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# EMPIRICAL INVESTIGATION OF EGOVERNMENT CRITICAL CHALLENGE IN KHYBER PAKHTUNKHWA PROVINCE OF PAKISTAN: RECOMMENDATIONS FOR PROJECT DEVELOPMENT

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## KeyWords

Challenge(s), Development, eGovernment (eGov), Implementation, Software Development Process.

## ABSTRACT

Government applications are widely being used across the world; because, of benefits such as increased efficiency, transparency and service delivery at reduced cost. However, the eGovernment project implementation runs into problems, especially in developing countries such as Pakistan, where most of the initiatives are unsuccessful. As such, this study focuses on the challenges in eGovernment projects of KPK government, identifies the critical issues and explores why there is less successful projects in the government sector of Pakistan. The purpose of this paper is to identify a major concern for development. Both qualitative and quantitative methods comprising of interviews and expert evaluation were employed in the study. This study provides a comprehensive overview of the eGovernment development status in the world, identifying and mapping the major eGovernment and software development process identification challenges, and an empirical study to validate the challenges from KPK government. The findings show that a major issue of eGovernment project failure is the selection of a "Software Development Process" according to the context. It is due to the lack of practitioners' knowledge and expertise in software development process and its practices. The study also reveals that such insufficient knowledge and expertise issues are critical and impede the implementation of KPK eGovernment projects. This study provides a valuable discussion that although KPK government has developed a number of various success eGovernment projects, there is still the need for a defined software development process in eGovernment initiatives of the KPK province of Pakistan. The paper gives a detailed description about the relevance and significance of proper software development process in the projects of KPK government.

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## 1. INTRODUCTION

The Government provides many services to the citizen, businesses and its own departments. These services are vital for its citizens and functioning of the Government itself. ICT has enabled Government across the world to automate delivery of the services in order to make these more efficient, timely and cost effective (Almarabeh and Abuali, 2010; Gorla et al., 2010). Such government service automation projects are broadly categorized as eGovernment (Al-Shboul et al., 2014). Governments have used eGovernments in innovative ways to better serve their citizens (Abbas et al., 2011; Anna & Kei, 2005). eGovernment implementation strategies vary across government department and across countries. Several studies were undertaken in various countries to understand eGovernment implementation perspective (e.g. studies (Ramon & Pardo, 2005; Yildiz, 2007; Akman et al., 2005; Joseph, 2013; Bhuiyan, 2011; Ferro & Sorrentino, 2010; Larsson & Grönlund, 2016; Meijer, 2015; Rose & Grant, 2010; Savoldelli et al., 2014). Moreover, the current studies often fail to address implementation challenges in an integrated way. And if somewhere studies have addressed the challenges properly, they tend to focus on organizational context only rather than the technical one (Dittrich, 2016). On the other hand, to the best of our knowledge, few studies partially discuss eGovernment implementation in Pakistan, e.g. (Abbas et al., 2011; Noor et al., 2014; Shaukat et al., 2009; Kayani et al., 2011; Qaisar & Ghufraan, 2010). These studies are conceptual and descriptive in nature. They fail to provide the current state of eGovernment project implementation in Pakistan in an in-depth manner as well.

There are several factors that contribute towards success of any software project (Pereira et al., 2008; Procaccino et al., 2005). Such as resources, requirements, development process, budget, tools, communication, etc. (Damas, 2009; Pereira et al., 2008). One of the most critical factors for software development in any organization is to establish and maintain robust software development process (Baharom et al., 2014; Valle et al., 2017; Xu & Ramesh, 2015). The software development process is the most significant and the “glue” that ties all other related factors together (Chevers et al., 2017). “Software development process” is one of the key research areas for software engineering researchers (Hayat & Malik, 2017; Valle et al., 2017). The definition and management of the software development process are challenging tasks for practitioners (Khan et al., 2017; Elder & Garman, 2008; Heeks, 2006). The required project/software quality are not likely to be accomplished without giving proper attention to the “software development process” (Baharom et al., 2014; Gregory et al., 2016; Iqbal et al., 2015; Valle et al., 2017). Existing research shows that generally organizations do not clearly establish software development processes because they face difficulty in defining processes consistent with their business requirements (Larrucea et al., 2016). Most of the organizations lack employee expertise, do not have enough resources, lack of funds, cost and time, commitment and lack of knowledge and information (Larrucea et al., 2016; Raza & Faria, 2016). Such issues are very common in eGovernment sectors (Elder & Garman, 2008). Therefore, implementation of eGovernment projects in developing countries are often considered challenging (Choudrie et al., 2017). The practitioners find it critical to determine the specific methodology for a given project (Nasir & Sahibuddin, 2011; Vijayasathay & Butler, 2016). As there is no “silver bullet” available for all type of projects (Chevers et al., 2017; Li et al., 2006). The choice of appropriate software process might be based on industry supported practices and some standards (Vijayasathay & Butler, 2016). It is uncertain that choosing a methodology will ever be a simple deterministic exercise (Chevers et al., 2017; Clarke et al., 2017; Li et al., 2006). The concept of process identification and definition is still problematic (Clarke et al., 2017; Kruchten, 2013).

eGovernment projects are essentially the software development projects (Elder & Garman, 2008; Heeks, 2006). But, the context of eGovernment projects differs from private sector software development projects (Heeks, 2002; Elder & Garman, 2008; Heeks, 2006). eGovernment projects have a broader context (Heeks, 2006). The difference with respect to context occurs due to fundamental differences in ownership, funding and control (Elder & Garman, 2008; Editorial Board, 2017). The appropriate definition of project-specific software development process for eGovernment projects has been a quite challenging task; particularly in developing nations (Heeks, 2002). There are different factors that affect the development of a software project (Pereira et al., 2008; Procaccino et al., 2005). Some of those factors are lack of awareness about situational context difference and business needs, lack of expertise, lack of employees, lack of commitment, and lack of knowledge and information (Elder & Garman, 2008; Ogasawara et al., 2014). The implementation of eGovernment projects in developing countries are often considered challenging due to these insufficient knowledge and expertise issues (Choudrie et al., 2017; Elder & Garman, 2008; Ogasawara et al., 2014). Pakistan is one of the developing countries that are in progress of delivering eGovernment services. But, unfortunately practitioners lack the required skills and expertise (Heeks, 2002; Elder & Garman, 2008; Heeks, 2006). And face problem of defining a project-oriented software development process for a particular eGovernment project in the country (Heeks, 2006). Thus, there is a need to examine eGovernment initiative in the developing country generally (Al-Shboul et al., 2014) and in Pakistan particularly. The primary objective of this study is to explore the eGovernment challenges in the provincial government of Pakistan, namely Khyber Pakhtunkhwa (KPK) province.

Therefore, this study will address the following research questions.

**RQ1:** What challenges to eGovernment implementation are identified in the literature?

**RQ2:** What challenges to software development process are identified in the literature?

**RQ3:** What challenges to eGovernment project implementation in KPK government are found in the empirical study?

**RQ4:** What challenges to software development process in KPK government are identified in empirical study?

**RQ5:** What are the most critical challenges that exist in an eGovernment project implementation identified in the empirical study and

the literature?

**RQ6:** Which critical challenges need more investigation?

These research questions aim to identify the challenges to eGovernment project implementation, and to the software development in order to assess the critical challenges in eGovernment software development in KPK government and to improve eGovernment programs more effectively.

