

Trust Room's of Manoeuvre Lasting Communication In Distributed Product Development Projects

غرفة الثقة في المناورة الدائمة للاتصال في المشاريع الموزعة لتطوير المنتجات

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Abstract:

The complexity of distributed development projects is making the communication process confused between the interactive networks of stakeholders risks. To solve this problem, the paper builds a Design Structure Matrix to model the communication frequency based on trust among stakeholders. Further, it ranks the most influencing stakeholder. An industrial example is provided to illustrate the proposed model. Results indicated that trust moderates the communication frequency among distributed stakeholders.

keyword: Communication; Product development project ; Stakeholder risks ; Trust

JEL classification code : M10

ملخص:

تعقيد مشاريع التنمية الموزعة يجعل عملية الاتصال مشوشة بين الشبكات التفاعلية لمخاطر أصحاب المصلحة. لحل هذه المشكلة ، يبني المقال مصفوفة بنية التصميم لنمذجة تردد الاتصالات بناءً على الثقة بين أصحاب المصلحة. علاوة على ذلك ، فإنه يصنف صاحب المصلحة الأكثر تأثيراً. يتم تقديم مثال صناعي لتوضيح النموذج المقترح. أشارت النتائج إلى أن الثقة معتدلة وتيرة الاتصالات بين أصحاب المصلحة الموزعة.

الكلمات المفتاحية : الاتصال ؛ مشروع تطوير المنتج ؛ مخاطر أصحاب المصلحة ؛ الثقة

تصنيف JEL : M10

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1. Introduction :

An effective organizational structure of Global Product Development (GPD) architecture makes it easier for teams (e.g., stakeholders) to exchange important information by collocating and establishing coordination mechanisms among the most highly interactive teams (Yang et al., 2015; Browning, 2016). In GPD projects, efficient online communication among stakeholders becomes more sophisticated when they perform interdependent activities across spatial barriers (i.e., different locations) and temporal barriers (i.e., different time zones) (Derakhshan et al., 2019; Yang et al., 2015).

Researchers such as Mazur et al. (2014) have revealed that behavioral skills and competencies, more specifically emotional intelligence (EI), defined as the ability to be aware of, to manage, and to understand emotions in self and others, can affect the outcomes of major projects. Rezvani et al. (2016), for instance, found that managers with high levels of EI are more motivated to become involved in effective communications and are more creative regarding complex tasks, resulting in increased chances of project success in major projects.

Although research (e.g., Rezvani et al., 2016) has shown the importance of EI to the achievement of successful outcomes. The project management literature is replete with unsubstantiated generalizations, with much of the existing evidence bearing on the role of EI for project managers. As such, this literature appears to have overlooked the assessment of EI for project team members. Research on non-project based organization has shown further that team EI can enhance team members' ability to communicate with one another, to be open to opposing views, ideas, and to use emotion to increase team decision-making and performance (e.g. Troth et al., 2012).

The Design Structure Matrix Method proposed by Steward (1981) is adopted in this study to facilitate the link identification process. This approach has been widely recognized by researchers as an efficient tool to depict and assess interrelations among units using a matrix format (Browning, 2016). This step defines the links in the project risk network relying on trust and communication, which represent the impact between two units. The next section will introduce the DSM and how it can be used to analyse stakeholder-associated risks within Online communication.

It is evident that stakeholder management procedures at the micro level of distributed PD projects have not been fully evaluated and, to date, the understanding of the project impact at the local community level and how this can be minimized through a more inclusive approach to stakeholders' engagement remains marginal. This study consolidates the disparate literature to identify the issues which have prevented, to date, a full integration of a holistic approach to stakeholder engagement in global PD projects.

2. Research Model : Material and Method

First, the risk sources in GPD project are analyzed with the identification of associated project stakeholders. Second, the stakeholder-associated risks in the project are viewed as interdependent rather than independent, autonomous units. Third, the impact of the risks is quantitatively calculated based on their communication frequency-related risk. Finally, the interfaces of different project stakeholder groups are analyzed in the DSM.

