Introduction

Pre-construction planning is the most crucial part of the project because during this stage, strategies are made to understand the goals and requirements of a project. During this process, engineering teams and construction staff cooperate with stakeholders to identify any potential risks that might occur during the process and cause a delay in the completion of the project. Pre-construction is significantly assisted by a mobilization plan aimed at making employees aware of their role, and analyzing assets and sites to make the work environment safe. Some of the processes in the construction and after construction that need to be considered are quality, multi-factor conductivity, material logistics, sustainability, and demolition and reuse.

Quality

Quality in the construction projects is referred to as the completion of the project within a given timeline and exceeding the resources and guidelines provided by the stakeholders in the Scope of the Work. The quality of the project is determined and improved by quality assurance and quality control. Any compromise in the quality can result in a delay in the project and the replacement of material that can cost the owners extra (Mahamid 2021). In a two-storey residential building, quality reviews and quality actions must be implemented so that any errors can be identified and resolved and the quality of the residential building is improved. Quality, in this case, would suggest that the design of the residential building is made by considering the comfort of the residents. The goal of the quality in this project is to provide comfortable, high-quality, and affordable housing to attract new residents. Moreover, quality assurance is also used to inform the owners, stakeholders, and clients that the procedure and quality standards are being met. The quality of the building is regulated by the state and territory governments and each

jurisdiction is designed to address the issues of licensing building practitioners, enforcing building regulations, and certifying buildings (Department of Industry, Science, Energy and Resources 2018). New regulations will give the government the authority to investigate and correct any problems in the residential buildings. Some of the specifications that are required for the residential building are concrete, plumbing, better material selection, drainage of wastewater, and roofing. Some of the synergies such as the implementation of DMAIC and PDCA tools can be effective in improving the quality and saving the cost of the construction process. Implementation of DMAIC ad PDCA tools, when applied correctly, make corrections and standardization to the quality of the buildings (Vidolin et al. 2021). Cost synergy would also be beneficial in reducing the cost and increasing the quality of the construction through external partnerships and mergers of different organizations. Different departments can be made aware of each other's roles, and planning and designing processes can be made more inclusive to encourage collaboration between departments. It can lead to improved quality as more insight is provided. I would pay attention to the specifications and quality requirements of the building and assign the roles accordingly. My priority will be to assign the right workers to the right positions. Moreover, ensuring the quality and safety of the workers will be a constant goal throughout the project so that any delay in the project can be avoided. I would make sure that different contractors and workers interact and collaborate in an extensive design process so that a smooth framework can be designed. For the qualitative evaluation of the efforts, data about the tasks performed, operation opted, and work setting will be collected. Qualitative data will be collected via questionnaires and interviews of workers where they will be asked about their experience and the effectiveness of the measures taken. Quantitative data that will be used to determine the effectiveness of the strategy will be the frequency of scope creeps, mishandlings by

subcontractors, and complexity of the design. Moreover, the cost of the material and the project will also be observed. This data can be collected through surveys and from the database of the company that keeps a record of the financial matters. A strategy framework will be used because it is effective in outlining plans for changes and determining the effect on future goals.

Multi-Factor Productivity

Multifactor productivity of any organization is used to measure their economic performance by evaluating the output received against the combined input that was used to complete the project. This kind of productivity can provide better insight into the project than the individual productivity measures, such as labor productivity (Apostolides 2008). In this project, multi-factor productivity will determine the effectiveness of the collaboration between different departments and individual inputs in improving the quality and reducing the cost of construction. The goal of the multi-factor productivity is to identify what changes in the output are a result of changes made in the input in form of labor and capital, which can show what measures were effective and what measures did not contribute to the improvement of the output. Multi-factor productivity is affected by the skills of the worker, changes in technology, and changes in management practices. Thus, it can help target specific areas to improve the quality and the cost-efficiency of the project (Reserve Bank of Australia n.d.). The multifactor productivity of the construction project depends heavily on the technology that is being used. The technology that is present today is not good enough to improve multifactor productivity. Hence, technology innovation is required and governments and contractors need to invest in futuristic cloud-based technologies, construction drones, and green building solutions because they can be useful in saving the cost of the building in the long run. Any accidents at the workplace that occur due to

