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Exploring the Delay Factors of Integrated Energy Project by Dynamic Green (Pvt.) Limited

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Abstract

Dynamic Green (Pvt.) Limited is the latest initiative of the Dynamic group of companies to tackle the most challenging issue faced by Pakistan that is energy crisis. In Pakistan, the manufacturing industry, businesses, and households face energy shortfalls. To achieve the objective of reduction in energy crises, Dynamic Green (Pvt.) Limited has started the first integrated energy project. The aim of this study is to explore the delay factors and their causes in an integrated energy project by Dynamic Green (Pvt.) Limited. Qualitative research methodology was used in this study. Data was collected through semi-structured interviews conducted with those employees of Dynamic Green (Pvt.) Limited who had been actively involved in this integrated energy project. NVivo v11 software was used to analyze the critical delay factors and their causes. By applying the word cloud and thematic analysis, the study found that communication gap, improper planning, incomplete documents, poor organizational processes, stakeholders' conflicts, lack of coordination between project coordinators, unskilled labor, procurement issues, and poor evaluation of vendor selection were significant delay factors in the integrated energy project. These findings are expected to be a noteworthy contribution of this study which recommends practical solutions to prevent further delays in the future.

Keywords: delay factors, Dynamic Green (Pvt.) Limited, integrated energy project, project management offices

1. Introduction

1.1. Background of the Study

Most of the world's energy is produced by burning fossil fuels such as coal, oil and gas. These natural resources are formed from the remains of plants and animals that died millions of years ago (Dimbleby, 2017). Some fossil fuels produce carbon dioxide (CO_2) that pollutes the environment (Dresselhaus & Thomas, 2001). Moreover, once fossil fuels are consumed they cannot be replaced, so people are now moving towards renewable sources of energy that provide an opportunity to

look for alternative energy sources in order to reduce the greenhouse effect and to save the environment (Ndahimana & Kim, 2017).

According to a recent report published by National Transmission and Dispatch Company (NTDC), a Pakistani government owned power transmission company, Pakistan is currently facing a shortfall of 6,000 megawatts (Ashfaq, Zhang & Malik, 2018). Therefore, many organizations are striving to find alternative ways to produce energy and Dynamic Green Private Limited (DGL) is one of them. These organizations are working on integrated energy projects in strategic collaboration with the Pakistani government. DGL is pursuing strategically long-term partnerships with the leading manufacturers of solar panels, batteries, mountings / accessories and invertors to serve its customers with premium quality and affordable solutions.

With the increase in the demand for electric power supply, DGL has engineered state of art and affordable solutions, such as integrated power generation projects. According to Khosa, Zia and Bhatti (2015), integrated projects installed in Pakistan such as solar energy and biogas are few in number. To maximize overall system efficiency, reduce costs, and optimize component development, the integrated system is another source of power supply which is being preferred on a domestic and commercial level and it may result in improved energy utilization (Kroposki et al., 2010).

The first task for integrated power projects consists of the development of a methodology for site selection (Atici, Simsek, Ulucan, & Tosun, 2015).The selection of an appropriate site is very difficult for integrated power projects, where both energy sources (dung and clear sunlight) are available (Correljé, Cuppen, Dignum, Pesch, & Taebi, 2015). Since the masses have no or little know-how about such projects, they believe that biogas system emissions have harmful effects and they cause serious diseases which affect human health adversely (Pandey & Bajgain, 2007). In Pakistan, DGL installed the first of its kind integrated solar and biogas project in Punjab because the areas of Vihari, Faisalabad, Sheikhupura, and Sumandri suffer from a shortfall of electricity (Dawn News, 2012).

When a project is started without a plan, its ground realities might be totally different. Additionally, there are a number of factors including procurement quality, key stakeholders, integration management, and communication gap (Odeh & Battaineh, 2002; Aibinu & Odeyinka, 2006; Alaghbari, Kadir & Salim, 2007; Shaikh, Muree & Soomro, 2010; Aziz, 2013) which may directly and indirectly impact the project (Akogbe, Feng & Zhou, 2013). The current study explored the delay factors of integrated projects that have a strong influence over procurement,

key stakeholders and communication of the management. The current study is different from previous studies in which strategic decisions of the organization were not focused with reference to their implementation.