By identifying the directions of influence in the entire risk, project managers can conduct systemic analysis, communicate with internal and external project stakeholders about the influential risks, and develop risk response or mitigation strategies accordingly. In essence, the application of the DSM perspective to investigate the patterns of stakeholder-associated risk networks as well as the forces which shape these patterns, and unlocks trust interactions inside the project's whole relationship network. All of these are intended to provide a rationale for stakeholder communication and trust response strategies and facilitate the decision-making process in GPD project management.

Therefore, the main theoretical background for this study draws on stakeholder theory, which is a recognized framework for analyzing the behavioral aspects of the project management process (Sutterfield et al., 2006). Taking into account the needs and requirements of both primary and secondary project stakeholders as an essential contributing element to better project performance provides a solid basis for stakeholder identification, classification and assessment (Flyvbjerg, 2014), which are the first steps required for effective stakeholder engagement (Reed, 2008).

The dependency strength of distributed teams is defined as the collaborative intensity between teams to cultivate mutual and collective expectations, perceptions, and norms of behaviour with their associates

while performing common activities. Trust in the stakeholder team can originate from members' beliefs regarding their team. Members are also likely to develop shared notions of trust through continuing collaboration (Gillespie & Mann, 2004). Especially in the context of globally distributed projects, where ambiguity, uncertainty, and interdependency are high, trust is therefore likely to increase the ability of stakeholders to be vulnerable to the actions of another party and to confide in teams to share information and greater cooperation (Stephens & Carmeli, 2016). The Communication Dependency Strength (CDS) between stakeholders is associated with the overlapping process among their communication as expressed in the equation (1).

$$CDS = \ln(\alpha \times T_{ov} \times SCF + 1) + \lambda_0 \quad (8)$$

where λ_0 represents the degree of inherent communication frequency that is expressed during asynchronous working time. T_{ov} is the overlapping time between team's activities (Yang et al., 2015). The parameter α represents the trust in teams. We used five items (ordinal variables) interpersonal trust scale developed by Cook and Wall (1980) designed to reflect trust in the team. We used this scale because it is the most widely used measure of interpersonal trust and, based on previous studies (e.g. Costa & Anderson, 2011; Tsai et al., 2012), it shows good psychometric properties.

SCF is the synchronous communication frequency occurring at the same time due to geographical distance of teams, which is based on eight media assessed: 'Face-to-face', 'Phone or Voice mail', 'Teleconference', 'Email', 'E-room/Network file share', 'Net Meeting', 'Video-conferencing', and 'Instant messaging'. The response scales ranged from 'Never' (1), 'About once a day' (2), 'About 2-3 times per day' (3), 'About 4-5 times per day' (4), to 'Almost continuously' (5). The sum of these eight communication media items was calculated to respond to the total frequency of communication.

In particular, we argue that individuals with a high level of emotional intelligence are more likely to trust in their colleagues (Sy et al., 2006). Consequently, higher levels of trust should lead to higher levels of communication (Rezvani et al., 2016). Thus, we empirically test a set of theoretically derived equation (1) regarding trust as a

motivator of higher dependency strength among virtual teams. Finally, an involvement degree matrix is defined as step 3 of Figure 1 after calculating the relative communication dependency in Step 2. $ID(I,i)$ is defined as the ratio of a stakeholder communication effort to perform activity i to its entire communication effort to perform all activities involved.

An illustrative example at CEVITAL Group in Algeria was chosen because they present high level project complexities, which make its stakeholder and risk analysis more meaningful in the environment of trust, due to the complex relationships in the projects, and the project managers had challenges managing them. The data was collected by workshops which was organized to identify the internal and external stakeholders and their associated risks in the project. Eight project team members attended the workshop including project managers, consultant engineer, main contractor and end users. The workshop participants contributed to the development of communication strength dependency matrix.

Table 1 is showing the stakeholder's frequency based on their nature of risk in the distributed project with other stakeholders. This table is an input of the DSM matrix to calculate the CDS as shown in step 1 of Figure 1, where 24 stakeholders are identified to perform 46 activities of the project.

