




Enhancing Leadership and Management Effectiveness: Leveraging Actor-Network Theory for Project Risk Mitigation

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Abstract: Investment decisions of leaders and managers influence the adoption and use of digital technologies that then transform their organization's products, services, and operations. To foster transformation, project management methods are commonly used. However, project failure rates often exceed success rates regardless of the industry sector, or project management methodology. While project success has traditionally been measured in terms of time, cost, and quality, recent research suggests that success includes the dynamic interaction between multiple actors in diverse networks. Traditional project management methods may not adequately identify and help mitigate the risks associated with complex and dynamic influence of leadership and management on project success. This study uses actor-network theory (ANT) to examine opportunities to enhance the effectiveness of leadership and management in projects and mitigating associated risks. By doing so, this study aims to provide insights into how organizations can improve project success rates.

1 INTRODUCTION


According to Burga and Rezanian (2017), effective project management aims to assist organisations successfully undertake and deliver small to large initiatives in a manner that considers the time to undertake the project, that the project is delivered on budget and within agreed quality parameters with minimal unplanned disruption to the organisation.


The time, cost and quality criteria is referred by Hughes, Rana, and Simintiras (2017) as the iron triangle of accountability that encompasses the leadership and management of an organization. Leadership and management influence project strategic and operational activities to move stakeholders from a current state to the post project desired state. To make this transition the identification and mitigation of risk contributes to effective project control (Burga and Rezanian, 2017)


To assist organisations transition from the current state to the desired state project management methodologies are commonly used. However, previous studies have shown, even with the use of

commonly used project management methodologies, many organisations find that projects success is elusive (Baxter and Sommerville, 2011; Bloch, Blumberg, and Laartz, 2012; Brosnan et al., 2023). An international sample of over 5,400 large information technology projects (defined as projects exceeding US\$15 million in cost) had more than US\$66 billion in cost overruns (Bloch et al., 2012). According to some estimates, the failure rate for technology implementations exceeds 60 per cent (De Waal, van Outvorst, and Ravesteyn, 2016; Pflügler, Malzer, Jäschke, Wiesche, and Krcmar, 2018), and rework to correct poor software development due to inadequate development of specifications for functional and business requirements exceeds more than US\$45 billion annually (Pimchangthong and Boonjing, 2017).

According to Pflügler et al. (2018), the rate of failure for digital technology initiatives has not significantly decreased in the past decade. These failures have social and economic impacts and can negatively influence the organisation and people working within it (Baxter and Sommerville, 2011;

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Bughin, Catlin, Hirt, and Willmott, 2018; Pflügler et al., 2018).

The high failure rates may be due to myriad reasons (Hewett, 2023). These reasons include issues such as more attention allocated to technical consideration of sociotechnical initiatives, and less focus on non-technical and social impacts (Brosnan et al., 2023; Spector and Wang, 2002; Tatnall and Gilding, 1999).

Therefore, situations can arise in which state-of-the-art technology can be developed and implemented, but the initiative may not be considered a success because the social aspect of the initiative was not adequately considered, leading to customer dissatisfaction (Baxter and Sommerville, 2011).

Therefore project success can be considered as having two perspectives; one focuses on judgements and perception of the project outcome, the other focus is relates to the successful delivery of the project (Jugdev, Perkins, Fortune, White, and Walker, 2013).

According to Burga and Rezania (2017); Floricel, Bonneau, Aubry, and Sergi (2014) there is a shift in the academic literature in which projects are described as a multidimensional social process rather than an instrumental process. As part of the social process, project management integrates consideration of cultural factors, process reengineering, and use of technologies that evolve. This integration is guided by organisational leaders and managers often beyond the responsibility and accountability afforded to project managers.

This paper argues that the leadership and management network of actors have a more influential role than outlined in current project management methodologies and frameworks. The leadership and management network of actors influences risks associated with the availability and allocation of human and financial resources, stakeholder feedback, promote incentives, and reprimand negative stimulus and other factors that influence project success.

In this study we contribute to the literature on project management, in particular how leadership and management influence the success of projects in two significant ways. First, we offer an informed description of how leadership and management influence strategic factors that include project governance and accountability, activities that influence organisational culture as well as operational activities related to processes and technologies that support the desired state. Second, we offer informed understanding of how management and leadership is enacted in projects can influence multiple networks to contribute to project success.

