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# Proposed Model for Effective Implementation of IS Megaproject in an Emerging Economy

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**Abstract.** Like other megaprojects, IS megaprojects are also large-scale, complex ventures having long duration that involve multiple stakeholders from diverse interests, are transformational in nature, and impact large population. The challenges and complexities are accentuated in the case of IS megaproject, and significantly more so in an emerging economy. In the latter case, the national context of low technology and infrastructure, institutional voids, poor governance, and higher user resistance to technology adoption are often contributory factors.

The study aims at developing a conceptual model that links governance mechanisms and their influence on performance, usage, and success of IS megaproject. This is exploratory, qualitative research based on empirical evidence and uses the institutional theory framework. We have conducted 36 semi-structured interviews of the stakeholders of an IS megaproject in an emerging economy.

Through the analysis of the interview transcripts and the help of relevant literature, we identified seven antecedents to the IS megaproject performance, and a conceptual model of seventeen propositions among those eight constructs, and a total of 119 scale items for the measurement of those constructs. The conceptual model explains how norms and work practices governing the project get established, and influence IS megaproject performance. This study contributes both to the empirical and the theoretical body of knowledge.

**Keywords:** IS Megaproject, Performance, Institutional Theory, Conceptual Model, Scale Development.

## 1 Introduction

The increasing complexity in public service delivery, greater demands, and higher expectations from the citizens and enhanced technological capabilities have led to the expansion of areas, scope, and scale, of megaprojects over time. Recognizing the potential impact of the ICTs on the economy and society, active participation of government and public, IS megaprojects (ISMPs) have been receiving increased attention from the policymakers globally [13], and recently in the emerging economies [26].

ISMPs, while having all the characteristics of a megaproject, such as long duration, multiple stakeholders, complex, large-scale, high cost, and new technology [21, 29], also have additional characteristics typically associated with IS projects. These include time and/or cost overrun, inadequate utilization of potential benefits, and fast pace of

technological change [21, 29]. Such characteristics lead to additional challenges, modest success rates, and low adoption rates for ISMPs. Further, impediments in the design, implementation, and acceptance of ISMPs arise due to inertia and resistance from the users, which are the typical characteristics of any government organization [7]. As a result, challenges are accentuated in the case of ISMP, and often, the underlying challenges can neither be comprehended nor anticipated.

Over and above these factors, ISMPs in an emerging economy face significant challenges because the national context may lag in technology and infrastructure, be plagued with institutional voids, and the users may have higher resistance and inertia in adopting newer technologies [26].

## **2 Research Gaps**

There are very limited studies on ISMPs, especially in the context of emerging economies. In relation to organizations or projects, ISMPs are subject to changing institutional dynamics and organizational forms that serve as the main determinant of project performance, usage, and, eventually, success [5]. As per our knowledge and review of the literature, there are no scale items available for the measurement of antecedents and the performance, usage, and success of ISMPs.

## **3 Aim of the Study**

Recognizing this gap in the existing literature, the study aims at developing scale items that measure the governance mechanisms and their influence on performance, usage, and success of ISMP. We recognize that in the context of the network form of ISMPs, governance of the same emerges from the formal and informal rules of participating organizations, and interactions of the various stakeholders and organizations operating for the cause of the megaproject [8]. Adopting this perspective allows us to examine ISMPs as complex and embedded in institutional frames.

## **4 Methodology**

This is exploratory research in which we conducted 36 semi-structured interviews of the stakeholders of an ISMP in an emerging economy. We developed the scale items based on the analysis of these interview transcripts and review of the academic literature on megaprojects, IS projects, and other related research.

## **5 Project Background**

Indian Railways (IR) is considered as the lifeline of the nation responsible for the socio-economic growth of the country through the transportation of passengers and freight across the length and breadth of the country [19]. Freight transportation is more

important to IR's operation as it generates around 65% of its revenue. This segment generates profit for IR, which cross subsidizes the loss-making passenger services [5, 19].

Freight transportation through railways is more efficient, less expensive, and more environment-friendly than road transportation. Despite this, IR's share of freight transportation has come down close to 30% today, which used to stand at 90% in the post-independence era<sup>1</sup>. This falling share in freight traffic has been a cause of major concern on IR, and numerous initiatives and actions have been taken to improve upon the delivery of freight services. One of the plausible ways to control this downward trend involves the efficient utilization of freight assets, which includes technological innovations as well as the deployment of appropriate decision support systems and management information systems [6]. FOIS is one such initiative in this regard, and it has an inherent potential to improve the ease of doing business with railways. FOIS was initially conceived as an application to monitor the movement of freight trains on IR and track the wagons, locomotives. Today it has evolved as a complete freight operations management application, including the on-line freight calculation and generating & processing the billing. IR claims it to have played a major role in the increased efficiency of wagon utilization. The objective of the project is to fulfil the needs of the emerging Indian economy through efficient utilization & improved productivity of the assets and better customer services<sup>2</sup>.

