EXTERNAL ENTERPRISE ENVIRONMENT FACTORS (ExEEFs) NEGATIVELY INFLUENCING SOFTWARE PROJECT MANAGEMENT IN PAKISTAN

Aamir Mairaj[1], Ali Ahsan[2]
[1]Avionics Production Factory, Pakistan Aeronautical Complex, Kamra, Pakistan
[2]Center for Advanced Studies in Engineering, UET Taxila, Taxila, Pakistan
Corresponding Author: bilal_329@yahoo.com

ABSTRACT:*Environing the typical Enterprise Environmental Factors (EEFs), the External Enterprise Environmental Factors (ExEEFs) include (but not limited to) culture, traditions, country's political condition, foreign relations, international politics, legislation, economy, political stability, country's law-and-order situation, etc. The research presented in this paper covers those ExEEFs which have a negative impact on software project management (SPM) in Pakistan. The data collection is carried out by employing the technique of 'planned-but-unstructured-interviews'. The data analysis is conducted by employing the techniques of brainstorming and Ishikawa method. In total, 40 interviews were conducted where the respondents, with an experience of five years and more, were software project managers and CEOs from 30 different software houses of Pakistan. The study reveals that SPM in Pakistan is being negatively influenced by following causes: vague intellectual copyrights; aftermath of 9/11; inadequate labor legislation and enforcement; brain drain; international exploitation; politicized institutes. The research is followed by some recommendations to mitigate these ExEEFs.*

KeyWords; External Enterprise Environmental Factor (ExEEF), Software Project Management (SPM), Intellectual Property Rights (IPR), piracy, cause-and-effect analysis, qualitative research methodology, Ishikawa Diagram.

MANAGERIAL RELEVANCE STATEMENT

Though Pakistan's SW industry has flourished a lot during last 10 to 15 years, its dormant potential is yet to be effectually utilized. For instance, Indian economy is 5 times bigger than Pakistan's general economy, but this proportion does not hold good for the SW industry of the two countries; as Indian SW industry is 27 times bigger than that of Pakistan's [1]. Favorable ExEEFs would largely contribute towards a thriving SW industry and vice versa. The study reported in this paper presents the views of various software project managers about ExEEFs negatively influencing SPM in Pakistan. The expected contribution of this research is following: (1) To educate the SW project managers of Pakistan about negative ExEEFs. (2) To present recommendations to mitigate these ExEEFs for effective SPM.

INTRODUCTION

The enterprise environmental factors (EEFs) are the factors which are not under the control of project teams in an organization. These factors are as follows: organizational culture, organizational structure, market-place, location, infrastructure, existing human resource, etc. [2]. The external enterprise environmental factors (ExEEFs) are the factors which further surround the EEFs; e.g., country's political environment, governmental policies, international politics, and country's culture, etc.

Software development projects have more dependency on human resource than on technology, and human resource are influenced by the surrounding conditions—the external enterprise environmental factors [3]. These external factors can either bring opportunities or pose threats to the software project depending on how much attention is paid to them while formulating the strategies.

Dynamics of Pakistan Software Indutry

Pakistan's SW industry comprised of 110,000 professionals and 1500 companies; where 110 companies are ISO 9001 certified, 23 companies are CMMI certified (two are at CMMI level 5), and 11 companies are ISO 27001 certified [4]. The global share of Pakistan's SW industry is US$2.8 billion [5]; whereas, India aims at US$60 billion [6].

Research Questions

Following questions are addressed in the research: (1) What are the external enterprises environmental factors (i.e. ExEEFs) which have negative influence on international Project Management? (2) What are the ExEEFs which have negative influence on international Software Project Management? (3) What are the ExEEFs which negatively influence Software Project Management in Pakistan?

List of Abbreviation

Table 1 shows the abbreviations used in the paper.

Table 1: Abbreviations

EEFs	Enterprise Environmental Factors
ExEEFs	External Enterprise Environmental Factors

List of Acronyms

Table 2 shows the acronyms used in the paper.

