Assessment of Workflow Reliability in Two Infrastructure Projects Considering Efficient Adoption of Lean Leadership Culture and Engagement

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Abstract

An organization leadership culture is the corner stone of success or failure. This paper focuses on Lean Leadership as an emergent concept introduced to many organizations where leaders are role models, empower their teams and make them accountable. In construction projects, culture is usually the combination of behaviours, attitudes, and communication inherited from previous experiences. A culture change is not welcomed unless mandated by the leadership and practiced daily. Where many factors are similar, two projects had different outcomes. A root cause analysis, on two infrastructure projects with the Public Works Authority ASHGHAL in the State of Qatar, reveals that project culture is the driving factor on a successful delivery on time and budget, and complying to quality, health and safety, and environment standards, with a public satisfaction focus. Client pre-set strategic objectives are achieved through a collaborative effort of project team where accountability is the bonding agent between promises and accomplishments. This paper summarizes a lean leadership culture adoption where it established a psychological safe working environment that delivers project to client expectations.

Keywords: Workflow reliability; Lean Leadership; Accountability; Empowerment; Daily huddles

1 Introduction

Construction industry has been characterized by a top-down management structure, similar to a military organization structure where instructions just need to be followed. Then, accountability is not shared, and those who perform the work are responsible just in front of their superiors on how they performed their missions, without being involved in any assessment or actions of improvement (Demirkesen et al., 2019).

The difference between these two structures is in the amount of information received, where in construction accurate data is scarce and incomplete. As Simon Sinek stated in his book “Start with why”: “The point is, we make assumptions. We make assumptions about the world around us based on sometimes incomplete or false information.” This is the norm in construction projects, even if few exceptions exist. To be an exception, special behaviour and organization culture should be adopted and practiced at all levels in a standard manner (Ebbs et al., 2018).

In two infrastructure projects (project A & project B), with similar scope of work (roads and infrastructure in residential areas) and the same external factors (client management, consultant,

stakeholders) outcomes had been widely different, and on several occasions, responses had been totally opposite. Adopting a different working culture (Walter et al., 2020) had been a key difference as witnessed by both projects' stakeholders.

2 Context

In a disrupted ecosystem impacted by COVID-19 pandemic, most of infrastructure projects had suffered a disrupted supply chain, decreasing productivity, poor predictability, and a lack of proper communication between project team members.

Leaders arise in complicated situations to draw a vision and inspire others with a set of attitudes and practices characterized by consistency and efficiency (Manion, 2011). Organization's "Noise" (Kahneman et al., 2016) is intensified in a disruptive environment. Project Manager (PM) should act like a Maestro to clear this "Noise".

A Maestro's skill is to be a good listener at first hand and have the ability to inspire his musical groups to show the best of their talents. Similarly, a PM needs to have a good listening capability to understand and have better view and visibility of how the project is running (Howell & Macomber, 2006). Plus, PM should help his project team member to excel and improve their performance capability through transparency, delegation, and accountability.

PMs of project A & project B had different approaches to drive their teams for the completion stages, with significant different performances, attitudes, and work culture. Data, analysis, and observations supported the Lean Leadership management aspects.

3 Data and Facts

Basic project metrics used to evaluate project performance have been collected from Jun-2019 until Jul-2022. Analysis shows the following:

3.1 Progress:

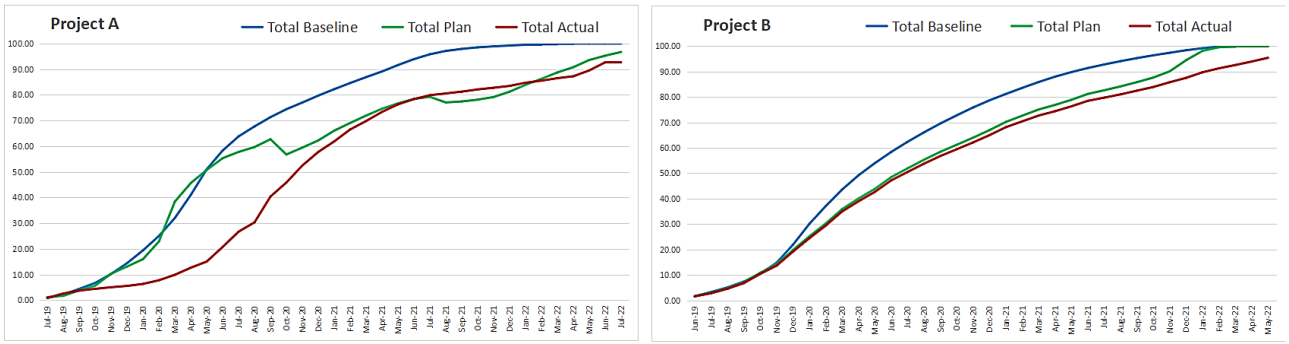

Fig. 1: Progress Curve for Project A & Project B

Project A progress shows a cumulative variance reaching -34.6 on Jun-2020. This led to the appointment of a new Contractor's PM to develop a recovery plan. The recovery took 12 months to catch-up with the Plan. Despite Plan instability due to scope change, project performance remained stable and project completion had been on-time. While project B showed a stable progress almost matching the Plan, the project could not stand ahead and did not deliver on-time.

3.2 Public Satisfaction

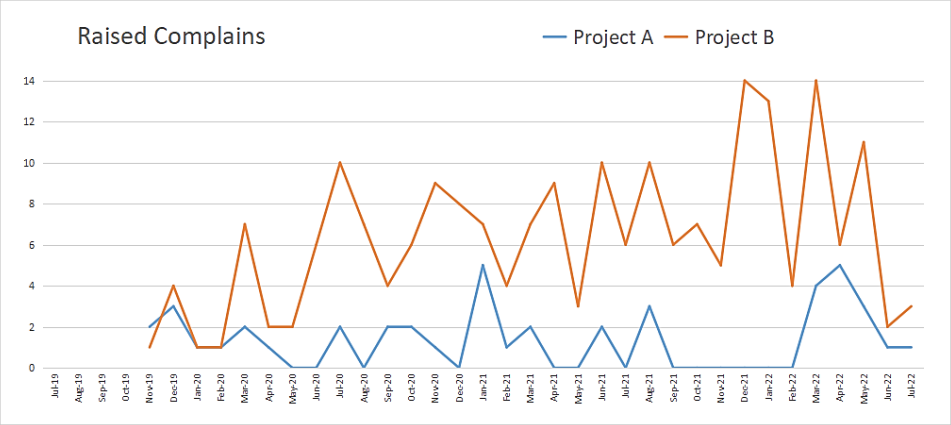

Fig. 2: Raised Complaints per month for Project A & Project B

A key client value is proper coordination with project stakeholders, and especially residents within project zones. Dedicated Public Relations officers are appointed to improve communication and ease any special requests. This section is measured by complaints raised to the client hotline. Figure 2 shows constant complaints track for project B with a monthly average of 5.4 complaint/month, while project A had a monthly average of 1.3 complaint/month and during several months of zero complaints record reaching six consecutive months.

