challenges of ERP adoption. Thus this study underpins to investigate the following research question.

What are the post-implementation challenges of ERP adoption in the apparel industry of developing country?

To inspect and fulfill the research gap followed by the research question, the authors performed a bibliometric review of existing pieces of literature on the post-implementation challenges of ERP adoption in the apparel industry and compare it with in-depth qualitative interviews for further research augmentations.

## **METHODS AND PROCEDURES**

We followed the basic four-step technique as suggested by Kovacs, Van Looy, Cassiman [2015]. The steps are literature search, selection process, data extraction, and outcome reporting. For yielding further robustness of this study, we compared the outcome with the

feedback gathered from six employees working in the IT department of apparel manufacturing firms in Bangladesh. Using convenient sampling, those six employees were chosen and reached [Islam et al., 2021, Etikan, Musa, Alkassim, 2016]. Six qualitative interviews were deemed adequate [Creswell, Creswell, 2017, Sandelowski, 1995]. The qualitative data regarding the challenges of post-implementation of ERP systems in the apparel industry were transcribed and analyzed thematically [Saldana, 2011].

### Literature search

A systematic search for scholarly peer-reviewed publications was carried out to explore the post-implementation challenges of ERP adoption in the context of the apparel industry. Two large full-text databases, Scopus and ScienceDirect have been chosen for this study. Scopus database has been chosen due to its wide range of dominant and advanced searching tools. Apart from this, it covers approximately 25 million abstracts from over 12,900 titles across 4,000 publishers. ScienceDirect has been chosen since it covers a wide variety of subject areas and disciplines, including information systems and technology.

Studies that were published during the period from 2000 to 2021 were included for both databases. Generic search strategies for systematic reviews have been followed [Koffel, 2015, Dieste, Padua, 2007].

Table 1. Searching parameters

Search keys	Data-base	Search field	Search parameters	Initial number of studies
ERP post-implementation on challenges	Science Direct	All	ERP+post-implementation +challenges	4,071
ERP post-implementation on challenges	Scopus	All	ALL ( erp AND post-implementation AND challenges ) AND PUBYEAR > 1999 AND PUBYEAR < 2022	783

Search keys, fields, parameters, and the initial number of studies (before filter) have been shown in Table 1. Initially, there were 4,071 and 783 studies were traced in ScienceDirect and Scopus respectively.

### Selection process

For the selection process, authors followed the PRISMA flow diagram that is also known as “Preferred Reporting Items for Systematic Reviews and Meta-Analysis” [Stewart et al., 2015]. PRISMA flow diagram is widely used in identifying and analyzing quality publications in a specific domain of study [Panic et al., 2013].

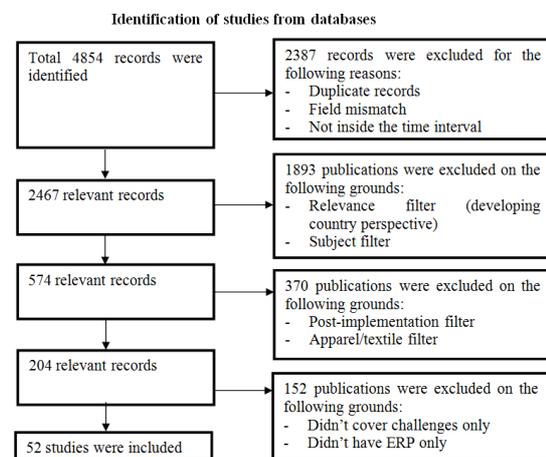


Fig. 1. Result of PRISMA flow diagram

Figure 1 depicts the step-by-step protocols followed to retrieve the final number of publications. An extensive filter-based search parameter has been used for the retrieval process. The exact search parameter is shown below.

ALL ( erp AND post-implementation AND challenges AND apparel ) AND PUBYEAR > 1999 AND PUBYEAR < 2022 AND ( LIMIT-TO ( SUBJAREA , "COMP" ) OR LIMIT-TO ( SUBJAREA , "BUSI" ) OR LIMIT-TO ( SUBJAREA , "DECI" ) OR LIMIT-TO ( SUBJAREA , "SOCI" ) OR LIMIT-TO ( SUBJAREA , "ECON" ) ) AND ( EXCLUDE ( SUBJAREA , "MATH" ) OR EXCLUDE ( SUBJAREA , "ARTS" ) OR EXCLUDE ( SUBJAREA , "PSYC" ) OR EXCLUDE ( SUBJAREA , "MATE" ) OR EXCLUDE ( SUBJAREA , "EART" ) OR EXCLUDE ( SUBJAREA , "AGRI" ) OR EXCLUDE ( SUBJAREA , "BIOC" ) OR EXCLUDE ( SUBJAREA , "HEAL" ) OR EXCLUDE ( SUBJAREA , "MULT" ) )

52 publications have been retrieved finally through PRISMA flow diagram.