## 6 Theoretical Background

Kipp et al. (2008) [21], compared the characteristics and literature of megaprojects with that of ISMPs. They found that there is a commonality in the characteristics and issues involved with megaprojects and ISMPs. Therefore, they suggest that existing knowledge and literature from the domain of megaprojects may be drawn to the field of ISMP. Omar and Elhaddadeh (2016) [28], have examined the role of actors and structures in the institutionalization process in ISMPs. They proposed conceptual framework based on institutional and structuration theory, which is focused on the institutionalization of changes in public sector organizations through IS.

The institutional logics influence transformations in the governance mechanisms and the established work practices of stakeholders. Understanding an ISMP is possible only through its examination from the institutional theory perspective by considering the influence of regulatory, normative, and cultural-cognitive factors [8]. The institutional theory views an organization from an "open systems" perspective; this is what the temporary organization implementing the ISMP is. In such temporary organizations, the environment does influence the organization, as is the usual case. Besides, atypically, the organization influences the environment [5]. This environment is a social construction having strong historical underpinnings [5]. The social exchanges of individuals and organizations under such an environment are governed by the rules determined by

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<sup>1</sup>Source: <https://www.financialexpress.com/economy/railway-traffic-increases-revenue-falls-in-2016-17/628801/>, last accessed 2020/07/30.

<sup>2</sup>Source: [http://fois.indianrail.gov.in/FOISWebPortal/pages/FWP\\_AboutFOIS.jsp](http://fois.indianrail.gov.in/FOISWebPortal/pages/FWP_AboutFOIS.jsp), last accessed 2020/07/30.

institutions [5]. Megaprojects are such temporary organizations that experience the paradox of embedded agency [25]. Although the agents are embedded in an institutional context, they can still manage to influence the context rather than their agency being influenced by the context [35]. The institutional theory explains how organizations interact with their environment to survive and thrive amidst all the competition and challenges thrown at them [9]. Because of these reasons, examining the megaprojects from an institutional theory perspective is an emerging research area. This includes the broader environment of the project, sponsorship, and governance [5, 35]. Because of these reasons, we used the institutional theory framework for the development of the conceptual model for ISMP.

## **7 Data Collection**

We conducted semi-structured interviews of the 36 stakeholders of the FOIS project. These stakeholders belonged to Top Management, Developer, Implementor, User (internal as well as external) and one Expert, who was a senior railway officer and a Ph.D. on complex projects and had a vast experience of executing and leading complex project. The majority of the respondents were government officials, with a large number of them occupying senior positions. Therefore, prior permissions from the competent authorities were obtained to safeguard the interests of the respondents and also demonstrate the same to them. The respondents were briefed about the research and assured about the confidentiality and anonymity of the data collected from them [15]. All the respondents willingly participated in the study and accordingly, the consent forms were signed by them. Institutional Review Board's approval was obtained to ensure that unethical means and practices were not adopted during the research study. All the interviews were audio-recorded with the permission of the respondents, and the average duration of the interviews was 33 minutes. The transcriptions were shared with the respondents, and they were asked to suggest any modifications if they wished to add or remove something from the transcriptions. This was done with the view of enhancing the validity of the data and to give an opportunity to the respondent to rephrase their statements [14].

## **8 Construct Identification**

### **8.1 Environment**

A number of respondents reported that ISMPs are influenced due to the environment, i.e., factors outside the implementing organization. Some of the environmental factors include evolving technological capabilities, growing expectations of the users, competition in the market, political influence and financial support from the government [5, 16, 20, 21, 23, 30, 41].

Coercive pressure from the government side was reflected in the statement of the project manager from the vendor side when she mentioned that "there were time pressure because the project was being monitored at the Ministry level." Normative pressure

operating from the environment was visible in the statement of the project manager from the implementing organization through, "any transporter not having a global picture, which is accurate, is no transporter." The project manager from the vendor side also mentioned that "they were losing their market share. So, that is why people realize; top management was involved." The project manager tried to convey that IR was losing its market share to road transport. Therefore, the top management of IR decided to go for FOIS. Our respondents also reported that ISMP for a transporter becomes necessary to have a global view of its operations and the assets, as this is the trend internationally. IS researchers have termed this environmental influence on the ISMP as institutional isomorphism [8].

## **8.2 Top Management Support**

The issue that most prominently emerged out of the analysis of the transcripts was that the top management support played a vital role in the ISMP. Top management refers to the key decision-makers, and their support to the ISMP is the crucial determinant for the initiative, implementation, and adoption. The top management was responsible for taking appropriate decisions that determine how the ISMP evolves and takes shape [1, 24].

The Director of the implementing organization mentioned during the interview that "the mandate is there from the top management only; then only it gets translated straight into the field." There were a large number of statements that repeatedly highlighted the role and importance of the top management support, and all class of stakeholders made such statements.