The study uses both qualitative and quantitative approaches to gather relevant information and to analyze results. The interviews with eGovernment professionals were conducted, and expert evaluation was employed in the study. A total of 40 eGovernment practitioners were interviewed to collect information regarding the eGovernment challenges and the process identification challenges; the empirical investigation. A conceptual mapping of both lists of challenges was performed and some major common challenges were identified. A number of countries were taken to assess their progress in overcoming these major challenges, and results were found. Summarily, we provide results of the review and the empirical investigation regarding critical eGovernment challenges, along with the mapping of eGov and process identification challenges and the countries' progress to overcome issues.

The findings show that Pakistan is far behind in the progress of the eGovernment sector as compared to some other countries. A major reason for the failure of eGovernment projects in Pakistan, especially in the targeted province of KPK was the "no proper software development process" challenge; the issue that is still unaddressed within the province.

Therefore, there is a need to investigate the software development process factor and its challenges in more detail, using real-world scenarios. The proper understanding of the defined process factor and the occurring challenges can improve the eGovernment initiative of the KPK government significantly by helping the practitioners in dealing with these issues before implementation, and can be helpful to the developing world as well. The relationships among stakeholders can be improved as well.

This paper is organized into six sections, together with the introduction. The second section presents the literature review including eGovernment challenges. The third section reports the research methodology used in the study. The fourth section presents the results and discussions of the study, including software process significance and identification challenges, mapping of the eGovernment and process identification challenges, and the information about the countries' progress. Finally, section five provides recommendations, followed by section six with the concluding remarks.

## 2. LITERATURE REVIEW

eGovernment has become a vital focus of government efforts all over the world (Almarabeh & Abuali, 2010; Gorla et al., 2010). Various governments worldwide have introduced and implemented eGovernment systems as a means to reduce costs, improve services, save time and to increase efficiency and effectiveness in the government sector (Abbas et al., 2011; Anna & Kei, 2005). The ICT revolution has encouraged changes in a number of ways around the globe, and has also changed the way in which public sectors worldwide interact with their employees, citizens, government agencies, businesses, and other stakeholders (Almarabeh & Abuali, 2010; Gorla et al., 2010). According to UN surveys and some international reports, eGovernment has turned out to be important to international and national societies, providing the users with several potential prospects to improve the eGovernment services and projects quality (United Nations, 2012; United Nations, 2014; United Nations, 2016).

### 2.1. EGOVERNMENT CHALLENGES

ICT applications have great "administrative potential" to provide remarkable services, such as "interconnectivity" (Reddick & Turner, 2012; Guha & Chakrabarti, 2014) "service delivery" (Aichholzer & Schmutzer, 2000; Ndou, 2004; Reddick & Turner, 2012; Wilson, 2014), "efficiency and effectiveness" (Aichholzer & Schmutzer, 2000; Almarabeh & Abuali, 2010; Al-Shboul, 2014; Batini et al., 2009; Schuppan, 2009), "interactivity" (Yildiz, 2007), "decentralization" (Nograšek, 2011; Ma et al., 2005), "transparency and accountability" (Almarabeh & Abuali, 2010; Ndou, 2004; Oza, 2006; Sharma et al., 2014; Al-Shboul, 2014). eGovernment covers all these functionalities completely and is considered as a new mode to improve the public sector, both in developing and developed countries (Dada, 2006; Layne & Lee, 2001). Although eGovernment provides beneficial services to users, but the public sector still faces several challenges (Heeks, 2002; Walsham & Sahay, 2006; Baharom et al., 2014).

eGovernment implementation offers many opportunities to the public sector (Walsham & Sahay, 2006). However, the developing countries do not enjoy eGovernment benefits completely, and is affected by political, social, technological and economic difficulties (Ndou, 2004; Matavire et al., 2010; Chen & Perry, 2003; Clemons, 2003). eGovernment challenges are not available in a single list; however few consistent primary challenges in eGovernment context are specified. The main challenges that are being faced in eGovernment development and implementation falls under five main categories (Ramon & Pardo, 2005; Ulf & Karin, 2006), shown in Table 1.

**Table 1: eGovernment challenges**

Category	eGovernment Challenge	Reference(s)
Information and Data Challenges	Information and data quality	(Ramon & Pardo, 2005; Nawi et al., 2012; Naser et al., 2015; Sulaiman et al., 2013; Alghamdi & Beloff, 2016; Rahimy, 2016)
	Dynamic information needs	(Ramon & Pardo, 2005)
	Lack of appropriate data	(Ramon & Pardo, 2005; Almarabeh & Abuali, 2010; Nkwe, 2012; Al-Shboul et al., 2014)
	Lack of decision support systems	(Ramon & Pardo, 2005; Sarayrih & Sriram, 2015)
	Lack of cumulative knowledge	(Gregor et al., 2010; Ramon & Pardo, 2005; Sharma et al., 2014; Sulaiman et al., 2013)
	Less usability	(Ramon & Pardo, 2005)
	Security issues	(Ramon & Pardo, 2005; Al-Shboul et al., 2014; Larsson & Grönlund, 2016; Savoldelli et al., 2014)
	Technological incompatibility	(Herath & Kishore, 2010; Huang & Bwoma, 2003; Ramon & Pardo, 2005; Nawi et al., 2012; Oza, 2006; Al-Azri et al., 2010; Akman et al., 2005; Joseph, 2013)
	Technology complexity	(Ramon & Pardo, 2005)
	Lack of technical skills and experience	(Ramon & Pardo, 2005; Matavire et al., 2010; Al-Rashidi, 2010; Al-Shboul, 2014)
Information Challenges	Technology newness	(Ramon & Pardo, 2005; Al-Rashidi, 2010; Akman et al., 2005)
	Inadequate infrastructure	(Ramon & Pardo, 2005; Matavire et al., 2010; Sharma, 2014; Nkwe, 2012; Sulaiman et al., 2013; Akman et al., 2005; Joseph, 2013; Al-Shboul et al., 2014; Bhuiyan, 2011; Nagi & Hamdan, 2009; Sarayrih & Sri-

		ram, 2015)
	Lack of proper IT planning	(Ramon & Pardo, 2005; Nawi et al., 2012; Sharma, 2014; Nkwe, 2012; Akman et al., 2005; Al-Shboul et al., 2014; Sarrayrih & Sriram, 2015)
	Design reality gap	(Dada, 2006; Heeks, 2003; Almarabeh & Abuali, 2010; Oza, 2006; Rahimy, 2016)
	Digital divide	(Akman et al., 2005; Al-Shboul et al., 2014; Bhuiyan, 2011; Nagi & Hamdan, 2009; Rose & Grant, 2010; Savoldelli et al., 2014)
Organizational and Managerial Challenges	Project size	(Ramon & Pardo, 2005; Al-Shboul et al., 2014)
	Lack of resources	(Almarabeh & Abuali, 2010; Sharma, 2014; Nkwe, 2012; Al-Shboul et al., 2014; Bhuiyan, 2011)
	Manager's attitudes and behavior	(Herath & Kishore, 2010; Ramon & Pardo, 2005; Nawi et al., 2012; Rose & Grant, 2010; Sarrayrih & Sriram, 2015)
	Users or organizational diversity	(Hwang et al., 2004; Ramon & Pardo, 2005; Oza, 2006; Al-Azri et al., 2010; Nkwe, 2012; Kayani et al., 2011; Alghamdi & Beloff, 2016; Akman et al., 2005; Rahimy, 2016; Meijer, 2015)
	Lack of aligning the organizational goals and project	(Herath & Kishore, 2010; Ramon & Pardo, 2005; Nawi et al., 2012)
	Fear of process change	(Nawi et al., 2012; Walsham & Sahay, 2006)
	No proper software development process/methodology	(Nawi et al., 2012)
	Multiple or conflicting goals	(Ramon & Pardo, 2005; Nawi et al., 2012)
	Resistance to change	(Al-Rashidi et al., 2010)