Table 1 : Summary of risks and stakeholder groups identified in CEVITAL project

Stakeholder category	Stakeholder	Number Of risks	Risk category
Client	IBR, IFR, NUMILOG CANDIA, DANONE, SOUMMAM	8	Cost Time Quality/technical

				Environment
				Ethical/reputation
				Ethical/reputation
				Quality/technical
				Organization and management
Contra				
ctor				
	FTJA	6		Cost
				Time
				Quality/technical
				Environment
				Safety
				Quality/technical
Subcon				
tractor	4 Subcontractor	3		Cost
and				
supplie				
r	and supplier			
				Time
				Quality/technical
End				
user	IBR and its staff	3		Cost
				Safety
				Organization and management
Govern				
ment	Local			
	government for	1		Policy and standards
	building			
	approval			
	Local			
	government for	1		Policy and standards
	green			
	certificate			
	approval			
Comm	Green building	1		Ethical/reputation

unities			
	committee		
Compe	2 Other		
titors	consultants	2	Quality/technical Environment
Assess			
ors/	8		
Certifi	Assessors/certifi		
es	es	1	Ethical/reputation

Source: illustrated by the author

3. Results and Discussion :

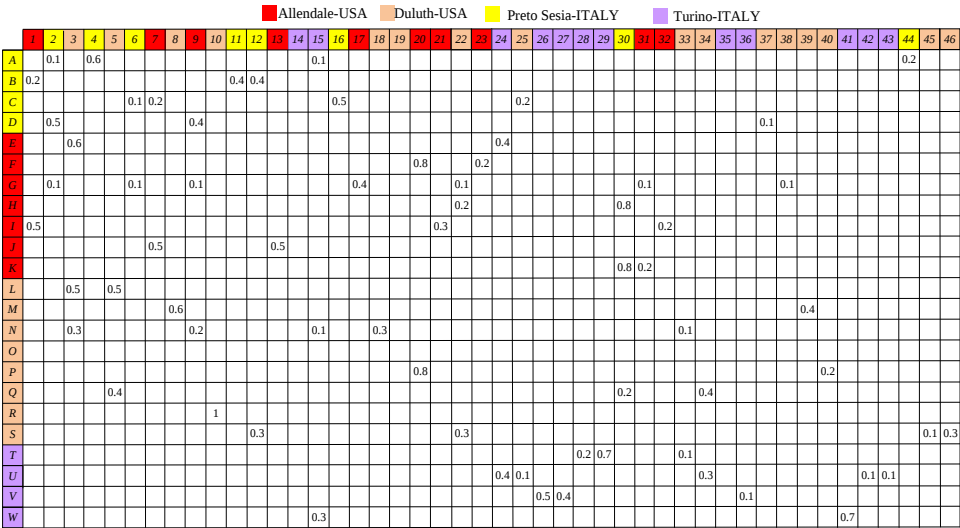
The result of the matrix below (Fig.1) could provide the project manager with an appreciation of how a stakeholder is influencing the activities. In fact, the number of performed teams resulting from the communication exchanged and the higher level of trust with other stakeholders show the more integrated risks by a stakeholder. In this case, the stakeholder G is the most influencing because it shares larger number of activities which are geographically distributed. The study of project risk management extends previous project management studies considered the governance environment as macro risk, such as policy risk and political risk (Wang et al., 1999). Those studies used case studies, questionnaires, or interview methods to discuss risk identification (e.g., policy risk, demand risk, and construction risk), risk evaluation, risk allocation, risk management, and how each risk impacts private investment respectively (Ke et al., 2009; Loosemore, 2007; Keers and van Fenema, 2018; Shrestha et al., 2017). However, those different kinds of risk may interact with each other and transmit risk. For example, macro-risk (e.g., policy risk and political risk) may affect micro-risk allocation (e.g., demand risk and construction risk). Thus, this paper used a large-N sample to test risk interactions. The findings have enriched previous PPP risk studies in the project management literature by showing the interaction between macro and micro risks.

Figure 2 shows the status centrality map in the GPD project. The risk impacts decrease along with the distance between the open online communication relaying on trust (node) and the central of the circle.