LIMITATIONS

The research cannot be generalized for Pakistan because of following reasons: (1) Data collection was done from software houses located in Islamabad, Lahore, and Karachi only. (2) Sample size is small, i.e., 40 respondents from thirty different software houses.

LITERATURE REVIEW

Though PMBOK and CMMI standards provide a detailed description of the impact of Enterprise Environmental Factors (EEFs) on SPM, they do not cover the External Enterprise Environmental Factors, i.e., ExEEFs [2,7,8,9].

Aosa and Machuki conducted a study to analyse the influence of ExEEFs, such as, political, economic, and technological factors, on general project management. The study revealed that external factors can impact the corporate performance in either positive or negative way depending upon how adequately these factors were understood before doing strategic planning [10]. This study is relevant to Research Question No. 1.

Ali investigated the internal and external constraints on project management in public sector organizations of Pakistan; the study revealed that besides the internal constraints, the external factors like social, political, cultural, and financial

problems create hindrances to manage projects effectively [11]. This study is also relevant to Research Question No. 1.

MacGregor et al. reported the impact of inter-cultural factors on global software development projects [12]. These factors include following: difference in styles of thinking, feeling, and reacting; Power Distance Index that deals with the social equality; Individualism/Collectivism Index;

Masculinity/Femininity Index that deals with the established gender roles; Uncertainty Avoidance Index, i.e., to what extent uncertain occurrences are welcomed in the society; and Long-term or Short-term Time Orientation. This study is relevant to Research Question No. 2.

Borchers analysed two multi-cultural software development projects, where the project teams were comprised of developers from India, United States, and Japan. Even though same practices were followed, the SPM was influenced by following cultural factors: individualism; power distance, i.e., the authority of bosses over sub-ordinates; and uncertainty avoidance [13]. This study is related to Research Question No. 2.

Table 2: Acronyms

CMMI	Capability Maturity Model Integration
PSEB	Pakistan Software Export Board
IT	Information Technology
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
SEI	Software Engineering Institute
ISO	International Organization for Standardization
SPM	Software Project Management
IPR	Intellectual Property Right
IPO	Office of Intellectual Property
IP	Intellectual Property
NDA	Non-Disclosure Agreement
FIA	Federal Investigation Agency
SW	Software
CEO	Chief Exective Officer

Hayat et al. highlighted two ExEEFs which lead to the failure of SPM in Pakistan, i.e., job insecurity and lack of sense of ownership [14]. Like all other fields, there is joblessness in SW industry of Pakistan. At any point in time if an employee does not perform up to the mark, he or she can be very easily replaced by another one, which creates a sense of insecurity. An important practice in large organizations is to make employees feel that they are an important part of the organization. However, in Pakistan most of the projects suffer from financial constraints and employees are given the least priority. This study is related to Research Question No. 3 that is the main focus of this study.

METHODOLOGY

Research Process

Initially, literature review was conducted to answer first two research questions. Later, forty pre-planned-but unstructured interviews were conducted where the respondents were software project managers with an experience of five years or more from thirty different software houses in Pakistan.

Data Collection Method

Qualitative data collection method was adopted by conducting pre-planned-but-unstructured interviews.

Data Analysis Method

Qualitative data analysis method was used, such as (but not limited to) brain storming, and Ishikawa diagram, etc.

ANALYSIS AND RESULTS

Software Project Management Life Cycle spans over five phases; i.e., Initiation, Planning, Execution, Monitoring & Control, and Closing. The SPM life cycle covers a wide range of activities (to name a few): Appointment of Project Manager; Business Case Preparation; Award of Contract (this also includes outsourced contracts); then a number of activities in between; and, in the end, Issuance of Final Acceptance Certificate [2,7,8,9].