Legal and Regulatory Challenges	Lack of strategic holdup	(Paul & Thompson, 2003; Al-Raja et al., 2015; Kayani et al., 2011; Sarrayrih & Sriram, 2015)
	Varying costs and budget constraints	(Matavire et al., 2010; Walsham & Sahay, 2006; Joseph, 2013; Rahimy, 2016)
	Lack of communication and user involvement	(Nawi et al., 2012; Al-Raja et al., 2015; Rose & Grant, 2010)
	Underprivileged restrictive laws and regulations	(Ramon & Pardo, 2005; Almarabeh & Abuali, 2010; Nkwe, 2012; Sulaiman et al., 2013; Kayani et al., 2011; Alghamdi & Beloff, 2016; Akman et al., 2005; Joseph, 2013; Al-Shboul, 2014)
Institutional and Environmental Challenges	Poor intergovernmental relationships	(Ramon & Pardo, 2005; Anders et al., 2006)
	Privacy concerns	(Ramon & Pardo, 2005; Al-Shboul et al., 2014; Larsson & Grönlund, 2016; Savoldelli et al., 2014)
	Autonomy of agencies	(Ramon & Pardo, 2005; Joseph, 2013)
	Inadequate policy	(Ramon & Pardo, 2005; Yildiz, 2007; Al-Shboul et al., 2014; Savoldelli et al., 2014)
	Political pressures	(Hwang et al., 2004; Ramon & Pardo, 2005; Savoldelli et al., 2014)
	Environmental context (social, economic, demographic issues)	(Ramon & Pardo, 2005; Al-Azri et al., 2010)

These problems are considered to be the inhibitors of eGovernment initiative (Gichoya, 2005). The organizations, public or private, unaware of these critical factors may suffer project failure (Ndou, 2004).

### 3. RESEARCH METHODOLOGY

The study utilizes the mixture of qualitative and quantitative methods. In data collection, the first section consisted of a bibliographic analysis in which the authors reviewed the related present literature. UN survey reports and previous research reports were also studied, as well as journals and other relevant documents.

The second part consisted of an empirical investigation of the identified data in the first part, the mapping of identified challenges, and the assessment of countries' progress. The empirical investigation was performed using semi-structured interviews. A total of 40 respondents (eGovernment professionals) participated in the interviews, encompassing project developers, project managers, IT

consultants, team leads, business analysts, and other high management titles.

To collect the qualitative data for the empirical part, semi-structured interviews were conducted with the officials of the KPK eGovernment projects. A number of respondents were part of the multiple eGovernment projects, whereas few of them were new in the domain. The qualitative data were analyzed using the tabulation. In addition, the mapping and the analysis of countries' development was performed using tabulation, diagrams and graphs.

### 3.1. STUDY AREA

The KPK province of Pakistan is considered to be the most successful region in the eGovernment project implementation. Therefore, KPK province is accessed for interviews and data collection. This province has earned noteworthy honors because of the diversity, vision and success of its eGovernment initiatives. In addition, other provinces have shown the intention to replicate strategies and initiatives used by KPK government. It can, therefore, be expected that the lessons learnt from this research would have a strong impact on the implementation strategy of eGovernment within the entire country.



**Figure 1:** Map of the Khyber Pakhtunkhwa Province of Pakistan

The province has 101,7412 km land area. Khyber Pakhtunkhwa is the third-largest province of Pakistan in terms of both economy and population, however it is smallest one geographically. The province shares a border with Balochistan, Punjab, Azad Kashmir, Islamabad, and Gilgit-Baltistan. Figure 1 shows the province of KPK in the coastal area of Pakistan.

## 4. RESULTS AND DISCUSSION

The section presents the results and discussion of this study, and analyzes a number of aspects as well as the issues contributing to the low success rate of eGovernment projects at the provincial level.

### 4.1. SIGNIFICANCE OF SOFTWARE DEVELOPMENT PROCESS

Various software projects are developed worldwide, most of which are failed projects (Standish & Report, n.d.). Chaos study reported that only three out of more than 500 software development projects were successful (Resolution, 2009; Standish & Report, n.d.). Many projects in top-ranked organizations have failed irrespective of controlled efforts (Resolution, 2009). There are several factors that contribute towards success of any software project (Pereira et al., 2008; Procaccino et al., 2005). Such as resources, requirements, development process, budget, tools, communication, etc. (Damas, 2009; Pereira et al., 2008). Researchers suggest that only intrinsic factors are not sufficient, there are some extrinsic factors as well which are necessary for project's success (Choudrie et al., 2017; Pereira et al., 2008; Procaccino et al., 2005). The software development process is one of those extrinsic factors which play vital role in project's success (Chevers et al., 2017; Clarke & Connor, 2015; Iqbal et al., 2015; Resolution, 2009; Tripp & Armstrong, 2017; Valle et al., 2017; Xu & Ramesh, 2015). The software development process is the most significant and the "glue" that ties all

other related factors together (Chevers et al., 2017). Researchers believe that the main cause of software project is more likely the lack of execution and focus on software development process (International, 2013; Resolution, 2009). Moreover, it is stated that the use of software development process increases software development effectiveness and reduces failure rate (Iqbal et al., 2015; Valle et al., 2017). Boehm stated that the quality of project is directly linked to the quality of the development process (Boehm, 1996).

Some researchers pinpointed and concluded that “software development process” is an important factor for an eGovernment project’s success, discussed as follows: Nawi et al., (2012) explored various factors w.r.t ITPOSMO; seven dimensions that influence the eGovernment implementation. Krishna & Walsham (2007) emphasized the importance of need to reorganize existing software development processes, confine processes and practices according to the technologies. Herath & Kishore (2010) stated that modification of software development processes to accommodate clients tools and systems is necessary in order to deliver a successful project. Lowery (2002) have given stress on the development of an eGovernment strategy that should include the critical success factors: technology, process, and the people. Elkadi (2013) have also given emphasis on the eGovernment implementation w.r.t. IT-POSMO. Napitupulu & Sensuse (2013) and Ramadhan et al., (2013) also stated the importance of software development process as one of the critical factors for success. Tsai et al., (2009) have specified the software development process as a critical element for success in the development life cycle of a project.

Brief overview of software development process in eGovernment studies has been given in Table 2.