the lack of communication can cause a delay in the project and can have economic consequences for the company and the owner. To reduce these delays and to make the construction workplace safer, a collaboration between security and productivity can be adopted. This synergy can prove effective in reducing accidents and increasing the health of the workers. A healthy and accident-free environment can make the workplace ideal and can increase the multifactor productivity of the organization and the project (International Labour Office 2006). As discussed earlier, innovation in the construction process can be crucial in increasing multifactor productivity. This innovation will be combined with the hiring of skilled labor and managers that can use new technology and can nurture an environment of safety. Another input that can be improved is the site and revenue reports that can provide employees information about resources available and help in managing the flow of these revenues to ensure quality and increased productivity. Some of the measures to determine the success of the strategy in improving the multifactor productivity can be labor, capital, and labor and capital. Labor and capital productivity based on the gross output and the value-added can provide insight into the contribution of each factor in the increased productivity of the project.

Material Logistics

Material logistics is the process in which labor and equipment are delivered to and from the work site. Material logistics is a complicated process that requires significant planning, organization, coordination, and controlled flow of the material. This could help maintain the flow of the supply chain. In this project, material logistics will divide the stakeholders according to their roles. The client is responsible for setting the requirements of the material logistics plan and the main contractor has the responsibility to make and execute the plan. An efficient material

logistics plan is important to ensure safety and productivity at the construction site. The intended goal of material logistics is to reduce the effort in moving the equipment and managing the material, which can be crucial in saving valuable time and cost in the construction process. It can be achieved by an efficient logistics plan and service that could reduce delays and allow workers to complete their tasks efficiently. Material logistics will also help keep the workplace clean, safe, and easy to get around. One of the innovations that are being discussed in material logistics in the construction industry is Coordinated construction logistics. It is expected that coordinated construction logistics will prove helpful in providing on-site safety, transportation efficiency, and reduced material usage. But currently, it cannot be considered an embedded innovation because it has not achieved the goals that it initially suggested, but in near future, it can be optimized to better represent and achieve its goal of a safer, efficient, and productive construction site (Hedborg Bengtsson 2019). To improve the quality and safety of the project, the supply chain and construction project can be synergized. The concept of forwarding and reverse logistics can be introduced, which can help handle the inventory and categorize products of the construction. Synergized supply chain and construction projects can help improve the availability and lead time of the products required for the construction project (Sharma 2012). I will improve the logistics plan so that safety and on-time completion can be assured and waste can be reduced at the site. I will achieve this by introducing consolidation centres that would be responsible for the supervision of inventory. I will eliminate the need to store the material on the construction site by adopting a just-in-time delivery process. I will predict the number of materials required for the construction project using software such as PlanSwift. The quantitative measures of the logistics at the construction projects are resource utilization, the performance of delivery, lead time for order-to-delivery, and response time from the supply chain. Companies keep a record of

the supply chain activities and the material logistics that could be noticed during the construction process; database for such companies can provide data about material logistics. A performance measuring framework called AMBITE will be used to measure the success of the logistics plan.

Sustainability

Sustainability in construction projects can be environmental, economic, and social. Sustainability means that a company focuses on leaving a positive impact on the environment and society while making sure that they stick around for a longer time by improving their resources. In this project, sustainability would require reduced noise and material pollution so that environment or the neighborhoods are not disturbed. This can be achieved by an efficient and safe work environment that would reduce the chances of any delay in the project and not put any unnecessary burden on the environment, society, and the resources allocated for the project. The end goal of sustainability in construction projects is to help build a clean and healthy environment by efficiently using the resources. The goal of introducing sustainability is the use of recyclable material and the use of life-cycle costing that could help the environment and economic conditions of the company (Robichaud and Anantatmula 2008). Some regulations that government puts on the construction projects of residential buildings are focused on energy efficiency. National Construction Code has come up with measures and regulations that have improved energy efficiency in residential construction projects. These measures include the implementation of projects such as the Building Sustainability Index (Parliament of Australia, n.d.). In the future, policies and strategies can be introduced to improve the National Construction Plan and the sustainability of the construction projects. To improve the sustainability of the construction project, synergy can be established between Building

Information Modeling and lean construction. BIM covers lots of ground for sustainability as it focuses on the efficiency of the process, energy efficiency, and process visualization, whereas lean construction focuses on minimizing waste and optimizing the use of resources (Rahman et al. 2013). Combining lean construction and BIM can integrate the goals of sustainability in one program and save cost and time for the company and reduce any negative impact on the environment. I will research the use of recycled material and sustainable concrete to test whether it meets the strength requirements of the building. After the analysis and research are complete, I will move to the other material that can be replaced with sustainable materials in the construction. As construction projects require electricity for working, I will make sure to implement green energy if possible so that the energy consumption can be reduced. The success of the strategies will be measured by some quantitative measures such as life cycle assessment, measurement of ecological footprint, and measuring the environmental governance quality. Construction Project Sustainability Assessing System (CPSAS) is a helpful assessment tool to measure the performance of the sustainability measures of the construction projects.