2 LITERATURE REVIEW

2.1 Leadership and Management in Project Management as a Basic Concept

Leadership and management is recognised as an enabler for fostering knowledge management within organisations. Additionally, leadership and management helps develop trust with stakeholders and helps motivate staff to participate in projects (Asrar-ul-Haq and Anwar, 2016). In successful, complex initiatives actions of leaders and managers develop the culture, the expertise, and change the way actors and networks interact. To foster changes, leadership and management develop and implement strategies and identify the actors to advance them (Papenbroock and Österberg, 2017). These changes are often resisted, and not initially embraced (Alexander and Silvis, 2014; Gurteen, 1999; Hislop, Bosua, and Helms, 2018). The literature describes reasons for this resistance, including organisations' leaders and managers providing little clarity about how the project will achieve the desired change and neglecting to encourage and support knowledge sharing across multi-disciplinary networks (Corfield and Paton, 2016).

Widely used project management methods and standards such as the Project Management Body of Knowledge (PMBOK) and Projects in Controlled Environments (PRINCE2) are still based on time, cost and quality (Hughes et al., 2017).

As organisations increase reliance on technology, the digital competence of leadership and management actors is essential (Marnewick and Marnewick, 2021). This knowledge can assist increase understanding of social, economic, and political shifts that occur as a result of the adoption of digital technologies within organisations. Furthermore, as artificial intelligence, automation, robotics, and other digital technologies evolve and become more mainstream, there are opportunities for the competencies to transform governance, thus allowing opportunities for more efficient delivery of services (Jones, 2017).

2.2 Actor-Network Theory

Actor-network theory (ANT) was selected as a suitable research framework as it enables consideration and examination of dynamic, iterative and socially constructed phenomenon and how they interact (Latour, 1987, 1996). The use of ANT in

project management provides an opportunity for a more reflective approach in which to view complex project activities, including the dynamic interaction and the transformation of networks involved as projects evolve. According to Callon (1986), ANT aligns well with identifying and tracing association between project human and non-human actors and processes.

A benefit of ANT is its ability to consider and analyse iterations, or changes to an initiative or project as it progresses from a starting phase to the development and a completion stage (Wilson, 2021).

Within the ANT framework, the relationships between the actants (human, non-human, processes) and their respective networks interact with the purpose of resolving conflicts and stability (Callon, 1986; Latour, 1987, 1996; Sage, Dainty, and Brookes, 2011).

There are four stages of ANT: problemisation, interestment, enrolment and mobilisation. From an operational perspective, these stages overlap instead of operating in a sequential manner.

Table 1: ANT stages and descriptions.

Stage	Description
Problemisation	The initial stage in project management where relationships are initially defined and charters are established.
Interestment	The stage in project management where operationally the project exists and relationships among actors are dynamic in their enactment of accountability.
Enrolment	In the project management context (Callon,1986) enrolment is the stage when relationships are translated successfully by actors through the use of power.
Mobilisation	The methods of leadership and management are generalised and able to be mobilized or translated for use in other similar projects.

Like ANT, project management methodologies includes stages of change. Depending on the project management methodology, the following examples are of PMBOK and PRINCE2 methodologies, the stages can involve:

- Project initiation or conception;
- Planning or feasibility;
- Executing or implementation; and

- Monitoring / controlling or operation (Skogmar, 2015; Wideman, 2002).

The project management and ANT stages can be aligned allowing more thorough consideration of sociotechnical influences. Within their respective stages, iterations of actions are performed until the stage is considered complete.

Table 2: Alignment of ANT and project management stages.

Stage: ANT	Stage: Project Management	Description
Problemisation	Initiation or conception	Initial stage, problem and initial stakeholders identified.
Interestment	Planning or feasibility	Human and non-human actors allocated, relationships form, engagement and interaction between actors develop.
Enrolment	Executing or implementation	Production of project deliverables commence.
Mobilisation	Monitoring, controlling, or operation	Project activities are monitor, risk identified and mitigated.

It is important to note that ANT has little to do with the study of social networks but focuses instead on actor’s interpretations and translations of the project as it evolves through its various stages of development. The actor-network determines how the actor translates activities and influences how it interacts and involves other actors.

We expect to see that project leadership and management will follow stages described by (Callon, 1986). During these stages the intentions of leadership and management is translated through well-defined organisational governance documents including risk registers and project methodologies and frameworks such as the PMBOK and PRINCE2. Relationships between leaders, manager and actors evolve through the project stages. We anticipate that ANT provides a framework to study and verify how leadership and management are embedded and guide project progress.

3 RESEARCH METHODOLOGY AND BACKGROUND

The essence of this paper is the study of the ways in which five community organisations, based in five different Western Australian (WA) local government areas (two rural and three metropolitan areas) use digital technologies as a primary means of engagement with residents and to support and extend the residents' knowledge of their local communities. The five community organisations are aligned to three separate categories: social enterprise, community enterprise, and local government.

This study considers how leadership and management actions contribute to project success by monitoring and mitigating risk related to community engagement and associated knowledge management and sociotechnical initiatives. This is done by investigating the potential opportunities and limitations of models and frameworks for transforming how five WA community organisations engage and manage the knowledge of residents through digital technologies.