## **8.3 Core Team**

The interview respondents brought out that top management constituted the core team for the project with the deployment of the project leader at the helm. The project leader was a domain expert of the railway operations as well as having enough knowledge and experience of the IT systems. The project leader was given full freedom for the team selection, and there was no interference from the top management in the project and team-related matters. The project leader was acceptable to almost all the stakeholders, and he was able to take everyone along. The analysis of the interview transcripts brings forth that the core team should be competent and cohesive. And also, the core team members should be provided with a reasonably long tenure [34]. The respondents mentioned that the core team members should not be governed strictly by the norms of usual terms of tenure. Instead, they should be informed beforehand that they are responsible till the development of a specific module or submodule of the ISMP. The cohesiveness of the core team was also reflected in the statement of one of the implementors, "The way this project was launched by the team, it was like no other teams have done before. There was, no hierarchy barriers. There was, no seniority barriers. Everybody was sharing with everyone. So, team was very cohesive."

#### 8.4 IS/IT Governance

The respondents brought out during the discussions that the ISMP gave rise to the creation of new organizations, departments, and positions for the design, development, planning, and execution of the ISMP [5, 21]. The government and the implementing organization formulate various policies which are implemented through the ISMP. The implementing organization also comes up with policy initiatives that facilitate and overcome various impediments in the ISMP. The ISMPs also generate various capabilities that enable evidence-based policymaking in the implementing organization [16, 20, 40]. The General Manager of the implementing organization mentioned that "Whatever policy changes are taking place or, or, the type of improvement that railway wants to bring in, to improve the user-friendliness, the policy have to be aligned towards the requirement of the customers that is actually an ongoing process, depending on the changes in the environment and the requirement of the customers." One of the respondents, a FOIS user, mentioned about the project that "it has provided the evidence-based policymaking and thereby reducing any post facto scrutiny, etc."

#### 8.5 Contractual Governance

Our respondents reported that multiple stakeholders operating in the ISMP have well-defined roles and responsibilities. The formal rules provide an overarching contractual framework for day-to-day functioning and collaboration among stakeholders [33]. This framework of formal rules is termed as contractual governance [4, 22]. Based on formal rules and regulations, contractual governance explicitly defines the responsibilities of various stakeholders [39]. Contractual governance thus serves as a reference point for various transactions and interactions taking place [17]. One of the end-users mentioned during the interview that, "We have directly access because we have contract between CRIS and NTPC and whatever information we want, we approach to these people and if something new is required, for which, we can pay, and we can seek the information."

#### 8.6 Relational Norms

Megaprojects are network organizations involving multiple stakeholders from diverse organizations [37]. Coming together of these multiple stakeholders gives rise to new organizational norms, which are often different from the underlying organizations to which they originally belong. Due to the long-term association and regular interaction, combined with complex interrelationships and interdependencies among multiple stakeholders, informal rules tend to develop in the megaprojects [37]. These informal rules termed as relational norms are driven by shared beliefs, cultural practices, and social values [4]. Our respondents revealed that many times they resort to such practices that expedite the processes, e.g., one respondent mentioned that, "most of the cases, I've given my personal email also. If you are not able to reach to SBI email, okay, you send me on my gmail id and I used to take care of that."

## 8.7 Project Management

The respondents highlighted the importance of project management for megaprojects. Project management is defined as "the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements"[31]. It was brought out by the respondents that project management plays a key role in ensuring that the ISMP does not suffer from the time and cost over-run [11]. One respondent, who was the Member of the Railway Board, while talking about the role of project management mentioned that, "the project management now becomes a very important thing particularly for the railways because a lot of investments are coming up and mega investments are there." Effective project management of ISMPs builds around employing a professional approach and promoting economic and social development [2, 10]. Project management is responsible for deploying the necessary resources and skill sets to the ISMP, managing the risk, uncertainty and complexity, engaging the suitable vendors & contractors, and adhering to the delivery schedule [2, 11].

## 8.8 Project Performance

Based upon the interviews with the participants, we found that the traditional definition of the fulfillment of laid down goals & objectives and achieving the time, cost, and quality requirements of the project are the desirable criteria for defining the success of an ISMP [2]. The reason being that evolving technological capabilities and changing business needs, increase the expectations of the organizations as well as users [10, 13]. Ultimately, the user wants to have more and more control over the outcomes through the use of technology [3]. Additionally, ISMPs tend to bring more and more users to its fold. They lead to changes in the usage profile of the users. E.g., the traffic accounts branch and the statistics branch of IR were originally meant for registering and updating the freight revenue and the statistics of the freight operation. After the implementation of FOIS, all this information is readily available from the system. Now, their role has become more of an auditor to see and report if any malpractices are taking place in those areas.