**Table 2:**Brief overview of Software Development Process Importance

Title	Author	Objective
“Government ICT Project Failure Factors: Project Stakeholders’ Views”	Nawi et al., (2012)	Project Failure Classification is being done by the IT-POSMO model
“Implementing Public Information Systems in Developing Countries: Learning From a Success Story”	Krishna & Walsham (2007)	One of the success factors for eGovernment is the development context; the software development process.
“Most eGovernment-for-Development Projects Fail How Can Risks be Reduced?”	Heeks (2003)	eGovernment projects failure occurs due to the lack of understanding about design-reality gaps w.r.t IT-POSMO.
“Offshore Outsourcing: Risks, Challenges, and Potential Solutions”	Herath & Kishore (2010)	The software development processes changes is an integral part of system implementation
“Developing a Successful eGovernment Strategy”	Lowery (2002)	eGovernment strategy should include three key drivers: the process, the people, and the technology to get success.
“Success and Failure Factors for eGovernment projects: A Case from Egypt”	Elkadi (2013)	ITPOSMO play vital role in project's success.
“The Critical Success Factors Study for eGovernment Implementation”	Napitupulu & Sensuse (2013)	Better defined software development process is a critical factor of eGovernment project success
“Synthesizing Success Factors for eGovernment Initiative”	Ramadhan et al., (2013)	eGovernment projects' success rely on feasible software development process
“Agile innovation management in government: A research agenda”	Mergel (2016)	Introduction of a software development process as per the technology and demand is necessary for innovation
“Improving the process of eGovernment initiative : An in-depth case study of web-based GIS implementation”	Tsai et al., (2009)	There must be a framework for software development process to be implemented for ‘systems development life cycle’ SDLC of a project.
“To explore managerial issues and their implications on eGovernment deployment in the public sector: Lessons from Taiwan's Bureau of Foreign Trade”	Tseng et al., (2008)	The software development processes helps in decision making and resolving issues.
“Managing IT-enabled transformation in the public sector: A case study on eGovernment in South Korea”	Jeong et al., (2007)	The technology and business/software development processes alignment is a major factor for executing eGovernment initiatives.



The researchers have specified that the implementation in developing countries is more challenging as compared to developed states (Heeks, 2002). For developing countries, application of proper structures to accurately manage the software development activity is a major challenge (Ali et al., 2017; Baharom et al., 2014; Gregory et al., 2016). The task of managing the software development effectively can be achieved by introducing appropriate software development process (Vijayasarathy & Butler, 2016).

#### 4.2. SOFTWARE PROCESS IDENTIFICATION

Software development process" is one of the key research areas for software engineering researchers (Larrucea et al., 2016). It has become a research focus in past few years (Chevers et al., 2017; Li et al., 2006; Ogasawara et al., 2014). Methods and processes are essential for development of quality software projects (Clarke & Connor, 2015; Dittrich, 2016; Iqbal et al., 2015). The organizations must use proper software development methods to develop high quality software that satisfies the client (Dittrich, 2016; Kruchten, 2013). A well-defined software development process provides consistency to organizations and help to improve their work (Humphrey & Kellner, 1989; Valle et al., 2017). One of the most critical factors for software development in any organization is to identify, establish and maintain robust software development process (Clarke & Connor, 2015). The definition and management of the software development process are challenging tasks for practitioners (Connor & Laporte, 2011; Larrucea et al., 2016). The required project and software quality are not likely to be accomplished without giving proper attention to the "software development process" (Baharom et al., n.d.; Iqbal et al., 2015). Existing research shows that generally organizations do not clearly establish software development processes, and face unnecessary challenges (Larrucea et al., 2016). It is because they face difficulty in defining processes consistent with their business requirements and practices (Larrucea et al., 2016). The use of appropriate software development process for a project gives competitive advantage to organizations (Clarke & Connor, 2015; Lee, Shiue, & Chen, 2016). The software development process has been considered as an important component of project's success (Lee et al., 2016). As a result, the appropriate software development process focus would increase the success rate and quality of projects (Ramon & Pardo, 2005).

#### 4.3. CHALLENGES IN SOFTWARE PROCESS IDENTIFICATION

The challenges that practitioners face in identifying and defining the software development process are specified below in Table 3:

**Table 3: Software Development Process Identification challenges**

Category	Challenge	Reference(s)
Project administration	Lack of skills & Experience	(Cuevas & San-feliu, 2014; Goldenson & Herbsleb, 1995; A. W. Khan & Khan, 2013; S. U. Khan et al., 2010; Niazi et al., 2010; Niazi et al., 2013; Niazi et al., 2007; Pproach et al., 2004; Rainer & Hall, 1999; Ramasubbu, 2014; Sulayman et al., 2014; Sulayman et al., 2012)
	Staff turnover	(Ali et al., 2017; Emam & Koru, 2007; Khan & Keung, 2016; S. U. Khan et al., 2010; Niazi et al., 2010, 2013, 2007; Pettersson, 2007; Pproach et al., 2004; Rainer & Hall, 1999; Sulayman et al., 2014, 2012)
	Lack of sponsorship	(Ali et al., 2017; Niazi et al., 2010)
	Organizational politics	(Ali et al., 2017; Cuevas & San-feliu, 2014; Emam & Koru, 2007; Goldenson & Herbsleb, 1995; Khan & Keung, 2016; A. W. Khan & Khan, 2013; S. U. Khan et al., 2010; Niazi et al., 2010, 2013, 2007; Pettersson, 2007; Pproach et al., 2004; Rainer & Hall, 1999; Ramasubbu, 2014; Sulayman et al., 2014, 2012)
	Lack of organizational support	(Ali et al., 2017)
	Budget constraints	(Ali et al., 2017)
Coordination	Stalling on action plan implementation	(Ali et al., 2017)
	Cultural differences	(Ali et al., 2017)
	Lack of trust	(Ali et al., 2017; Niazi et al., 2013)
	Lack of feedback	(Ali et al., 2017)
	Personality clashes	(Goldenson & Herbsleb, 1995; A. W. Khan & Khan, 2013; Niazi et al., 2010, 2013)

Software methodology	Lack of communication and involvement	(Ali et al., 2017; Emam & Koru, 2007; A. W. Khan & Khan, 2013)
	Lack of proper formal methodology	(Cuevas & San-feliu, 2014; Goldenson & Herbsleb, 1995; A. W. Khan & Khan, 2013; S. U. Khan et al., 2010; Niazi et al., 2010; Niazi et al., 2013; Niazi et al., 2007; Pproach et al., 2004; Rainer & Hall, 1999; Ramasubbu, 2014; Sulayman et al., 2014; Sulayman et al., 2012)
	Lack of process knowledge	(Khan & Keung, 2016)
	Lack of training	(Ali et al., 2017; Khan & Keung, 2016)
	Workload	(Ali et al., 2017; Khan & Keung, 2016)
Human resources management	Time pressure	(Cuevas & San-feliu, 2014; Emam & Koru, 2007; Goldenson & Herbsleb, 1995; A. W. Khan & Khan, 2013; S. U. Khan et al., 2010; Niazi et al., 2010, 2013, 2007; Pettersson, 2007; Pproach et al., 2004; Rainer & Hall, 1999; Ramasubbu, 2014; Sulayman et al., 2014, 2012)
	Lack of resources	(Cuevas & San-feliu, 2014; Emam & Koru, 2007; Goldenson & Herbsleb, 1995; A. W. Khan & Khan, 2013; S. U. Khan et al., 2010; Niazi et al., 2010, 2013, 2007; Pettersson, 2007; Pproach et al., 2004; Rainer & Hall, 1999; Ramasubbu, 2014; Sulayman et al., 2014, 2012)
	Organizational changes	(Khan & Keung, 2016)
Technology factors	Temporal distance	(Khan & Keung, 2016; A. W. Khan & Khan, 2013)
	Poor organizational infrastructure	(Ali et al., 2017)
	Lack of tools	(Emam & Koru, 2007; Goldenson & Herbsleb, 1995; S. U. Khan et al., 2010; Niazi et al., 2010; Pettersson, 2007)

This study is significant because it employs both literature review and the empirical investigation of the phenomenon. Moreover, the study employs both the qualitative and quantitative methods to assess and analyze the challenges in KPK government.