3.3 Quality Management

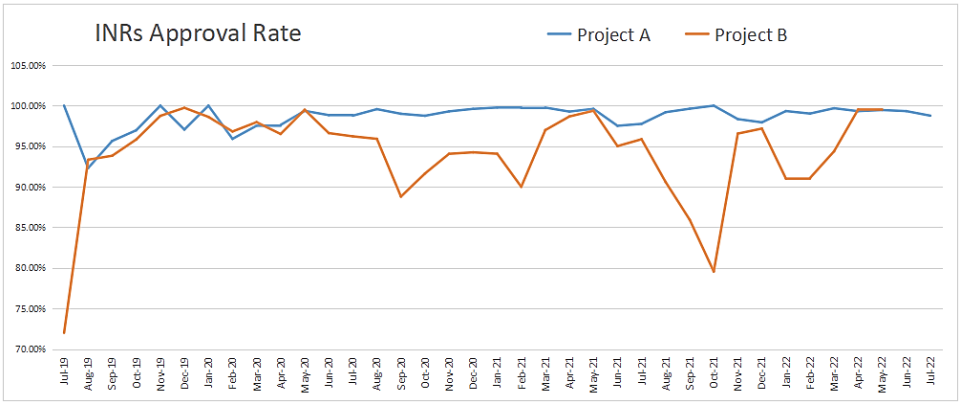

Fig. 3: Monthly Inspection Requests approval rate for Project A & Project B

Inspection Requests (INRs) approval rate is considered as one of the leading project KPI. It reflects the proper planning of inspections with work progress beside the quality compliance. Project A progress recovery from Jun-2020 has been characterized by a stable work inspection and approvals with an average INRs approval rate 99.3% over the 12 months recovery period. Despite its stable progress, project B inspection and approval have been unstable during most of the project life. Figure 3 illustrates this instability in inspection approvals in comparison to the stable performance of project A. Moreover, Figure 4 summarizes the INRs approval ranges, usually a quality assessment approach, where it demonstrates further the instable performance in the presence of a “wider” range of “INR approval probability” in comparison to the narrow range of project A. This stable quality performance helps to strengthen reliability between project shareholders: Client, Consultant, and Contractor. Project A efforts in having a stable quality record was rewarding as it won the client “Quality best practice award” in its first edition.

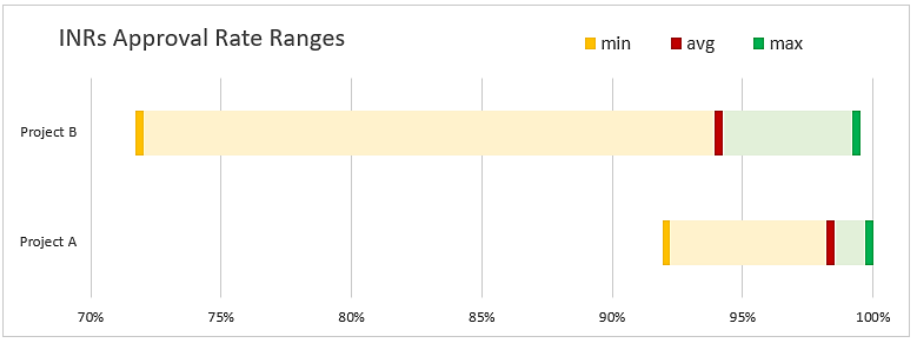

Fig. 4: Inspection Requests Approval rate ranges for Project A & Project B

Another fact that impacted the handover stage in Project B was the high approval proportion of Code B. Figure 5 visualizes the INRs statistics, where in Project B, the Code B INRs yellow area (45%) almost equals the Code A INRs green area (49%). In contrast, project A Code A INRs green area is dominant (80%) and it supported a smooth handover process for completed work.

The revision of Code B INRs to receive Code A approval is a time-consuming process that has a hidden commercial risk of final payment delays, usually not properly identified or assessed. Plus, Code B approval can be avoided with a proper planning of work and coordination of inspections. The time and efforts spent to transfer INRs from code B to code A can be saved easily with a better organization and accountability.