Therefore, the goals and objectives of the ISMPs are not fixed. Because of the changing goals and objectives, the initial time, cost, and quality requirements do not remain relevant throughout the entire life cycle of the project. Though they are important, it is not plausible to monitor them rigidly because of the newer time, cost, and quality requirements that arise. Because of these changing goals & objectives and shifting time, cost, and quality requirements, user satisfaction is seldom achieved. As a result, user satisfaction in an ISMP may be strived for, but usually, it is never attained [36]. From this discussion, we concluded that the goals & objectives, time, cost and quality requirements, and user satisfaction are the desirable criteria for an ISMP. Though, these are important but not the necessary conditions.

Some of the implementors and users suggested that a successful system is one, which is indispensable, i.e., the user cannot work without the system or the total dependence on the system. However, the closer examination of the ISMPs reveals that every successful system is indispensable, but every indispensable system may not be necessarily



successful. Due to the scale and magnitude of the operations, it may not be practically possible to carry out the functions without the help of the system, as is the case with FOIS. Without entering into the debate of FOIS being a successful project or not, today, it is unimaginable for any user to work without the FOIS.

Some of the participants suggested that the acceptance of the system by the users is one of the dimensions to evaluate the success of the ISMP. However, if the system is not acceptable to a large number of users, they would reject the system. And the developers would be forced to make suitable and relevant changes in the system [3]. Therefore, user acceptance is the fundamental criteria to evaluate ISMPs. The customer-centric approach and benefits to the users as well as organizations are the two dimensions that almost all the participants have agreed as the key criteria for evaluating an ISMP. Implementors and users have highlighted that usefulness and ease of use are also vital dimensions to evaluate ISMP.

Continuous evolution and up-gradation of the system is a dimension which only a few of the participants have recognized as a criterion to evaluate the ISMP. However, we realized that this is an area that is very important for the ISMP. Otherwise, it would become irrelevant and obsolete in no time. Therefore, a successful ISMP is one that is regularly updated in terms of the software as well as hardware with the reasonably latest technologies [2].

From the above discussions, we realized that the evaluation of the success of an ISMP is a subjective continuum that has user acceptance at the one end and the satisfaction at the other end. In between, there are objective criteria like achieving the goals and objectives, fulfilling the time, cost and quality requirement, and the subjective criteria like indispensability, usefulness, ease of use, benefit, and up-gradation.

## 9 Development of Propositions

The analysis of interview transcripts revealed that the external environment operates on the ISMP through the top management, formulation, and implementation of various policies influencing ISMP. The respondents reported that monitoring of the ISMP by the government exerts pressure on the top management and leads to their greater involvement and participation in the project [16, 23, 41]. The analysis of the interview transcripts also revealed that ISMPs serve the means of IT initiatives implementation of the government [20, 28, 41]. The respondents brought out that the environment influences IS/IT Governance through the formulation and implementation of the policies, which give rise to the increase in the goals and scope of the ISMP [16, 20, 40]. The above arguments lead us to formulate the following propositions.

*P1. Environment influences top management support,*

*P2. Environment influences the core team, and*

*P3. Environment influences IS/IT Governance.*

According to our respondents, the top management support is responsible for the deployment of the core team for the ISMP, formulation of the necessary structures, processes and policies, and the conflict resolution [16, 24, 34, 41]. The constitution of

the core team also depends upon the environmental factors. At the same time, top management keeps coming with various policy initiatives that aim at facilitating the ISMP through the creation of various organizations, departments, positions, and processes [1, 18, 41]. From the above discussion, we arrive at following propositions:

*P4. Top management support influences the core team, and*

*P5. Top management support influences IS/IT Governance.*

The relational norms serve as an informal control mechanism in the ISMPs and help the top management, core team, and the project management to exert control during their interaction with the ISMP stakeholders [24]. Cohesion, commitment, and the long-term association of the core team influence these relational norms [12]. At different hierarchical levels, top management support and project management also resort to informal practices and processes during their interaction with the stakeholders [12]. Therefore, we propose:

*P6. Core team influences relational norms*

*P7. Top management support influences relational norms, and*

*P8. Project management practices influence relational norms.*

During the interview, the project managers mentioned that they can achieve and perform because of the top management support [1, 10]. The respondents indicated that a committed, competent and a cohesive team helps the project management in decision-making, risk apportionment, complexity handling, and stakeholder management [30, 34]. Based on this discussion, we have the following propositions:

*P9. Top management support influences project management practices, and*

*P10. The core team influences project management practices.*

Project management is directly responsible for the award and execution of various tenders and contracts, and the top management is involved in finalizing the MOU's with other ministries and state governments [24]. Therefore, we propose the following:

*P11. Project management practices influence contractual governance, and*

*P12. Top management support influences contractual governance.*

New policies are formulated and implemented to tap the potentials generated through the ISMPs, which give rise to new contracts, e.g. e-Payment module of FOIS has given rise to tripartite contracts between banks, freight customers and IR. Therefore, we propose:

*P13. IS/IT Governance influences contractual governance.*

ISMPs usually have long term association with the vendors, contractors, and other stakeholders, and their interactions are not necessarily driven by the contract conditions or the formal rules itself. The respondents revealed during the interview that vendors try to prove their credentials, through their association with the ISMP [13, 16]. Therefore, we propose:

*P14. Relational Norms influence contractual governance.*

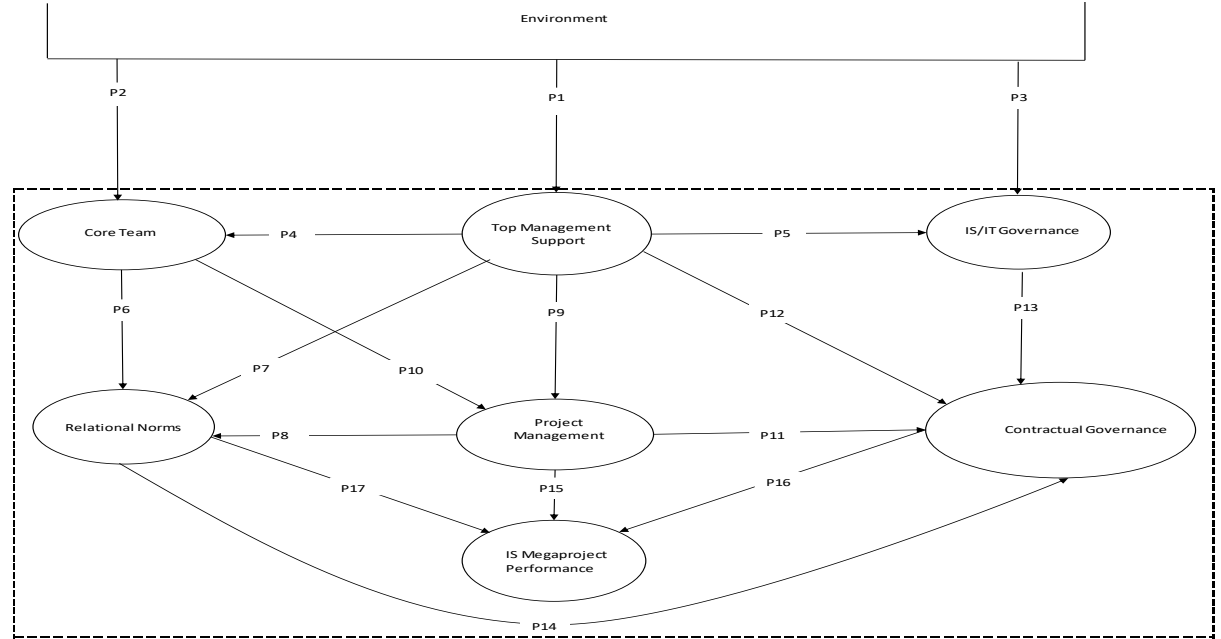
Project management, contractual governance and relational norms influence the project performance [4, 11, 12]. Therefore, we propose:

*P15. Project management practices influence ISMP performance,*

*P16. Contractual governance influences ISMP performance, and*

*P17. Relational Norms influence ISMP performance.*

Based on the above discussion and combining all the 17propositions, we propose the conceptual model, as shown in Figure 1, for ISMP in an emerging economy.



**Fig. 1.** Conceptual Model of IS Megaproject

## 10 Scale Items

For the measurement of eight constructs as discussed above, a total of 119 scale items were developed. These scale items are given separately in Appendix-I. The scale items were adapted to our context by modifying the original scale items based on the analysis of interview transcripts.

## 11 Contribution

Through the analysis of the interview transcripts and the support of related literature, we have developed a conceptual model for ISMP in an emerging economy. The model embedded in the institutional theory framework explains how the environmental factors influence ISMP, what is the significance of the top management support, how the policies, structures, and processes are formulated and implemented that influence the ISMPs. What are the formal and informal control mechanisms in an ISMP, and how do they interact?

As per our knowledge and the review of available literature, these aspects have not been studied before in the context of ISMP. Therefore, our study makes a unique contribution to the field of ISMP.

## 12 Limitation and Future Research

The conceptual model has been developed primarily based on the analysis of the interview transcripts of ISMP stakeholders. Therefore, its validity and generalizability is limited to a similar context [42]. This is an exploratory study, and the findings need to be confirmed through empirical and confirmatory studies.

As the next step to this research, we intend to collect survey responses from the ISMP stakeholders and test the proposed relationships delineated in the model.