#### 4.4. EMPIRICAL DATA COLLECTION

On the basis of the literature review findings, empirical interview questions were developed to investigate challenges to software process in context of eGovernment in KPK province of Pakistan. Such investigation made it possible to obtain data from a large target population. We collected information from practitioners involved in eGovernment projects in KPK government. The questions were created on the basis of challenges identified from the bibliographic survey. A five-point Likert scale was used; following were the expected responses: "strongly agree," "agree," "neutral," "disagree," and "strongly disagree". Neutral response about a statement provides genuine response. Absence of a neutral choice can result in biased data; forcing participants to respond either negatively or positively. The interviews were recorded and transcribed accordingly.

A pilot evaluation of the questions was done using an organization having experienced personnel. On the basis of the feedback, the questions were modified to increase appropriateness and clarity. The final interview questions included demographic data, eGovernment implementation challenges, software development process identification challenges. We confirmed that the collected data will be treated as confidential.

##### 4.4.1. Data Sources

The purpose of this research study was to investigate critical challenges to the implementation of software development process in eGovernment field. As a result, we collected information from various practitioners with experience in eGovernment. They were contacted and an interview session timing was fixed with them. Interviews were held for 20-25 minutes in order to collect all relevant information. The participants ranged from software engineers to projects' vice presidents; all had experience in eGovernment project implementation. The Appendix I details the respondents' demographics.

##### 4.4.2. Interview data analysis

We used the frequency analysis method to establish the descriptive information. We used frequency tables to show the percentages and frequencies of the data. Frequency analysis is useful to analyze both ordinal and numeric data. Using this approach, the most critical challenges were identified based on their frequencies of responses.

#### 4.5. RESULTS OF THE EMPIRICAL STUDY

In this section, the results of the practitioners' interviews are discussed.

##### 4.5.1. eGovernment issues identified in empirical study

The RQ3 was answered by conducting interviews with eGovernment practitioners on the basis of the challenges found in the literature. Table 4 shows the resultant categories of the challenges. We divide the table into three major categories: "Positive" (strongly agree (EA), and agree (A)), "Negative" (strongly disagree (SD), and disagree (D)) and "Neutral" (N). The 'positive category' characterizes the respondents' percentage who agreed that the challenges identified in the literature exist in the industry as well. The 'negative category' represents the respondents' percentage who did not consider either the challenges to be important or they do not occur. The 'neutral category' shows respondents with unsure response regarding the challenge(s) significance.

**Table 4:**eGovernment issues identified in empirical study

Sr.No	Challenge	Responses(N=40)							
		Positive			Neutral		Negative		
		SA	A	%	N	%	D	SD	%
C1	Information and data quality	26	8	85	6	15	0	0	0
C2	Dynamic information needs	17	13	75	9	22.5	1	0	2.5
C3	Lack of appropriate data	27	5	80	8	20	0	0	0
C4	Lack of decision support systems	15	12	67.5	11	27.5	1	1	5
C5	Lack of cumulative knowledge	25	5	75	10	25	0	0	0
C6	Less usability	15	11	65	8	20	5	1	15
C7	Security issues	10	25	87.5	4	10	1	0	2.5
C8	Technological incompatibility	5	27	80	8	20	0	0	0
C9	Technology complexity	10	20	75	10	25	0	0	0
C10	Lack of technical skills and experience	32	8	100	0	0	0	0	0
C11	Technology newness	5	23	70	10	25	1	1	5
C12	Inadequate infrastructure	18	20	95	2	5	0	0	0
C13	Lack of proper IT planning	12	22	85	6	15	0	0	0
C14	Design reality gap	13	20	82.5	5	12.5	2	0	5
C15	Digital divide	10	22	80	8	20	0	0	0
C16	Project size	15	15	75	10	25	0	0	0
C17	Lack of resources	32	8	100	0	0	0	0	0
C18	Manager’s attitudes and behavior	21	13	85	6	15	0	0	0
C19	Users or organizational diversity	10	22	80	7	17.5	1	0	2.5
C20	Lack of aligning the organizational goals and project	9	28	92.5	3	7.5	0	0	0
C21	Fear of process change	20	16	90	4	10	0	0	0
C22	No proper software development process/methodology	33	7	100	0	0	0	0	0
C23	Multiple or conflicting goals	22	12	85	6	15	0	0	0
C24	Resistance to change	11	18	72.5	8	20	2	1	7.5
C25	Lack of strategic holdup	32	8	100	0	0	0	0	0
C26	Varying costs and budget constraints	35	3	95	2	5	0	0	0
C27	Lack of communication and user involvement	24	16	100	0	0	0	0	0

C28	Underprivileged restrictive laws and regulations	13	17	75	9	22.5	1	0	2.5
C29	Poor intergovernmental relationships	10	22	80	6	15	1	1	5
C30	Privacy concerns	12	20	80	8	20	0	0	0
C31	Autonomy of agencies	4	26	75	8	20	1	1	5
C32	Inadequate policy	12	22	85	5	12.5	1	0	2.5
C33	Political pressures	5	24	72.5	10	25	1	0	2.5
C34	Environmental context (social, economic, demographic issues)	11	23	85	6	15	0	0	0

The results show that most of the respondents agreed that the specified challenges highly affect the government implementation; all issues reveal a “Positive” reply of greater than 65%, except of C6 (Less usability).

The interviewees considered the “Lack of technical skills and experience” (C10, 100%), “Lack of resources” (C17, 100%), “No proper software development process/methodology” (C22, 100%), and “Lack of communication and user involvement” (C27, 100%) as the most important challenges to implement eGovernment initiatives successfully. Shboul et al., (2014) conducted interviews to investigate the eGovernment implementation in the particular country. They found that lack of technical skills and experience was a major challenge in successful implementation of eGovernment initiative. Sharma (2014) identified lack of resources as a critical barrier to eGovernment success. The ineffective skills and expertise, and poor resources may not be in the interests of the eGovernment success. Nawi et al., (2012) conducted survey to investigate stakeholder views about eGovernment barriers. They found that no proper software methodology and lack of communication and involvement were quite critical challenges in eGovernment implementation. Our results show that “inadequate infrastructure” (C12, 95%) and “varying costs and budget constraints” (C26, 95%) remained the second most important challenges to the interviewees. The majority of the respondents consider lack of skills and experience to be an important challenge that can create other issues. Similarly, the importance of no proper software methodology was attributed to the absence of proper skills, communication and resources vital for success of eGovernment implementation.

The challenge “less usability” (C6, 15%) was considered to be the least important challenge in the “Negative” category. Therefore, we can say that 15% of the participants did not consider less usability to be a hurdle to implement eGovernment. It could be attributed to improvements in the developed systems, which have lessened the ease of access among the teams. The second least important challenge, for the respondents, in eGovernment implementation was “resistance to change” (C24, 7.5%). Hence, it shows that, usually, eGovernment teams have adequate understanding of the importance of changes to be incorporated. “Lack of decision support systems” (C4, 27.5%) was the significant challenge in the “Neutral” category. Therefore, a noteworthy amount of the respondents was unsure regarding the importance of decision support systems for their respective projects.