The advancements in science and technology have turned the world into a global village. In order to reduce the over-all project cost, many foreign companies outsource their software projects to developing countries. Even in SW Industry of Pakistan a major chunk of revenue is generated from the outsourced projects. During last ten to fifteen years, considerable efforts have been made at Government level to promote the SW industry. An increasingly growing opportunity is the acquisition of SW projects from the local public/private sector. The analysis presented below covers ExEEFs adversely affecting SPM for abovementioned two categories of projects. The Ishikawa diagram based upon the analysis is shown as Fig. 1, below. The contributing causes are explained in the ensuing paragrap

Vague Intellectual Property Rights

Intellectual property rights (IPR) are among the major institutions that influence the innovation—the very essence of competitiveness. The IP policy tool is grossly important to stimulate the economic growth, but IPRs are not adequately asserted in SW industry of Pakistan; besides, these are not easily prosecutable and enforceable. So, international investor has started losing confidence in Pakistan's SW industry. In this connection, following are the secondary causes.

A. Limited Outsourcing Due to Confidentiality Concerns

Vague IPRs raise the concerns of investors about breach of confidentiality. At times, only a small portion is outsourced instead of the complete project; or if India, Pakistan, and China bid for the same project, Pakistan is given the last priority.

B. Breach of Non-disclosure Agreements by Employees

Though NDAs are signed between the international investor and the software organizations; an employee may easily quit the job and join other company compromising the confidentiality of project. The company who has signed NDA would suffer and may not get any future projects.

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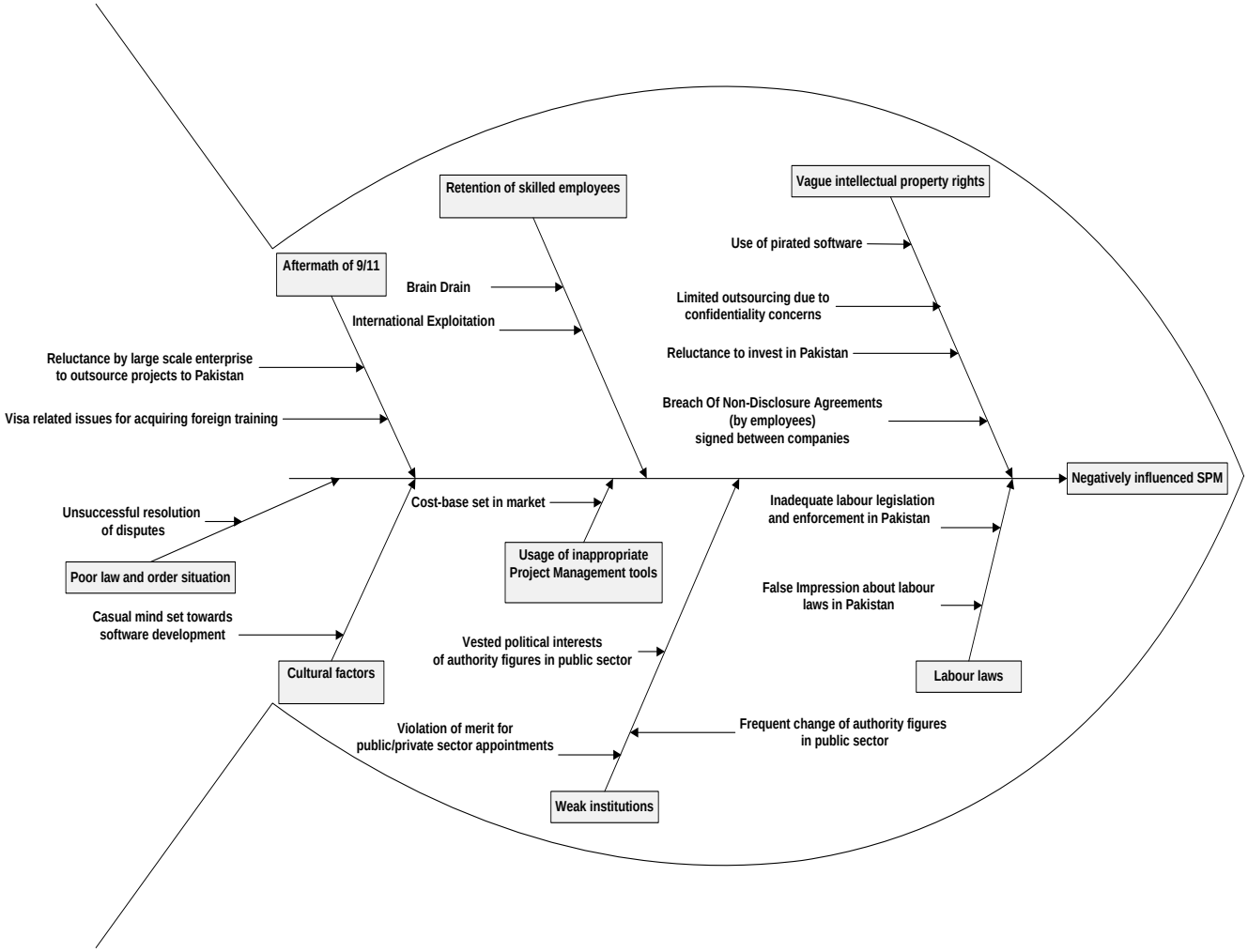