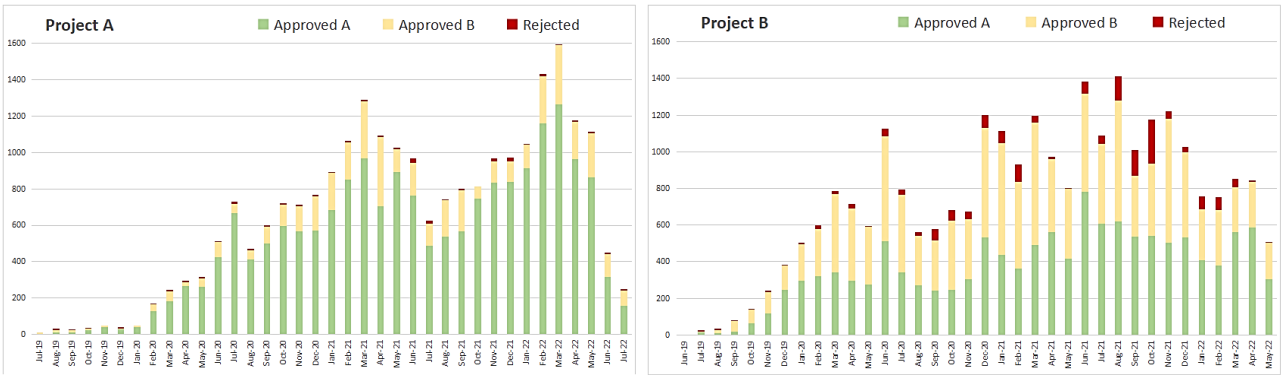

Fig. 5: Monthly Inspection Requests stats for Project A & Project B

Besides, Figures 1 & 5 indicate that submitted INRs had been in line with the Project A on-site progress, on the contrary to Project B where INRs approvals had been delayed in several cases to later stages, which increased rejection rate or Code B approvals, and subsequently impacted the handover process.

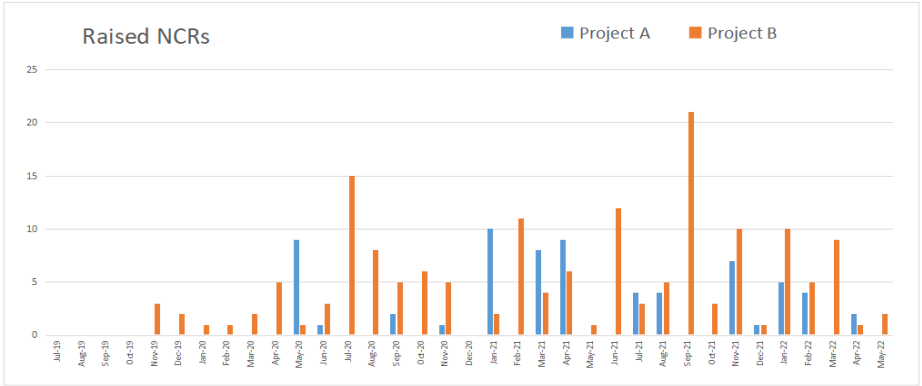

Fig. 6: NCR Issued per month for Project A & Project B

Another index of proper quality compliance is the Non-Conformance Reports records. Figure 6 proves that Project A has a significant different approach towards quality as only 67 NCRs are issued to the 163 NCRs in project B. Details show that NCR close-out was smoother and direct in project A, while project B suffered to reach an agreement with client and consultant rooted in the low reliability level, as stated before.

3.4 Variations and Changes

Typical contractors focus on the cost analysis dashboards during the assessment of project performance. In this aspect, again, both projects had different tactics: Project A focused on delivering value for the client that will support building a relationship of trust, and Project B used each and every argument to challenge client and claim inconsistent cases.

Table 1 summarizes that while both projects had similar percentages of overall change orders amounts (descope in both cases), the overall percentages of approved Extension of Time (EoT) was extensively disproportionate (more than the double). It reiterates the consistency in Project A performance especially a relationship of trust with client versus a devious attitude with the client of Project B management.

Table 1: Variations and Changes stats for Project A & Project B

	Project A	Project B
Change orders amounts (% in reference to original project cost)	-13.38	-13.26
EoT (% in reference to original project duration)	27.62	61.33

4 Root Cause Analysis

Project A success in progress recovery and on-time delivery resulted in receiving client appreciation. Despite its traditional stable progress records, Project B suffered the typical project issues: late delivery, poor quality records, rework phase, delayed handover, and cost overrun.

Project A achievement requires an investigation to uncover the foundations for such success. Most of the common stakeholders to project A and project B acknowledge the contractors' culture as the main difference factors, especially PM's leadership approaches to handle the projects. For this reason, authors used Simon Sinek's Golden Circle questions as an approach to investigate the root causes, as described in Table 2: **What** the project team did? **How** they did it? **Why** they did it?

Table 2: Lean Construction performance root cause analysis for Project A & Project B

	Project A	**Project B**
What	1) Daily huddles for 30 minutes at the end of shift with the participation of all project team, facilitated by PM, and attended by supervision consultant staff. 2) Weekly follow-up on prerequisite for the 3 months look ahead plan, ensuring all requirements are achieved on-time. 3) Critical issues are attended on-site by engineers and managers and resolved on the spot. 4) Site engineers have the authority to take decisions on resources distribution, and weekly and daily targets, assessing all risks incurred.	1) Daily huddles happen occasionally without all project team attendance. 2) Despite having a good planning approach, site engineers were not empowered to take decisions without PM's approval on simple tasks. 3) Site visits had been attended individually to have an update for "just in case" purpose. Joint site visits happened twice during project life. 4) All issues are escalated to PM to get resolved.