#### 4.5.2. Process Identification issues identified in the empirical study

We conducted interviews with the eGovernment practitioners regarding the software process identification challenges as well on the basis of identified issues from the literature, in order to answer RQ4. Table 5 shows the challenges and categories. Three major categories are made, as discussed before: “Positive”-agreeing with challenges (strongly agree (EA), and agree (A)), “Negative”-do not consider the challenges to be important (strongly disagree (SD), and disagree (D)) and “Neutral” (N)-unsure about the challenge.

**Table 5:** Process Identification Challenges identified in the empirical study

Sr.No	Challenge	Responses(N=40)							
		Positive			Neutral		Negative		
		SA	A	%	N	%	D	SD	%
PC1	<b>Lack of skills &amp; Experience</b>	32	8	100	0	0	0	0	0
PC2	Staff turnover	27	9	90	4	10	0	0	0
PC3	Lack of sponsorship	16	19	87.5	5	12.5	0	0	0
PC4	Organizational politics	8	22	75	10	25	0	0	0
PC5	Lack of organizational support	5	21	65	12	30	2	0	5
PC6	<b>Budget constraints</b>	35	4	97.5	1	2.5	0	0	0
PC7	Stalling on action plan implementation	4	24	70	9	22.5	2	1	7.5

PC8	Cultural differences	2	23	62.5	14	35	1	0	2.5
PC9	Lack of trust	12	26	95	2	5	0	0	0
PC10	Lack of feedback	13	23	90	3	7.5	1	0	2.5
PC11	Personality clashes	8	20	70	8	20	2	2	10
PC12	<b>Lack of communication and involvement</b>	24	16	100	0	0	0	0	0
PC13	<b>Lack of proper formal methodology</b>	33	7	100	0	0	0	0	0
PC14	Lack of process knowledge	18	13	77.5	8	20	1	0	2.5
PC15	Lack of training	22	12	85	6	15	0	0	0
PC16	Workload	15	19	85	5	12.5	1	0	2.5
PC17	Time pressure	3	26	72.5	9	22.5	1	1	5
PC18	<b>Lack of resources</b>	32	8	100	0	0	0	0	0
PC19	Organizational changes	9	21	75	10	25	0	0	0
PC20	Temporal distance	4	24	70	9	22.5	3	0	7.5
PC21	<b>Poor organizational infrastructure</b>	16	23	97.5	1	2.5	0	0	0
PC22	Lack of tools	8	22	75	8	20	2	0	5

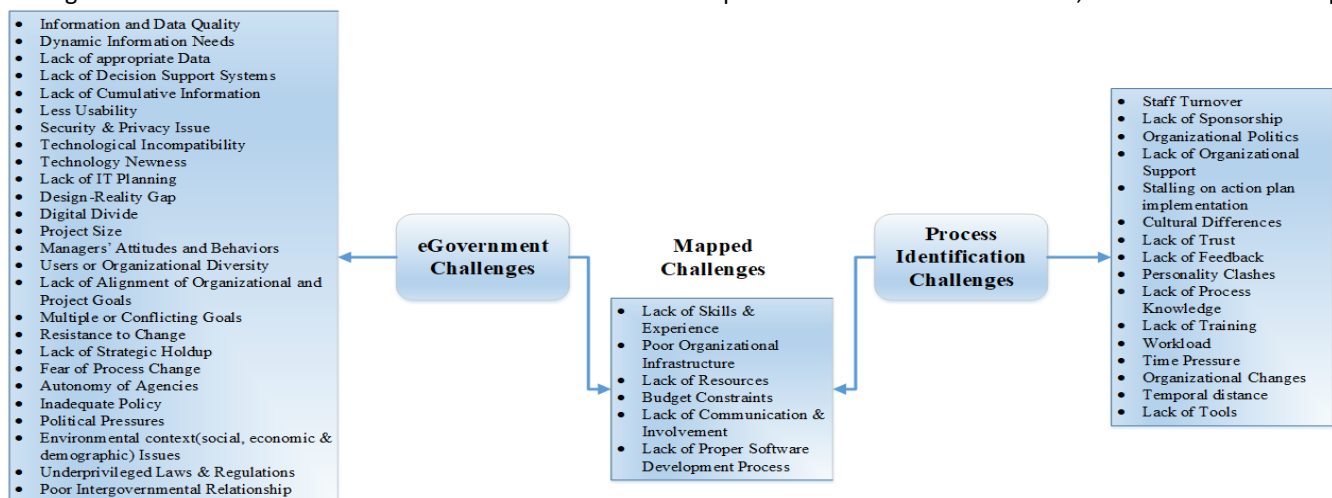
In the “Positive” category, “Lack of skills and experience” (PC1, 100%), “Lack of communication and involvement” (PC12, 100%) “Lack of proper formal methodology” (PC13, 100%), and “Lack of resources” (PC18, 100%), were considered to be the most significant challenges to successful identification of software development process by the interviewees. The researchers found that lack of experience, method, communication, involvement, and resources affect the software development significantly [103]-[114]. Additionally, the second most important challenges to the respondents were considered to be “budget constraints” (PC6, 97.5%) and the “poor organizational infrastructure” (PC21, 97.5%).

The challenge “personality clashes” (PC11, 10%) was considered to be the least important challenge in the “Negative” category. Thus, 10% of the respondents did not think that the personality clashes is a barrier to the process identification. The coordination and communication needs to be improved which can reduce the clashes. The second least important challenges in the software process identification were found to be “stalling on action plan implementation” (PC7, 7.5%) and “temporal distance” (PC20, 7.5%). In the “Neutral” category “cultural differences” (PC8, 35%) was the most significant challenge. As a result, a significant amount of the participants were unclear regarding the importance of the culture, norms and values in the organization.

The results show that the huge number of the interviewees confirmed that the identified issues and challenges are critical and affect the software process identification activity.

#### 4.6. CONCEPTUAL MAPPING OF EGOVERNMENT AND PROCESS IDENTIFICATION CHALLENGES

The factors which are important and need much focus of the management to accomplish specified goals are known as critical ones. The inadequate consideration to these factors undermine the success of the initiative. Figure 2 shows the mapping of major and critical challenges that exist in the eGovernment domain as well as in the process identification. Therefore, such considerable mapped



set of challenges in eGovernment and process identification can help the practitioners to identify the critical issues in eGovernment software process identification and overcome them to provide effective and efficient eGovernment projects. A total of six challenges was considered to be critical to eGovernment software development process: lack of skills and experience, poor organizational infrastructure, lack of resources, lack of communication and involvement, lack of proper software process/methodology, and budget constraints.

**Figure 2:** eGovernment and Process Identification challenges' conceptual map

eGovernment organizations are struggling to deliver effective services (Chevers et al., 2017). The developing nations are trying to provide high quality services as well (Baharom et al., 2014). However, the implementation of eGovernment projects in developing countries is challenging due to several issues, such as lack of proper skills and experience, poor project management and infrastructure, lack of resources, budget constraints, poor communication, unrealistic process, and technological incompatibilities etc. (Heeks, 2002; Walsham & Sahay, 2006; Baharom et al., 2014). Among these, one of the critical issues is the selection of an appropriate "Software Development Process" (Baharom et al., 2014.; Boehm, 2005; Gregory et al., 2016; Iqbal et al., 2015; Li et al., 2006; Valle et al., 2017). The software development process has been considered as an important component of project's success (Lee et al., 2016). The selection of appropriate software development process for a project has been realized by many countries because of its significant impact on project success (Valle et al., 2017). However, there are few challenges that are associated with developing world (Heeks, 2002). Most of the studies regarding software development process have been carried out in the developed countries (Baharom et al., 2014). In developing countries, the organizations lack the knowledge and expertise regarding software development process, especially in eGovernment sector (Heeks, 2002; Walsham & Sahay, 2006).