## References

1. Ashja, M., Moghadam, A. H., Bidram, H.: Comparative study of large information systems' CSFs during their life cycle. *Information Systems Frontiers*, 17(3), 619-628 (2015).
2. Barclay, C.: Towards an integrated measurement of IS project performance: The project performance scorecard. *Information Systems Frontiers*, 10(3), 331 (2008).
3. Barki, H., Paré, G., Sicotte, C.: Linking IT implementation and acceptance via the construct of psychological ownership of information technology. *Journal of Information Technology*, 23(4), 269-280 (2008).
4. Benítez-Ávila, C., Hartmann, A., Dewulf, G., Henseler, J.: Interplay of relational and contractual governance in public-private partnerships: The mediating role of relational norms, trust and partners' contribution. *International journal of project management*, 36(3), 429-443 (2018).
5. Biesenthal, C., Clegg, S., Mahalingam, A., Sankaran, S.: Applying institutional theories to managing megaprojects. *International Journal of Project Management*, 36(1), 43-54 (2018).
6. Boysen, N., Fliedner, M., Jaehn, F., & Pesch, E.: A survey on container processing in railway yards. *Transportation Science*, 47(3), 312-329 (2013).
7. Clegg, C., Shepherd, C.: The biggest computer programme in the world... ever!': Time for a change in mindset? *Journal of Information Technology*, 22(3), 212-221 (2007).
8. Currie, W. L., Guah, M. W.: Conflicting institutional logics: a national programme for IT in the organisational field of healthcare. *Journal of Information Technology*, 22(3), 235-247 (2007).
9. DiMaggio, P. J., Powell, W. W. The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American sociological review*, 147-160 (1983).
10. Eom, M. T., Wu, W. W., Preston, D. S., Luftman, J. N.: Effective IT Project Leadership. *MIS Quarterly Executive*, 19(2), 6 (2020).
11. Eriksson, P. E., Larsson, J., Pesämaa, O.: Managing complex projects in the infrastructure sector—A structural equation model for flexibility-focused project management. *International journal of project management*, 35(8), 1512-1523 (2017).

12. Eskerod, P., Vaagaasar, A. L.: Stakeholder management strategies and practices during a project course. *Project Management Journal*, 45(5), 71-85 (2014).
13. Flyvbjerg, B.: What you should know about megaprojects and why: An overview. *Project management journal*, 45(2), 6-19 (2014).
14. Forbat, L., Henderson, J.: Theoretical and practical reflections on sharing transcripts with participants. *Qualitative Health Research*, 15(8), 1114-1128 (2005).
15. Gill, P., Stewart, K., Treasure, E., Chadwick, B.: Methods of data collection in qualitative research: interviews and focus groups. *British dental journal*, 204(6), 291-295 (2008).
16. Goo, J., Kishore, R., Rao, H. R., Nam, K.: The role of service level agreements in relational management of information technology outsourcing: an empirical study. *MIS quarterly*, 119-145 (2009).
17. Hart, O., & Moore, J.: Contracts as reference points. *The Quarterly journal of economics*, 123(1), 1-48 (2008).
18. Jewer, J., McKay, K. N.: Antecedents and consequences of board IT governance: Institutional and strategic choice perspectives. *Journal of the Association for Information Systems*, 13(7), 1 (2012).
19. Jha, U. S.: Indian Railways contribution to Indian Economy. *Sankalpa*, 8(1), 122-130 (2018).
20. King, A., Crewe, I.: *The blunders of our governments*. Simon and Schuster (2014).
21. Kipp, A., Riemer, K., Wiemann, S.: IT mega projects: What they are and why they are special (2008).
22. Krishnan, R., Geyskens, I., Steenkamp, J. B. E.: The effectiveness of contractual and trust-based governance in strategic alliances under behavioral and environmental uncertainty. *Strategic Management Journal*, 37(12), 2521-2542 (2016).
23. Liang, H., Saraf, N., Hu, Q., Xue, Y.: Assimilation of enterprise systems: the effect of institutional pressures and the mediating role of top management. *MIS quarterly*, 59-87 (2007).
24. Liu, G. H., Wang, E. T., Chua, C. E. H.: Leveraging social capital to obtain top management support in complex, cross-functional IT projects. (2015).
25. Lundin, R. A., Arvidsson, N., Brady, T., Ekstedt, E., Midler, C., Sydow, J.: *Managing and working in project society*. Cambridge university press (2015).
26. Miller, R., Lessard, D. R.: *Evolving strategy: risk management and the shaping of mega-projects* (pp. 145-72). Cheltenham: Edward Elgar (2008).
27. Newcomer, K. E., Hatry, H. P., Wholey, J. S.: Conducting semi-structured interviews. *Handbook of practical program evaluation*, 492 (2015).
28. Omar, A., & Elhaddadeh, R.: Structuring institutionalization of digitally-enabled service transformation in public sector: Does actor or structure matters? (2016).
29. Patanakul, P.: Managing large-scale IS/IT projects in the public sector: Problems and causes leading to poor performance. *The Journal of High Technology Management Research*, 25(1), 21-35 (2014).
30. Patanakul, P., Kwak, Y. H., Zwikael, O., Liu, M.: What impacts the performance of large-scale government projects?. *International journal of project management*, 34(3), 452-466 (2016).
31. Pmi, A.: *Guide to the Project Management Body of Knowledge*. In *Project Management Institute* (Vol. 130) (2004).
32. Pucher, J., Korattyswaroopam, N., Ittyerah, N.: The crisis of public transport in India: overwhelming needs but limited resources. *Journal of public transportation*, 7(4), 1 (2004).