	Project A	Project B
How	1) All project team members had the freedom to express their opinions and thoughts, take decisions when necessary and be responsible for the outcomes. 2) PM have direct and open communication with all project team and shares all information and updates. On several occasions PM consults site engineers prior taking any decisions. 3) Work culture had been founded on harmony and transparency without any top-down barriers. 4) Productivity improvement is a weekly discussion point to share lessons learnt and try/use new methodologies.	1) Site engineers take a defensive approach on productivity topics and a "push back" response for issues/risks. 2) PM had an authoritarian approach that resulted in slow progress during his absence. 3) Work culture is the standard of "silos" despite several attempts to improve horizontal communication and coordination. 4) Labour productivity is not a concern as no data is available to discuss. During commercial assessment, manpower reduction is an immediate solution without productivity evaluation.
Why	1) To deliver the project and mitigate the -34.6% variance, project team stated that adaptability, especially during COVID19, need empowerment and accountability by all project team members. 2) As stated by PM "disruption requires strong adaptability, and there is no other option than having a strong team culture and accountability."	3) Lack of work culture. 4) Lack of leadership's long-term visibility. 5) Traditional ad-hoc remedy mindset to issues and concerns.

5 Key Success Factors

Project B shows that a classic authoritarian project management system can no longer respond to external and internal constraints and remain manageable. Project A records reflect the flexibility generated through leadership engagement and project members empowerment. Establishing the Lean activities routine manifested the development of "Tuckman Ladder Model" five stages within the project (Kumar et al., 2014).

The comparison between the two projects lead to three key success factors that made the difference. Table 3 describes the key success factors identified:

Table 3: Lean Construction key success factors for Project A

Success Factors	How?
Strong Team Communication	1) Ensure daily huddles are attended by all project team and led by PM for 15-20 min as a recap of: what is achieved? any missed targets? Why it is was missed? How to mitigate? What is the target for tomorrow? Is it achievable? Any support needed? 2) Visualization using proper charts and layout in a big room or visual performance centre is essential for an effective daily huddle.
Empowering the team	1) Delegation of decision making at operational level with an acceptable tolerance; setting clear and measurable commitments; establish an accountability culture through engagement in planning and execution (Tillmann et al., 2012). 2) Create a psychologically safe working environment, where project members speak freely without concerns to be punished or humiliated. It is the foundation for the team to trust each other and set-up a mindset of reliability in making and keeping promises.
Continuous Improvement	1) Challenging the status-quo: it is an attitude that needs space and time to be harnessed. 2) Adopting Standard Lean Construction practices such as GEMBA walks, 5S, etc to collect, analyse and assess data for the purpose of finding what can be improved? Then how?

A project team relationship is key contributing factor of failure or success of the project (Fauchier et al., 2013). Vertical relationships pattern is designed by the PM and defines the leadership model to be exemplified by the PM himself (Howell et al., 2004). Lean Leadership is a new and powerful approach to steer a project toward success in a disruptive ecosystem.

6 Conclusion

Project A and Project B exemplify a case of traditional management culture and another of adaptive management culture. Records from both projects reflect how success is being established during and upon delivery of the project.

Fayol "command and control" model build on central authority of planning and administration is no longer the right approach to manage a disruptive ecosystem. Lean Leadership model based on being a role model, establishing a team culture, coaching and mentorship, and motivating others to improve and excel is the new norm of successful project delivery. Lean Leadership training (Shang, 2014) is the vehicle for bringing PMs to this contemporary need. PMI incorporates Lean Management concepts in the PMBOK seventh edition, especially on new performance domains in project management, namely, Domain I: People, Domain II: Process, and Domain III: Business Environment. To be able to practice those newly introduced concepts, PMs should have a set of Lean Leadership skills learnt and practiced on daily basis as a standard working attitude. Lean Leadership is a component of an organization transformation that requires a "Lean Strategy" to standardise and sustain the development and practice of the new norm requirement.

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