Figure 1. Ishikawa Diagram

C. Use of Pirated Software

Government is taking appropriate steps to curb the software piracy, but still there is lot more to do. The extract of Section 66 of Chapter XIV of the Copyright Ordinance 1962 is reproduced as below [15].

"The production, sale, copy, purchase or usage of unlicensed software is an offence, punishable and can lead to criminal prosecution for violation of the law."

To curb the piracy, FIA has recently launched raids on various companies for using unlicensed software [16]. On one side, this is an appropriate action but on the other side this gives a message to the international investor that piracy culture is largely prevailing in Pakistan. And their investments are constantly under threat until piracy practices are completely arrested.

Labour Laws

A. Inadequate Labour Legislation Pakistan

Software Industry is distinct from other industries, as it is largely influenced by the people—the human element. In developed countries, there is a strict enforcement of labor laws regarding classification of workers, working hours, working shifts, wages, leave and attendance; moreover, employees cannot be forced to work beyond the pre-defined timings. In Pakistan, although the labor legislation and its enforcement have gradually improved during last one decade, still this is not satisfactorily effective. Apropos, there is strong likelihood of human resource exploitation causing demotivation in employees.

B. False Impression About Labor Laws in Pakistan

Even though the labor laws and enforcement have gradually improved in Pakistan during last one decade, the foreign investors still think that these laws are very relaxed, and employees can easily be pushed to work for longer durations; moreover, good quality human resource can be acquired at cheaper rates for software projects. As an outcome of this false impression, the foreign investors try, and many times prevail as well, to outsource projects at a cheaper cost.

Problem in Retention of Skilled Employees

A. Brain Drain

Pakistan is facing a shortage of large-sized SW companies; hence there is a dearth of good opportunities for SW experts. Many experienced and skilled professionals are leaving the country to explore better avenues matching their skills. This phenomenon negatively influences the software project management as skilled human resource is not easily available for software projects.

B. International Exploitation

In this phenomenon, the prime contractor (i.e. international investor) outsources a project to Pakistan's SW Industry, after sometime identifies the core technical team-members and directly hires them at much higher wages, and finally terminates the outsourced contract by paying the damages. The international investor still can accomplish the project at a reduced cost despite paying the damages for breach of contract. This phenomenon adversely affects SPM in two ways: (1) skilled employees are taken away; (2) SW project is cancelled. A general measure taken by the local industry is to limit the employee's interaction with the client, but this in-turn causes following problems for the project management: software requirements are lost in translation as employee interacts with the client through project manager, variations occur in use-case scenario, and project faces time overrun and cost overrun.