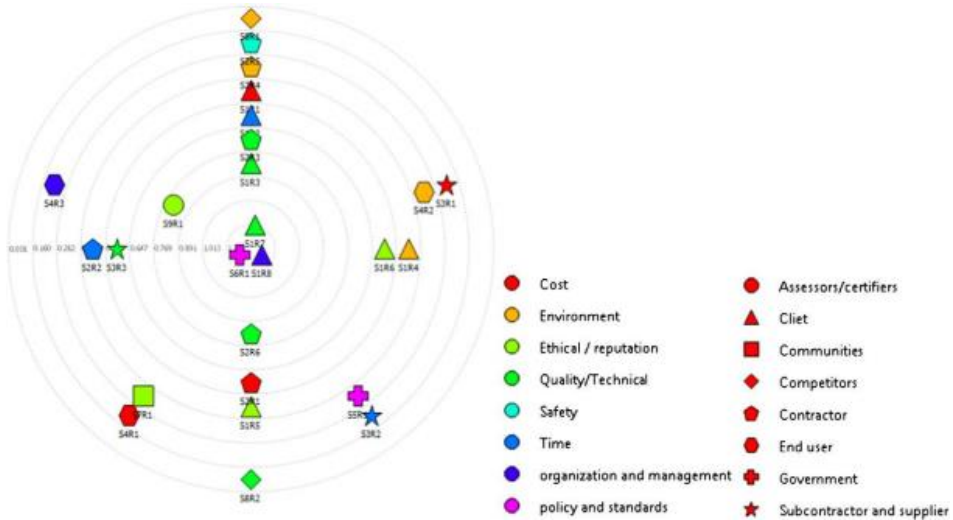
It also shows that ‘assessment experience and fairness’ is a critical risk with the consideration of the propagating effects in the network. This supported the The client and government, and are within ‘quality/technical’, ‘policy and standards’, and ‘organization and management’ risk categories have higher impact within the network respectively.

These results confirm the observation made by Yang et al. (2015) who describe the main concentration at the project level is on doing the projects in the right way. Projects are means of achieving organizational objectives.

Fig. 1 : The involvement degree stakeholders-activities of CEVITAL Group



Source: illustrated by the author

Fig. 2: The status centrality map in the GPD project

Source: illustrated by the author

The centrality map in the project shows the risk impacts decrease along with the distance between the risk (node) and the central of the circle. In the case project, the three risks have higher impact within the network. They are associated with client and government, and are within ‘quality/technical’, ‘policy and standards’, and ‘organization and management’ risk categories respectively. Fig. 4 also shows that ‘assessment experience and fairness’ is a critical risk with the consideration of the propagating effects in the network.

This supported the finding in the link betweenness analysis. Brokerage values indicate the roles of risks to connect different stakeholder groups. The top 10 risks which are considered as critical because they play significant roles to connect different stakeholder groups in the project. Obviously, the client has an important position in communicating with other stakeholders in order to mitigate the risks.

The head contractor took more communication responsibilities. This finding is consistent with the results from node betweenness analysis. Although this fact may be due to the different project contract

types as explained when comparing the network measure results, it also inspires thinking on the industry environment difference. From the degree and centrality analyses results, we can conclude that at CEVITAL, the external project stakeholders including government, end users, and assessors can cause more significant risks. Thereby, it requires large coordination work from client, who usually engages and communicates with external stakeholders more comparing to contractors (Yang, 2014). This finding shows to international firms, especially developers, the importance of establishing communication networks with local government, assessors as well as end users to mitigate the 'green' risks in CEVITAL.

Brokerage values indicate the roles of risks to connect different stakeholder groups. The top 10 risks which are considered as critical because they play significant roles to connect different stakeholder groups in the project. Obviously, the client has an important position in communicating with other stakeholders in order to mitigate the risks.

From project stakeholder management perspective, enhancing communications between internal stakeholders can contribute to a smooth PD design and construction in both countries. However, international developers to China may need more coordination work and spend more on subcontracting and labouring. Furthermore, clients in the projects should engage Algerian government, assessors and end users with more caution.

According to industry evolution theories (Audretsch, 1995), industry change at the early stage is usually driven by exogenous factors, such as the political requirements, and expectations from the upstream supply chain. The project is just beginning the "Marketplace Building" stage (Jackson and Harji, 2013), in which government policies, client's experience and reputation, and end user attitudes are the critical issues causing other risks in the whole industry.

4. Conclusion :

The distributed PD projects have been classified as challenging relationships among project stakeholders and high productivity (Thripathy and Eppinger, 2013; Yang et al., 2015; Wu et al., 2017, Rezvani et al., 2018). Thus, it is theoretically and practically significant to examine the influence of soft factors, more specifically trust

interactions between project stakeholders at a communication and coordination level simultaneously.