The countries are trying to achieve improved and reliable eGovernment initiatives (Nations, 2014, 2018). The eGovernment software process challenges are considered and efforts are being made to evade the challenges mentioned above. eGovernment has developed fast over last 20 years, since the United Nations attempted to benchmark the eGovernment state in 2001. The UN survey 2018 focus on persistent positive worldwide trend to eGovernment development higher levels. In this issue, forty (40) states score "Very-High", with Electronic Government Development Index (EGDI) values, amongst 193 member states. The countries rank according to the following values: "very High EGDI (Greater than 0.75)", "High EGDI (Between 0.50 and 0.75)", "Middle EGDI (Between 0.25 to 0.50)", and "Low EGDI (Less than 0.25)".

We have collected evidence from United Nations survey 2012, 2014, 2016, 2018 and 2020 about the countries' progress, and of few eGovernment projects about the issues that have been overcome and the ones that are still unaddressed. The selected countries belong to very-high, high and middle EGDIs. The low EGDI category is not considered, as they are lagging in the eGovernment progress. **Table 6** depicts the matrix of countries' and the challenges. Each challenge receives a ✓ if the country has addressed it, a ∂ is assigned if the challenge has been overcome to some degree, and a challenge receives ✗ if it is not handled or is still unaddressed in a country.

**Table 6:** Matrix for countries' progress in overcoming critical challenges

Region	Europe				America				Asia			
Country	Austria	France	Germany	Denmark	USA	Canada	Uruguay	Mexico	Korea	Singapore	India	Pakistan
<b>Challenge</b>												
Lack of Skills & Experience	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Poor Organizational Infrastructure	✓	✓	✓	✓	✓	✓	∂	✓	✓	✓	∂	∂
Lack of Resources	✓	✓	✓	✓	✓	✓	∂	✓	✓	✓	✓	✓
Budget Constraints	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	∂	∂
Lack of communication and involvement	✓	✓	✓	✓	✓	∂	✓	✗	✓	✓	∂	∂
Lack of proper formal methodology/process	✓	✓	✓	✓	✓	✓	✓	∂	✓	✓	∂	✗


#### 4.7. EGOVERNMENT IN PAKISTAN

Governments are struggling to achieve expected benefits such as efficiency, cost-effectiveness, transparency, etc. (Ramon & Pardo,

2005). The increasing numbers of eGovernment projects are being implemented worldwide (Heeks, 2003). However, behind the glamour of these projects, lies a bitter reality (Heeks, 2002; Heeks, 2003; Tsai et al., 2009). Most of the projects end up as failures; especially in developing countries (Dada, 2006; Heeks, 2003). This is due to the lack of technical knowledge, expertise and awareness about the software development process elements and the practices (Mergel, 2016; Schuppan, 2009; Vasconcellos et al., 2017). Such failures come at a high cost for the world's deprived economies; like Pakistan (Qaisar & Ghufra, 2010; Sulayman et al., 2012). The above matrix (Table 6) shows that Pakistan is still quite behind in the progress of eGovernment development and implementation, and needs to overcome few major challenges.

Pakistan is currently 153rd according to (UN eGovernment Survey 2020) and has eGovernment Development Index (EGDI) score of 0.4183, falling in middle EGDI rank. The country's ranking is shown in Figure 3 and Figure 4 respectively. Pakistan aims to gain the benefits of eGovernment being more dynamic, accountable, productive and transparent. Nevertheless, the lack of skilled staff, lack of IT knowledge, poor infrastructure, and insufficient training has been critical problems since many years in developing nations including Pakistan (Shaukat et al., 2009; Qaisar & Ghufra, 2010).

The research studies w.r.t. eGovernment initiatives in Pakistan provide one-sided view of factors that can help to measure an eGovernment project's success; whether transparency (Rehman & Esichaikul, 2011); time and cost savings (Rehman. & Esichaikul, 2011; Shaukat et al., 2009); management awareness (Abbas et al., 2011; Shaukat et al., 2009); stakeholder responsibility (Noor et al., 2014; Haider et al., 2014); bringing in right plan (Abbas et al., 2011; Kayani et al., 2011); right professional workforce (Kayani et al., 2011; Qaisar & Ghufra, 2010); convenience to use eGovernment programs (Haider et al., 2014; Haider et al., 2015; Alam & Ahmad, 2015); effectiveness (Rehman & Esichaikul, 2011); performance measures (Alam & Ahmad, 2015); citizen's desire (Haider et al., 2014), and effective infrastructure development (Shaukat et al., 2009; Kayani et al., 2011; Haider et al., 2015; Qaisar & Ghufra, 2010). But there is a lack of emphasis on the importance of software development process and the factors that are critical in the process definition for a project within eGovernment implementation in Pakistan (Sulayman et al., 2012).



<b>Pakistan</b>	
<b>Website</b>	National Portal
<b>Region</b>	Asia
<b>Sub-Region</b>	Southern Asia
<b>Income *</b>	Lower middle income
<b>Income Value</b>	1,580 USD, GNI per capita
<b>Population</b>	189,380,513
<b>E-Government Development Index</b>	0.4183 Rank 153 of 193
<b>E-Participation Index</b>	0.5238 Rank 103 of 193