Consideration was given to the possibility that leadership and management perspectives embedded within the models and frameworks used to help guide the transformation of how community organisations engage and interact with residents through digital technologies are insufficient. If this is the case, then the insufficiency may contribute to the high failure rate of efforts to transform community engagement and the associated knowledge management process.

3.1 Methodology

This study is an exploratory, qualitative design, in keeping with the emerging nature of knowledge development in this area. A key aspect in considering the integration of community and digital technology is whether the desired change is sustainable across a variety of social, economic, and political networks within a community. To gain some understanding of how changes have evolved, and the extent to which these have been durable, the study incorporates a longitudinal study of comparative cases. The inductive study design enables divergent experiences to be documented at each site. This approach will offer insights into the extent to which local context is important and identify common elements across the participating organisations. The longitudinal aspect of this study enables the researcher to determine the ways in which sociotechnical integration has evolved over time, in order to examine its influence upon how organisations use digital technologies to interact with

community residents. The findings of the comparative cases will indicate the similarities or differences of integration approaches and the affects of such integrations.

3.2 ANT as a Method

As a method, ANT studies follow actors and observes network creators through whose perspective they attempt to interpret the process of network development.

A review of the data collected from primary and secondary sources suggested that ANT was a useful theoretical lens as well as a method in which to analyse, interpret, and explain the data gathered from the organisations. ANT has also been applied as a method to identify reasons for IS projects failing in organisations and then used to guide their recovery (Pollack and Clegg, 2023). ANT was adopted because community organisations' engagement with residents is a relationship-based sociotechnical activity, in which people, text, devices, and infrastructures take the form of interdependent networks. ANT focuses on the ability to trace intricate networks and their associations with human and non-human networks (Doolin and Lowe, 2002).

ANT was used in other studies to analyse, describe and guide complex projects; to foster changes to organisation practice and behaviour through digital technologies (Linde and Linderoth, 2006); and to assist people to recognise then consider the consequences of intended or non-intended actions and unpredictable behaviour related to digital transformation projects (Pollack and Clegg, 2023; Sage et al., 2011). These ANT concepts align well to the needs identified in this study.

This research, through the framework described in this study, aims to synthesise risks. These risks include the complexities concerning interdependence of the human and non-human actors related to leadership and management and activities that guide projects that changes to organisational practice and behaviours from a current state to a desired state.

3.3 Data Sources

Data sources for this study included primary and secondary sources. Semi-structured interviews were the primary source of data. The intention of the interviews was to help us better understand and explore opinions, behaviours and experiences of participants involved in strategic and/or operational activities of using digital technology as part of the community consultative process.

Secondary sources included academic articles, annual reports and other government reports and publications, research reports, news reports and commentary, magazine articles, websites, podcasts and social media. Secondary data sources allowed this research to consider theories in a broader context and contribute to strengthening reliability and validity of existing theory (Bowler, Julien, and Haddon, 2018). Specifically, insight about current and proposed consultative activities, plans and strategies of respective organisations’ digital and face-to-face interaction with their community members.

Table 3: Data types, sources and purpose.

Data type	Data source	Purpose / Information collected	Data links to research
Primary Sources	Ten interviews were conducted during the longitudinal study.	How participants perceive the world, experience with their organisations past, present and future community projects.	Opportunity to understand and explore opinions, participants behaviours and experiences.
Secondary Sources	Annual reports, government reports and documents	Information about the leadership and management through organisational vision, mission, strategic initiatives, emerging operational focus.	Background information, chronology of events, key developments and accounts of events
Secondary Sources	Websites and social media	Organisational operational insights	Background information and to provide links to past and contemporary development. Provides a link to news and other online resources

3.4 Results

Across each of the five community organisations networks undertaking projects to change how their they engaged with residents, there was a lack of awareness of the potential value that can be gained from engagement with residents and better managing their community knowledge. Consequently, there was little evidence of a documented vision, or strategic planning, or activities to align and combine community engagement with knowledge management.

Processes and technologies to support project deliverables, including content management systems and archives seemed to evolve organically and not through a strategy supported by organisational leadership and management. Similarly, there was no specific framework or business model adopted by leaders and managers with the purpose of engaging with residents and managing knowledge resulting from such engagement. A stronger focus on the creation of networks of actors to for alliances to assist in promoting community engagement and associated knowledge management activities would prove beneficial. These alliances may include actors with knowledge and experience as content providers, training providers, researchers, technology providers. With the exception of one network there was little evidence of strategic business planning, policies, and guidelines for aligning community engagement and community knowledge.

As a result of the lack of a vision, strategic direction setting, plans for community engagement and associated knowledge management activities can continue to evolve organically, including from the bottom up. The implications can influence the resources allocated to the initiative, speed of adoption, the ability to gain support of stakeholders and form deeper alliances that can support community engagement and community knowledge management activities. Such alliances may contribute to expertise and knowledge to enrich the community engagement and knowledge and influence residents.