33. Qiu, Y., Chen, H., Sheng, Z., Cheng, S.: Governance of institutional complexity in megaproject organizations. *International Journal of Project Management*, 37(3), 425–443 (2019).
34. Scott-Young, C., Samson, D.: Project success and project team management: Evidence from capital projects in the process industries. *Journal of Operations Management*, 26(6), 749–766 (2008).
35. Söderlund, J., Sydow, J.: Projects and institutions: towards understanding their mutual constitution and dynamics. *International Journal of Project Management*, 37(2), 259–268 (2019).
36. Tesch, D., Miller, R., Jiang, J. J., Klein, G.: Perception and expectation gaps of information systems provider skills: the impact on user satisfaction. *Information Systems Journal*, 15(4), 343–355 (2005).
37. Van Marrewijk, A., Clegg, S. R., Pitsis, T. S., Veenswijk, M.: Managing public–private megaprojects: Paradoxes, complexity, and project design. *International journal of project management*, 26(6), 591–600 (2008).
38. Wang, D., Fang, S., Li, K.: Dynamic changes of governance mechanisms in mega construction projects in China. *Engineering, Construction and Architectural Management* (2019).
39. Williamson, O. E.: *The economic institutions of capitalism*. New York: Free Press (1985).
40. Winch, G.: Megaproject stakeholder management. *The Oxford handbook of megaproject management*, 339–361 (2017).
41. Xue, Y., Liang, H., Boulton, W. R.: Information technology governance in information technology investment decision processes: The impact of investment characteristics, external environment, and internal context. *MIS quarterly*, 67–96 (2008).
42. Yin, R. K.: Validity and generalization in future case study evaluations. *Evaluation* 19, no. 3, 321–332 (2013).

## 13 Appendix

Sr. No.	Item
<b>A</b>	<b>Environment</b>
1	The Government of India (GoI) is determined for digitalization in the service delivery.
2	Freight customers need Indian Railways (IR) to develop FOIS.
3	The competitive environment in the transport sector compels IR to develop FOIS.
4	The GoI has supported the FOIS project.
5	The government plays a significant role in building a harmonious relationship among stakeholders of the FOIS project.
6	The GoI implements policies that promote coordination among multiple stakeholders of the FOIS project.
7	The freight customers are making extensive use of IT.
8	IR aspires for improvement in service delivery through FOIS.
9	IR aspires for improvement in operational efficiency through FOIS.
10	GoI's promotion of IT influences IR's decision to develop FOIS.

- 11 Transporters use IT to compete against each other.
- 12 Successful transporters are making good use of IT.
- 13 It is common for large organizations to use IT increasingly.

**B Top Management Support**

- 14 Railway Board actively implements policies that push for the use of FOIS.
- 15 Railway Board has a firm belief in FOIS that it will be significantly beneficial.
- 16 Railway Board is committed to provide the necessary resources for FOIS.
- 17 Railway Board has clear cut plans to enhance the capabilities of FOIS.
- 18 Railway Board has clear cut plans to increase the usage of FOIS.
- 19 The FOIS project has never experienced funding constraints.

**C Core Team**

- 20 The core team is competent to accomplish the FOIS project tasks.
- 21 The core team has acquired the necessary skills required for the FOIS project.
- 22 The core team is competent to handle various challenges of the FOIS project.
- 23 The core team does not believe in hierarchy.
- 24 The core team does not follow bureaucratic processes.
- 25 The core team members are integrated as one team.
- 26 The core team members are focused on the project.
- 27 The core team members are committed to the success of the FOIS project.
- 28 The core team members are dedicated to ensure that the FOIS project achieves its objectives.
- 29 The core team members work hard to take along all the project stakeholders.

**D IS/IT Governance**

- 30 There is a process in place for planning the IT initiatives in IR.
- 31 There is a process in place to monitor the IT implementation in IR.
- 32 There is a process in place to monitor the performance of IT implementation in IR.
- 33 Necessary organization has been created for the IT implementation in IR.
- 34 Necessary department has been created specifically for the implementation of IT on IR.
- 35 Necessary posts have been created specifically for the implementation of IT on IR.
- 36 There is a regular structure in place for the audit of IT implementation in IR.
- 37 IR's IT implementation decisions are in line to achieve organizational goals.
- 38 IR's IT implementation decisions have helped the organization to deliver better services to freight customers.
- 39 IR's IT implementation decisions have helped to reduce the cost of operations.