The focus of this paper was to investigate the influence of trust as room's of manoeuvre for lasting online communication in project environments. This paper leverages the collective knowledge of risks and stakeholders in a network to generate better risk management solutions in green building development process.

This study answered the calls for a multilevel study of trust and developed a research model that simultaneously analyzed and advanced the multilevel influence of trust (Gupta et al., 2016), and risk networks (Yang and Shen, 2015; Nguyen et al., 2019).

Thus, six main contributions can be listed. First, the two orders of stakeholder management (prescriptive and relational) are relevant and should be considered by the project manager, with the prescriptive providing identification, classification and monitoring, and the relational recommending involvement and engagement. Second, the management of stakeholders of relational origin contributes positively to trust in terms of emotional intelligence, be they intuitive, integrity or competence. Third, involvement and engagement, expected of the relational order, are conducive to relationships of trust. Fourth, the indicators of trust as developed by Cook and Wall (1980) and forwarded by Hartman's (2003) was effective in explaining the proposed model in terms of trust, since relevant and significant relationships were found between the stakeholders using the centrality map. Fifth, structured trust is more relevant while teams are involved in common activities, which indicates the importance of coordination and Communication of interest in needs and expectations. This demonstration needs to be maintained after the start of the project because it is necessary to confirm and sustain trust in integrity and competence. Last but not least, the links between the relational order and integrity trust, and between the relational order and competence trust were relevant and statistically significant, although to a lesser degree than the intuitive one. Therefore, they should not be neglected by project managers.

Thus, despite meeting the objectives planned in this article, during the course of the research, it was possible to identify limitations. The limitation related to the trust construct since no more exhaustive

reviews of the literature on behavior in the absence of trust and in the presence of mistrust were made could be an initiation of new study.

The trust construct itself was analyzed from the respondents' perceptions, based on projects they list. The result could be different if one analyzes the perception of the client and the supplier of the same project.

The limitations raised lead to the conclusion that the results obtained, as well as the analysis, cannot be generalized. On the other hand, these limitations and deficiencies represent opportunities for future studies to advance the understanding of the influence of stakeholder management on trust.

Considering the results obtained from this research, the development of a study applying the hypothesized relationships is suggested between the management of stakeholders of prescriptive of trust. Other factors not included in this article may be analyzed, such as coordinating activities through the perspectives of time zone difference and culture difference.

The social network method, perceives green building development as a sophisticated system in which numbers of risks and problems created by various stakeholders are inter-twisted with the consequent impacts among them. This perspective improves the effectiveness and accuracy of stakeholder and risk analyses by demystifying the social complexity which is usually overlooked in traditional linear impact analysis.

5. References :

- Audretsch, D.B. (1995). *Innovation and Industry Evolution*. MIT Press.
- Browning, T. R. (2016) Design Structure Matrix Extensions and Innovations: A Survey and New Opportunities. *IEEE Transactions of Engineering Management*, 63(1), 3-52.
- Cook, J., & Wall, T., (1980). New work attitude measures of trust, organizational commitment and personal need fulfillment. *Journal of Occupational Psychology*, 53(1), 39-52.
- Costa, A.C., & Anderson, N., (2011). Measuring trust in teams: development and validation of a multifaceted measure of formative and reflective indicators of team trust. *European Journal of Work Organization Psychology*, 20(1), 119-154.