However, these results are beyond the realm of traditional project managers, project management models and frameworks. The traditional role of the project manager consists of ensuring that the project is completed successfully, on time, and within budget, to a specified quality, while also managing stakeholder expectations and maintaining a positive team dynamic. The risk identified in this study is beyond the role of the project manager and cannot easily be delegated from organisational leaders and managers.

4 DISCUSSION

ANT as described by Callon (1986) and summarised by (Florice et al., 2014) as stages of problemisation, interestment, enrolment and mobilisation are described and dynamically overlap and interact with each other, while each actor network operates differently with a common goal being successful project delivery. During the problemisation stage actors are engaged through translating actants such as a project charter and / or a project scope. During interestment, deliberations between actors and through translating actants roles are accountabilities are refined, the power of leaders and managers are used to influence, reward, and punish. During the enrolment the power is applied across multiple networks to transform from the current state to the desired state. Finally, through mobilisation the project is operational and lessons gained can assist other initiatives.

The leadership and management described throughout the transformative journey is translated through actors in a socially constructed environment. The use of ANT helps identify networks, relationships between networks and translating actors through which accountabilities are shaped and influence the success of projects.

5 CONCLUSIONS

5.1 Power Remains with Leaders and Managers, not the Project Manager

The delegation of power between networks was identified as a prominent factor that can influence the success of sociotechnical solutions. Understanding the power of actor networks, how the power evolves through the life of a project and the limits of project managers power and influence can help reduce the risk associated with sociotechnical solutions and thus project failure. In this study, we explored the way the power of leaders and managers influences strategic and operational networks activities. How this power is wielded can impact on, and influence risk associated with sociotechnical initiatives. A contentious projection of power, or ill-defined actions from leadership and management networks can create animosity that may be difficult for some projects to overcome.

5.2 Manage Complexity as a Risk

A key finding in the literature, and supported through the analysis of interviews, and through observations of the online presence of organisations and their operations, is the complexity of their journey transform community engagement and associated knowledge management activities. The broad range of issues, the iterative process of change to internal and external networks, their cultures, and associated power dynamics during sociotechnical transformation can be complex.

Managing the risk of complexity was identified in the research as a significant reason for the high failure rate of sociotechnical initiatives such as community engagement and knowledge management. However, many of the sociotechnical models and frameworks did not appear to recognise, or much less, acknowledge complexity. How leaders and managers identify and manage risk linked to complex issues can be able to be identified, better understood and mitigated. ANT takes into consideration that the power relationships between the networks are dynamic; and it is capable of tracing the ebb and flow of the power dynamics between networks, within and between changes to stakeholders according to stages of implementation or events.

5.3 Theoretical Contributions

This study makes two main contributions. First, it supports the view that it is not just the project manager or the product owner that's ultimately accountable for project success. A sustained level of leadership and management network engagement is important in the successful delivery of projects. This includes and is also broader than the traditional roles of project managers. The analysis of the longitudinal study reveals that project leadership and management is not conceptualised in the project management literature and requires more consideration and accountability of networks and actors that influence project time, cost and quality. Activities to influence these networks and actors are often beyond the responsibility of the project manager.

Secondly the study demonstrates that project actions and associated accountability was undertaken in an ad hoc manner, or not by design. As the project progresses the plans and actions of leadership and management evolve to address risks of various network stakeholders. This results in efforts to create a stabilised environment from multiple and differing human and nonhuman networks and artefacts to influence, gain support for and contribute to the

project. From an ANT perspective the project becomes a collective social activity through which translation of being accountable is determined by actor networks. To achieve and progress the project leadership and management should be conceptualised as a collaborative activity not just having accountability vested in the project manager and project owner.

5.4 Project Management Implications

Leadership, management and accountability are central to organisational control systems as well as project governance. Leaders and managers influence includes more than receiving and providing feedback on reports related to the project and project status. The depth of their accountability is distributed across multiple active and dynamic networks. This role is often more consequential than the performance of the project manager and project owner as outlined in many current project management methodologies and frameworks. This research seeks to influence increased consideration of sociotechnical risks within project management methodologies.

5.5 Limitations and Further Research

In this paper we identify and expand the role and understanding that leadership and management has on increasing opportunities for project success. We demonstrated through ANT how leadership and management influence traditional projects success factors identified in contemporary project management methodologies.

Limitations include risks related to leadership and management during each project management and ANT stage can be further explored. Furthermore, the focus of this study is on the leadership and management network. Other networks that influence project success will be the subject of additional papers. These other networks involve culture, processes and technologies. Through the identification, monitoring, managing and mitigating the risks of these networks, it is believed opportunities for project success can be increased.

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