Demolition and Reuse

Demolition allows safe and planned tearing down of any building. In the context of demolition and reuse, it means that an analysis should be made to identify material that can be salvaged and reused in another building before tearing down the building. In this project, recyclable materials will be used in such a way that if the building is demolished one day, it is easier to identify and salvage these recyclable materials. The intended goal for demolition and reuse is to reduce the cost of the material required for a new building and to achieve sustainability as recyclable material is cheaper and environmentally friendly while providing

almost the same strength. Demolition reuse also intends to reduce the demolition waste such as wall coverings, fasteners, and adhesives. Current residential demolition programs vary greatly across the region. Demolition strategies for different buildings and different regions vary based on the jurisdictions of the region. Variability in demolition practices is high on the construction sites, which hurts the chances of the potential reuse of the material. In the future, there is a possibility that new entities will come forth and meet the residential demolition demands and stabilize neighborhoods (EPA 2013). Strategies such as lean construction and recycling can be combined to improve the demolition reuse. Lean construction will optimize the material required for the construction project and recycling will focus on preserving such material and reusing it. It can help in the demolition reuse process because when the material is optimized, it becomes easier to identify and salvage the recyclable material. To ensure the reuse of the demolition material, I will come up with an adaptation and disassembly plan from the start and will back it up by using recyclable and durable material. Instead of using adhesives, I will normalize the use of mechanical fasteners such as bolts, nails, and screws that could be easily reused. Demolition reuse can be measured by gathering data about the waste produced during the construction process and resources spent on the material for the construction project. This data can be gathered from the company database and financial reports.

Bibliography

Apostolides, A.D., 2008. A Primer on Multifactor Productivity: Description, Benefits, and Uses | Bureau of Transportation Statistics [WWW Document]. URL https://www.bts.gov/browse-statistical-products-and-data/bts-publications/primer-multifactor-productivity-description (accessed 6.10.22).

Department of Industry, Science, Energy and Resources, 2018. Building and construction [WWW Document]. Dep. Ind. Sci. Energy Resour. URL https://www.industry.gov.au/regulations-and-standards/building-and-construction (accessed 6.10.22).

EPA, 2013. On the Road to Reuse: Residential Demolition Bid Specification Development Tool.

Hedborg Bengtsson, S., 2019. Coordinated construction logistics: an innovation perspective. Constr. Manag. Econ. 37, 294–307. https://doi.org/10.1080/01446193.2018.1528372

INTERNATIONAL LABOUR OFFICE, 2006. Occupational safety and health: Synergies between security and productivity.

Mahamid, I., 2021. Effects of Design Quality on Delay in Residential Construction Projects. J. Sustain. Archit. Civ. Eng. 28, 118–129. https://doi.org/10.5755/j01.sace.28.1.20531

Parliament of Australia, n.d. 7. Sustainable buildings [WWW Document]. URL https://www.aph.gov.au/Parliamentary_Business/Committees/House/ITC/DevelopmentofCities/Report/section?id=committees%2Freportrep%2F024151%2F25690 (accessed 6.11.22).

Rahman, M., Gonzalez, V., Amor, R., 2013. Exploring the Synergies between BIM and Lean Construction to Deliver Highly Integrated Sustainable Projects.

Reserve Bank of Australia, n.d. Productivity | Explainer | Education [WWW Document]. Reserve Bank Aust. URL https://www.rba.gov.au/education/resources/explainers/productivity.html (accessed 6.10.22).

Robichaud, L.B., Anantatmula, V.S., 2008. Sustainability- Construction Industry [WWW Document]. URL https://www.pmi.org/learning/library/sustainability-construction-industry-7099 (accessed 6.11.22).

Sharma, S., 2012. Towards a synergy between project and supply chain management. Int. J. Ind. Eng. Comput. 3. https://doi.org/10.5267/j.ijiec.2012.05.002

Vidolin, A., Romano, C., Cuzzuol, F., 2021. Synergy in the management of the civil construction industry: Applicability PDCA and DMAIC. https://doi.org/10.36229/978-65-5866-064-4.CAP.15