- Derakhshan, R. Turner, R. and Mancini, M. (2019). Project governance and stakeholders: a literature review. *International Journal of Project Management*, 37, 98-116.
- Flyvbjerg, B. (2014). What you should know about mega-projects and why: an overview. *Project Management Journal*, 45 (2), 6–19.
- Gillespie, N.A., & Mann, L. (2004). Transformational leadership and shared values: the building blocks of trust. *Journal of Management Psychology*, 19(6), 588 – 607.
- Gupta, N., Ho, V., Pollack, J.M., & Lai, L. (2016). A multilevel perspective of interpersonal trust: individual, dyadic, and cross-level predictors of performance. *Journal of Organizational Behavior*, 37, 8, 1271-1292.
- Hartman, F.T., 2003. Chapter 13: The role of trust in project management. In: Pinto, J.K., Cleland, D.I., Slevin, D.P. (Eds.), *The Frontiers of Project Management Research*. Project Management Institute, Inc, Four Campus Boulevard.
- Jackson, E.T., & Harji, K. (2013). Accelerating impact: achievements, challenges and what's next in building the impact investing industry. *International Journal of Project Management*, 12 (2), 68–74.
- Ke, Y., Wang, S., Chan, A.P.C., & Cheung, E. (2009). Research trend of public private partnership in construction journals. *Journal of Construction Engineering Management*, 135 (10), 1076–1086.
- Keers, B.B.M., Van Fenema, P.C.,(2018). Managing risks in public-private partnership formation projects. *International Journal of Project Management*, 36 (3), 861–875.
- Loosemore, A.N., 2007. Risk allocation in the private provision of public infrastructure. *International Journal of Project Management*, 25, 66–76.
- Mazur, A., Pisarski, A., Chang, A., Ashkanasy, N.M. (2014). Rating defence major project success: the role of personal attributes and stakeholder relationships. *International Journal of Project Management* 32 (6), 944 – 957.
- Nguyen, T.H.D., Chileshe, N., Rameezdeen, R., & Wood, A. (2019). External stakeholder strategic actions in projects: A multi-case study. *International Journal of Project Management*, 37, 176-191.

- Reed, M.S. (2008). Stakeholder participation for environmental management: a literature review. *Biological Conservation*, 141, 2417–2431.
- Rezvani, A., Khosravi, P., & Ashkanasy, N.M. (2018). Examining the inter-dependencies among emotional intelligence, trust, and performance in infrastructure projects: A multilevel study. *International Journal of Project Management*, 36, 1034-1046.
- Shrestha, A., Chan, T.-K., Aibinu, A.A., Chen, C., Martek, I. (2017). Risks in PPP water projects in China: Perspective of local governments. *Journal of Construction Engineering Management*, 143 (7), 05017006.
- Sovey, A.J., Green, D.P. (2011). Instrumental variables estimation in political science: a readers' guide. *American Journal of Political Science*, 55 (1), 188–200.
- Stephens, J.P., & Carmeli, A. (2016). The positive effect of expressing negative emotions on knowledge creation capability and performance of project teams. *International Journal of Project Management*, 34(5), 862 – 873.
- Sutterfield, J.S., Friday-Stroud, S.S., Shivers-Blackwell, S.L. (2006). A case study of project and stakeholder management failure: lesson learned. *Project Management Journal*, 37(5), 26–35.
- Sy, T., Tram, S.O., & Hara, L.A. (2006). Relation of employee and manager emotional intelligence to job satisfaction and performance. *Journal of Vocational Behaviour*, 68(3), 461 – 473.
- Tripathy, A., & Eppinger, S.D. (2013). Structuring work distribution for global product development organizations. *Production and Operations Management*, 22, 22, 1557-1575.
- Troth, A.C., Jordan, P.J., Lawrence, S.A., & Tse, H.H. (2012). A multilevel model of emotional skills, communication performance, and task performance in teams. *Journal of Organizational Behavior*, 33 (5), 700 – 722.
- Tsai, W.C., Chi, N.W., Grandey, A.A., & Fung, S.C. (2012). Positive group affective tone and team creativity: negative group affective tone and team trust as boundary conditions. *Journal of Organizational Behavior*, 33 (5), 638 – 656.
- Wang, S.Q., Tiong, R.L.K., Ting, S.K., & Ashley, D. (1999). Political risks: Analysis of key contract clauses in China's BOT project.

Journal of Construction Engineering Management, 125 (3), 190–197.

- Wu, G., Liu, C., Zhao, X., & Zuo, J. (2017). Investigating the relationship between communication-conflict interaction and project success among construction project teams. *International Journal of Project Management*, 35(8), 1466 – 1482.
- Yang, Q., Kherbachi, S., Hong, Y.S., & Shan, C. (2015). Identifying and managing coordination complexity in global product development project. *International Journal of Project Management*, 33(7), 1464-1475.
- Yang, R.J. (2014). An investigation of stakeholder analysis in urban development projects: Empirical or rationalistic perspectives. *International Journal of Project Management*, 32 (5), 838–849.
- Yang, R.J., & Shen, G.Q. (2015). Framework for stakeholder management in construction projects. *Journal of Management Engineering*, 31(4), 04014064.