Inappropriate Project Management Tools

High-end project management tools are very expensive and cannot be afforded by small and medium scale software organizations. Generally they go for one-size-fits-all option and use freely available open source project management tools like Redmine, etc. Due to financial limitations, the suitability of these tools to the project is given least consideration. If a software house wants to use the customized solutions for project management then client will be charged the cost of that solution. This will increase the base-price set by the other software houses in the market. For example, there is a stereotyping that a website development outsourced to Pakistan will cost 1000 $, so if a software house asks for a higher price, no matter how good quality work will be offered, they will not get the contract.

Aftermath of 9/11 Incident

A. Reluctance by Large Scale Enterprise to Outsource Projects to Pakistan

Before 9/11, Bangladesh, India, Pakistan were prime markets for software projects outsourcing. But after the incident the position of Pakistan has become weaker, and large-scale enterprises are generally reluctant to outsource projects to Pakistan.

B. Visa Related Issues for Acquiring Foreign Training

The visa issuance process, especially for United States and European countries, have become very cumbersome after 9/11 incident. In case if a foreign training is planned on some state-of-the-art software tool, the training process becomes lengthier due to visa-related issues, hence negatively affects the project schedule and budget.

Casual Mind-set Towards Software Development

This ExEEF is a cultural factor, i.e, software development projects are treated the same way as any other industry's projects, though former has a distinct flavor.

Weak Institutions

Institutionalization process is rather weak and slow in Pakistan that adversely affects all the disciplines.

A. Change of Authority Figures in Public Sector

In public sectors, due to politicized environment, sometimes quite a frequent change of authority figures is seen that adversely affects SPM. The authorities who approve the projects are different and those who accept the projects are different. As a result, the investment made by the vendors (i.e. software houses or IT companies) suffers, and even the accomplished projects are not fully utilized as the new authorities have little interest in the tasks accomplished by their predecessors.

B. Vested Political Interests of Authority Figures in Public Sector

In this phenomenon, an inappropriate hardware or equipment is procured from some foreign companies due to vested interests, and local SW companies are asked to adapt their already developed software solution to the inappropriate hardware. This affects budget, scope, and cost of the project.

C. Violation of Merit for Public/Private Sector Appointments

In private and public sectors of Pakistan, the prime-contractor (not to be confused with the end user of software product) who is outsourcing a project or part of the project to a software house, at times, lacks the requisite SW knowledge, as the pre-defined selection criteria is violated at time of their appointment. The lack of understanding adversely affects various software project management processes.

D. Poor Law and Order Situation

Disputes are pretty normal in projects, but their poor or unsuccessful resolution is alarming. Due to prevailing law and order situation in country, disputes linger on and thus SPM suffers.

CONCLUSION

The study identifies the external enterprise environmental factors negatively influencing software project management in Pakistan. Following main causes are identified: vague intellectual property rights; ineffective labor laws and enforcement; problem in retention of skilled human resource; aftermath of 9/11 incidents; culture of casual mind-set towards software development; weak institutions, i.e., violation of merit while appointing authority figures, etc.; and poor law and order situation in country.

RECOMMENDATIONS

- Adequate assertion of IPRs will help restore the confidence level of foreign investors for outsourcing projects to Pakistan SW industry. Government shall take appropriate steps to curb piracy but at the same time chalk out a strategy to acquire cheaper licensed software for local educational institutions, so that software skills development of students may not suffer. Open Source software, if available as an alternative for a particular project, seems a viable solution to seek: cost-effectiveness in software development; elimination of piracy culture; and assertion of IPR.
- Adequate labor legislation and enforcement will improve the motivational level of SW experts in Pakistan. This would also increase the opportunities to acquire projects from the foreign investors at a better cost.
- Government shall take steps to promote SW industry by generating better opportunities, so that 'Brain Drain' can be controlled and skilled human resource can be retained within the country.
- Adequate legislation is to be carried out to stop 'International Exploitation'.

- In order to generalize the research, a larger sample, collected from various cities of Pakistan, can be analyzed.

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