**E Contractual Governance**

- 40 Past association with the vendors/contractors helps the smooth execution of the project related contracts.

- 41 The vendors/contractors are committed to the success of FOIS.
- 42 There exists mutual trust among the stakeholders belonging to CRIS, IR, and vendors/contractors.
- 43 FOIS related contracts are well defined.
- 44 FOIS related MOU's are well defined.
- 45 There is clarity about the project scope.
- 46 There is clarity about the goals of the project.
- 47 The contract conditions attempt at minimizing the uncertainties in the FOIS Project.
- 48 The contract conditions attempt at minimizing the risks in the FOIS Project.

#### **F Relational Norms**

- 49 The stakeholders are committed to improvement in the FOIS.
- 50 The stakeholders are eager to help each other whenever the need arises.
- 51 The vendors/contractors feel that CRIS is reliable and trustworthy.
- 52 The vendors/contractors are committed to the success of FOIS.
- 53 Concerned stakeholders participate in decision-making.
- 54 CRIS regularly asks feedback from users for improvement in FOIS.
- 55 The stakeholders are contributing to improve FOIS in accordance with their specific potential.
- 56 Project related urgent information exchange across the stakeholders takes place informally.
- 57 Information exchange across the stakeholders takes place frequently.
- 58 Concerned stakeholders are informed about the event or changes that may affect them.

#### **G Project Management**

- 59 Project management is concerned about the business requirements of IR.
- 60 Project management regularly interacts with users.
- 61 Project management is considerate about the business requirements of freight customers.
- 62 Project management is aware of the technological changes taking place in the environment.
- 63 Project management explores various technological options before arriving at a technology decision.
- 64 Project management continuously looks for new opportunities for the improvement in FOIS.
- 65 Project management is concerned about the smooth implementation of the FOIS modules.
- 66 Project management has successfully managed the changes in the project scope.
- 67 Project management has successfully delivered FOIS that satisfies new and changing demands.
- 68 Project management is responsible for deploying suitable persons on the project.



- 69 Project management is responsible for engaging suitable vendors/contractors for the project.
- 70 Project management is responsible for upgrading the skills of project persons.
- 71 Project management is responsible for the breakdown of the project complexity into the manageable chunks.
- 72 Project management is responsible for updating FOIS architecture.
- 73 Project management is responsible for evaluating user requirements.
- 74 Project management regularly interacts with vendors/contractors.
- 75 Project management continually monitors the progress of the project.
- 76 Project management establishes a schedule of various project activities.

#### **H Project Performance**

- 77 The FOIS project is beneficial to IR.
- 78 The FOIS project is beneficial to freight customers.
- 79 FOIS has led to an improvement in IR's capability.
- 80 The outcomes of the FOIS project are aligned with the expectations.
- 81 The FOIS project has been delivered with minimum disruptions to the freight operations of IR.
- 82 It is not possible to carry out freight operations without FOIS.
- 83 The users are dependent on FOIS.
- 84 Freight operations managers are dependent on FOIS.
- 85 Freight customers are dependent on FOIS.
- 86 When I can do a task using FOIS, I will sometimes choose to use other ways to complete the task.
- 87 When given a choice between using or not using FOIS for a task, I usually choose not to use it.
- 88 FOIS is useful for its users.
- 89 FOIS has made it easier for users to perform their job.
- 90 FOIS is useful for freight customers.
- 91 FOIS is easy to use.
- 92 Learning to use FOIS is easy.
- 93 It is easy to become a skillful user of FOIS.
- 94 The FOIS hardware is regularly upgraded.
- 95 The FOIS software is regularly upgraded.
- 96 The FOIS system architecture is regularly upgraded.
- 97 Technological evolutions are suitably adopted in FOIS.
- 98 Technological capabilities of FOIS are continuously enhanced.
- 99 FOIS architecture permits information filtering.
- 100 FOIS architecture permits on-demand information delivery.
- 101 FOIS provides personalized services to freight customers.
- 102 FOIS attempts to fulfill the expectations of freight customers.

- 103 FOIS provides customized information to freight customers.
  - 104 FOIS is acceptable to freight customers.
  - 105 FOIS is acceptable to freight operations manager.
  - 106 FOIS is acceptable to the top management of IR.
  - 107 FOIS project satisfies the need of the users.
  - 108 FOIS provides reliable information.
  - 109 FOIS provides accurate information.
  - 110 FOIS provides relevant information.
  - 111 CRIS employees have a positive attitude towards users' grievances.
  - 112 Users readily grab new additions to FOIS.
  - 113 Users often suggest modifications in the existing FOIS.
  - 114 FOIS provides sufficient information.
  - 115 FOIS provides adequate information.
  - 116 Users have confidence in FOIS.
  - 117 FOIS has achieved its goals.
  - 118 FOIS has achieved its short-term objectives.
  - 119 FOIS long-term objectives are being strived for.
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