**Figure 3:** Pakistan Status according to UN survey

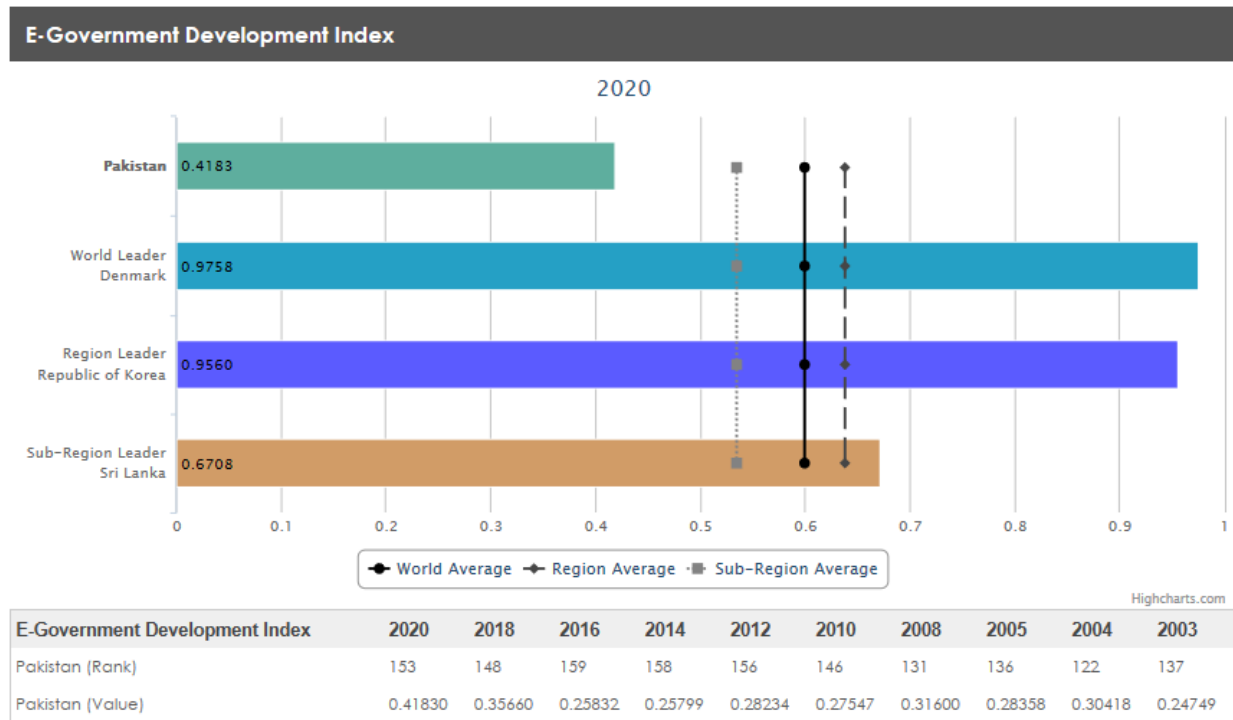


Figure 4: Pakistan's EGDI Rank

## 5. RECOMMENDATIONS

The eGovernment organizations are providing efficient, timely and cost effective services to its users worldwide. Many eGovernment projects have been implemented across the world. The eGovernment systems are information systems (IS) in the public sector. The software and information systems' role is increasing in the world (Heeks, 2006). This increasing role necessitates the developed eGovernment project to be of high quality, and can be evolved whenever the usage contexts change. The high quality system can only be developed by using an appropriate software development process (Larrucea et al., 2016; Raza & Faria, 2016). The results suggest that the success of projects is confined to proper software development process. Therefore, implementation of an optimum, lightweight and adaptive software development process is necessary to build an efficient software system in any private/government organization (Li et al., 2006; Watts et al., 1990; Ogasawara et al., 2014). The emphasis on process is creating new challenges for software process technology.

The appropriate definition of project-specific software development process for eGovernment projects has been a quite challenging task; particularly in developing nations (Heeks, 2002). Many studies regarding the software development process and its selection have been carried out in the private sector (Elder & Garman, 2008). The research on software development process is very limited in eGovernment domain (Heeks, 2002; Nawi et al., 2012; Walsham & Sahay, 2006).

The analysis in this study reveals that research on the eGovernment implementation in KPK province and in Pakistan w.r.t. software development process is rather limited (Gregory et al., 2016; Iqbal et al., 2015), and transcends the boundary of project success. It is due to the lack of attention to the software process, vulnerability in the correct definition of software development process and its tailoring, and the general misconception of software development process contextual factors. All software projects are not completely similar. They vary according to factors: size, product range, time in business, market sector, management style, and geographic location (Connor & Laporte, 2011; Vijayasarathy & Butler, 2016). Most of the studies regarding software development process were conducted in the developed countries, e.g. United States (US), Europe, and Japan but very few were carried out in Asian countries (Walsham & Sahay, 2006; Baharom et al., 2014), especially in Pakistan. The shortage of studies on eGovernment's implementation presents a knowledge gap that needs to be plugged (Jeong et al., 2007).

Therefore, we recommend to address this gap and conduct studies covering the concerned subject. Such gap can significantly be amplified by studying the context of software development process in eGovernment of Pakistan in more detail. It can, therefore, be expected that the lessons learnt from conducting such research can have a strong impact on the eGovernment project implementation strategy in Pakistan, and for developing countries as well.



## Conclusion

Currently, most of the countries worldwide is making great progress in eGovernment domain. The nations are automating their government activities. Such rapid growth of eGovernment initiative gave the motivation to identify challenges that affect the eGovernment projects. We conducted literature review and empirical investigation methods to identify a total of 34 eGovernment implementation challenges and 22 software process identification challenges respectively. The critical challenges in both subjects (eGovernment and process identification) and in both types of studies (LR and interviews) were found to be lack of skills and experience, poor organizational infrastructure, lack of resources, lack of communication and involvement, lack of proper software process/methodology, budget constraints. These critical challenges were confirmed by mapping the challenges from both domains. The challenges can be useful to the practitioners to identify and minimize the issues in eGovernment development. Further, we classified and mapped the identified challenges based on their significance and performance of countries. The results demonstrated that most of the developed countries have overcome these challenges and is progressing fast towards better eGovernment initiatives. Whereas, few developing countries still need to address some of the challenges. A major challenge that needs to be investigated and addressed is the lack of proper software methodology/process, especially in a developing country like Pakistan.

Most of the interviewees agreed positively with the outcomes of the literature. The practitioners must consider these challenges and need to know the means to address their particular challenges to effective implementation of eGovernment development initiatives. The software development process issue in KPK government needs special attention and additional studies to identify development prospects. Summarily, the practitioners and researchers in the eGovernment domain can use the results presented in this study to highlight and investigate the challenges in further details, such as case studies, surveys, etc. in the industry. Furthermore, the findings of the paper can be useful in addressing issues related to eGovernment and process activities, which are important to the success and progress of eGovernment domain.

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## Appendix . Details of Interviewees

Sr.No	Job Title	Experience(Years)	Scope of organization	Size
1	Project Manager	5	Vendor	Large

2	Project Manager	7	Vendor	Large
3	Associate vice President	21	Client	Large
4	Project Director	11	Executive Committee	Large
5	Senior Team Lead	4	Vendor	Large
6	Senior Project Manager	6	Executive Committee	Large
7	Program Manager	7	Executive Committee	Large
8	Corresponder	9	Executive Committee	Large
9	IT consultant	10	Executive Committee	Large
10	IT consultant	8	Executive Committee	Large
11	Project Director	14	Executive Committee	Large
12	Client Relationship Manager	9	Vendor	Large
13	Senior Developer	8	Vendor	Large
14	Project Manager	13	Executive Committee	Large
15	Business Analyst	10	Vendor	Large
16	Project Consultant	7	Vendor	Large
17	Project Coordinator	6	Vendor	Large
18	Project Manager	10	Vendor	Large
19	Senior Team Lead	4	Vendor	Medium
20	Developer	2	Vendor	Large
21	Project Manager	7	Vendor	Medium
22	Senior Developer	5	Vendor	Medium
23	Business Analyst	6	Vendor	Medium
24	Program Manager	10	Executive Committee	Large
25	Department vice president	18	Client	Large
26	Project Manager	5	Client	Medium
27	Developer	3	Vendor	Medium
28	Project Manager	8	Vendor	Large
29	Project Consultant	3	Vendor	Medium
30	Program Manager	6	Executive Committee	Large
31	Software Engineer	2	Client	Medium
32	Project Leader	5	Executive Committee	Large
33	Project Coordinator	3	Client	Medium
34	Process Consultant	9	Client	Large
35	Project Coordinator	6	Client	Large
36	Assistant Manager	12	Client	Large
37	Senior Team Lead	4	Vendor	Medium
38	Business Analyst	6	Vendor	Medium
39	Project Manager	7	Vendor	Large
40	Project Leader	5	Executive Committee	Large