## Data extraction

After the retrieval of those studies, the authors extracted the bibliometric information along with the text in the respective titles, abstracts, and keywords of the publications. Full bibliometric information is required to know the research trends [Safder, Hassan, 2019, Kalantari et al., 2017, Ellegaard, Wallin, 2015]. Hence, full bibliometric information has been exported in RIS form which is also known as the "Research Information Systems" format.

## Outcome reporting

For reporting the outcome, at first, authors showed the trend of publications for the period 2000-2021 using pertinent graphs and charts. VOSviewer1.6.16 was used to create a map based on assembled bibliographic data. Co-occurrence as the type of analysis and keywords as the unit of analysis were set. Authors used full counting method. Later, term co-occurrence map was created based on extracted text data using VOSviewer1.6.16.

After the scientific reporting of the published papers, authors reported the result of the six in-depth qualitative interviews that were compared to the systematic reviews and added new insights to the body of knowledge in this specific field of research.

## RESULTS

The trend of publications on ERP post-implementation challenges for the period 2000-2021 has been shown in Figure 2. The trend is upward rising as more and more publications came out after 2012. Because post-implementation challenges issue came to light after the initial adoption and implementation. Even when the authors extracted the publications from the database, it is seen that after 2012 the issue got the momentum, and still the challenges of post-implementation of ERP exist.

Figure 3 depicts the type of publications in the field of post-implementation challenges of ERP adoption. 61% of all publications

recorded in the Scopus database during 2000-2021 were in the form of articles. 27.5% of publications were done in the form of conference papers since the issue is directly related to the industry.

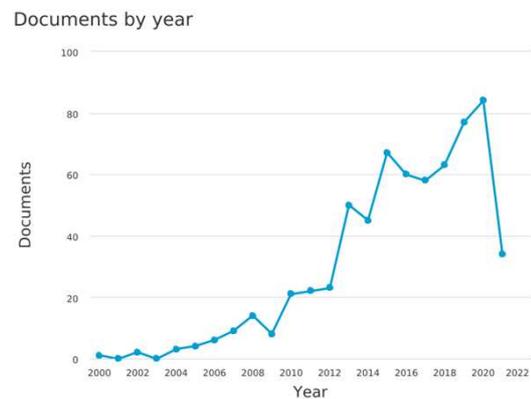


Fig. 2. Publications trend from 2000 to 2021

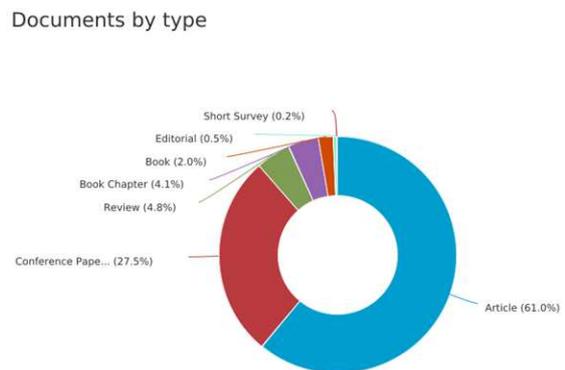


Fig. 3. Publications type from 2000 to 2021

Figure 4 exhibits a map based on bibliographic data. Co-occurrence as the type of analysis and keywords of the publications as the unit of analysis were set. Authors used full counting method to grip the whole picture. The map shows a network of identified terms like real usage of ERP, vendor support, cloud adoption, organizational performance, knowledge sharing and integration, training, customization. In the map, all of these terms are linked to the post-implementation of ERP.

Figure 5 is based on the title and abstract of the selected publications. The term co-occurrence map based on text data shows that risks, mechanism, organizational change, leadership style, intention, size of the firm, platform are the dominant terms that are connected to the post-adoption challenges in



## INTERVIEW OUTCOMES

The interviews were taken from April, 2021 to May, 2021 via online platform due to COVID-19 issues. Before commencing each interview, interviewees were informed about the aims and objectives of the research. They were also informed that the interviews won't be revealed to any other party; so, they agreed to participate in the interview sessions. Each interview lasted for 15-20 minutes. The profiles of the interviewees are shown in Table 2.

Table 2. Interviewees' Profiles

Interviewees	Gender	Designation	Work experience (years)
Interviewee 1	Male	Head of IT	16 years in apparel
Interviewee 2	Male	Systems Maintenance Engineer	5.5 years in apparel
Interviewee 3	Female	Systems Developer	3 years in ERP maintenance
Interviewee 4	Male	Head of MIS	14 years. But 6 years in the field of apparel.
Interviewee 5	Female	Database Analyst	4.5 years in apparel
Interviewee 6	Male	System Administrator	10 years in apparel

*"I have been working as a database analyst for 4.5 years in this firm. We faced challenges like data loss, old and manually kept data export to the systems specifically. Personally, I worked on Oracle before, so I have found ERP easier to use. But after implementation, we need to have proper training since we worked on different software platforms before."* [Interviewee 5]

Another interviewee opined that,

*"I have been working as a systems maintenance engineer. I am in this field for almost 5.5 years. We faced the first challenge last year while we wanted to upgrade the whole system. We had to rely heavily on our vendor company and it was costly. Now, we have decided to use open source ERP."* [Interviewee 2]

*"I have been working specifically in the enterprise systems of apparel for six years. Well, as the head of this division, I try to lead the whole IT team. But you know, sometimes I see one or two of my team members feel stressed and they keen to change the department within our company. I have seen this type of challenge when the company introduced open source ERP."* [Interviewee 4 added]

In this context interviewee 1 opined like that,

*"I am in this sector for almost 16 years and currently working as the head of IT at this firm. From my experience, some companies suffer at the post-implementation phase due to their financial constraints and lack of prior understanding. May be they haven't access the actual necessity before. We faced some problems related to the customization of our installed ERP. Actually, here in our company, we need production and manufacturing module blended with supply chain, accounting module, sales module, and HR module."* [Interviewee 1]

*"I am currently working as the system administrator. We faced security risks while we opened our systems to our partners and resellers. Even this year when we started to launch our smartphone app, we faced problems because the app worked well on android devices only. Training and development is needed for our IT team especially in smartphone apps development which is very essential these days"* [Interviewee 6]

*"I am working as a systems developer for 3 years in the IT division of apparel. I often face security threats because of erroneous configuration. I need to fix frequent problems like inaccuracy in inventory, incorrect invoices, mismatch in shipment, and unaligned production volume. These things happen due to human error and thus cause the systems to be halt."* [Interviewee 3 added].

## CROSS-MAPPING AND THEMES DEVELOPMENT

from the meta-analyses with the interviews. Table 3 has been constructed to develop themes.

At this stage, authors developed themes using cross-mapping the bibliometric terms

Table 3. Cross-mapping and themes development

Terms extracted from meta-analyses	Terms extracted from qualitative interviews	1 <sup>st</sup> level association	2 <sup>nd</sup> level association	3 <sup>rd</sup> level association	Themes
Vendor support, cloud adoption, organizational performance, knowledge sharing and integration, training, customization, risks, mechanism, organizational change, leadership style, intention, size of the firm, platform, knowledge transfer, security, access, uncertainty, guidance, requirement, workarounds	Data loss, manually kept data, training, vendor, costly, open source ERP, stressed, financial constraints, customization, security, risks, production and manufacturing module, supply chain, accounting module, sales module, HR module, smartphone app, training and development, security threats, erroneous configurations, inaccurate inventory, incorrect invoices, shipment mismatch, unaligned production volume	Vendor access, data management, cloud support, security, open-source facility, smartphone apps facility, configurations problem, training and development	System vendor support, system configuration, IS routine training, platform, IS security	Systems and technological challenge	Technical
				Functional and organizational challenges	
		organizational performance, knowledge sharing and integration, knowledge transfer, ERP modules, production, inventory, shipment, organizational size	Modules, scalability, organizational, functional	Human behavioral challenges	Human
		Intention, leadership style, stress, human errors and erroneous activities	Individual, behavioral, human		

## DISCUSSION AND CONCLUSION

Post-implementation challenges of ERP adoption in apparel industry thematically fall into the categories of technical, operational, and human. The study measured and identified these themes from the perspective of developing country. Existing literatures were cross-mapped with the practical insights from a developing country to intend the themes. It is obvious that challenges at the post-implementation phase of ERP adoption stem from the technical perspective followed by operational and human perspectives. Human consequences have been prioritized for the post-implementation of the ERP system since new challenges may arise caused by intentional or unintentional errors and stress. Operational challenges stem from the inability to maintain

organizational performance, lack of knowledge sharing and integration, inappropriateness of ERP modules, wrong estimations in production and inventory volume. This study has shown that these three are the major categories of challenges that need to be addressed to sustain the ERP implementation for the developing countries. Hence, practitioners at the industry level, consultants, policymakers in the apparel industry, IT experts along with other knowledge workers should pay attention and focus on these issues to build ERP systems more stable and advantageous.

Further empirical studies may be conducted taking into consideration these three themes; technical, operational, and human as the challenges of post-implementation of ERP adoption in apparel industry for the developing economies.

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