1.1.1. What is project management? Project Management Institute (2017) defined a project as a temporary endeavor undertaken to create a unique product, result or service (Spinner & Spinner, 1992). Project management is the practice of initiating, planning, executing, controlling, and closing the work of a team to achieve specific goals and to meet specific success criteria in the specified time (Association of Project Management, 2019). The primary challenge of project management is to achieve all of the project goals within the given constraints. A project is divided into five process groups, that is, initiation, planning, executing, controlling, and closing (Spinner & Spinner, 1992). The brief description of each project process is provided in Table 1.

Table 1
The Project Processes

Sr.	Phase	Definition
1	Initiation	The pre-planning phase of the project
2	Planning	Getting the baseline on project cycle
3	Executing	Implementation of all the relevant activities
4	Controlling	This phase deals with the monitoring and controlling of all relevant activities
5	Closing	This is the termination phase

According to Munns and Bjeirmi (1996), the role of different project management tools and techniques for the successful implementation of projects has been broadly established in these project processes. If all steps are executed according to their planned baseline, then there is little possibility of failure or delay in the project.

1.1.2. Importance of project management offices (PMOs). Sokhanvar, Matthews and Yarlagadda (2014) argued that the project management office (PMO) is a department within a business, enterprise or organization that maintains the standards of project management. PMO emphasizes the best practices and processes within an organization (Hobbs, Aubry & Thuillier, 2008). PMO can execute a repeatable project delivery process, so an organization can easily manage and deliver a project. It provides the project management guidance, methods, systems, tools, and techniques so that project outcome remains uniform all over the organization (Hill, 2007). PMO sets functions, processes, policies, regulations, and

procedures and also assigns responsibilities that describe the management and control of projects, programs and/or portfolios. PMO manages and organizes resources throughout the project (Martin, Pearson & Furumo, 2005). It also manages the timeline, budget, and resources. According to Sokhanvar et al. (2014), the expectations from a PMO include the following,

1. Selection of a cost effective approach
2. Effective coordination
3. Selection of projects that are strongly tied to the business strategy
4. Appropriate resource allocation
5. Creating opportunities by accelerating the completion of projects

1.1.3. Renewable source energy projects.

1.1.3.1. Biogas energy projects. Biogas plant technology was introduced in 1974 in Pakistan. In the public sector, many Non-Governmental Organizations (NGOs) installed biogas plants at that time for domestic use in the countryside of Pakistan. Major contribution in the biogas technology is provided by the Pakistan Council for Renewable Energy Technologies (PCRET) and the Ministry of Science and Technology of Pakistan (MSTP) for developing renewable energy technologies to fulfill the future energy requirements of the country (Uddin et al., 2016). PCRET is involved in research and development (R&D) for improving the performance and efficiency of biogas plant technology (Rafique & Rehman, 2017). PCRET also provides technical familiarity and guidance for installing all levels of plants. Biogas plants are used for electric tube wells and power generation (Kamran, 2018). According to Khan et al. (2017), in recent years 4000 biogas plants have been installed in different cities of Pakistan both at domestic and industrial levels on a cost sharing basis. PCRET, National Institute of Electronics (NIE), Pakistan Council for Scientific and Industrial Research (PCSIR) along with the National University of Science and Technology (NUST) have also made considerable contributions in well-placed biogas resources (Khan et al., 2017). Parallel to these biogas projects, research and development is also underway on solar energy projects.

1.1.3.2. Solar energy projects. Zeb, Ahmad, Haider, Basit and Salman (2018) stated that the demand for electricity is increasing on a daily basis due to the growth of electrical and electronic products in the Pakistani market. So, many departments, agencies, and institutes are working on renewable energy in order to improve performance through an integrated energy system designed as a low cost solution to make a reliable power generation system. Due to the increasing demand for electricity, traditional and non-traditional power generation systems are needed to

be installed. Energy shortage is a critical issue in Pakistan, therefore, most institutes are searching for integrated energy system solutions.

1.1.4. Dynamic green private limited – an overview. Dynamic Group of companies is a top player in Pakistan for providing industrial and commercial solutions in the areas of plant engineering, procurement, and construction (EPC), industrial compressors and pumps, civil works and food industry. DGL is the latest initiative of the group to resolve the most important problem of Pakistan, that is, the energy crisis due to which the industrial sector, the commercial sector and the households are facing energy shortfalls. DGL aims to serve the demand for using efficient and environment friendly means of energy making with an initial focus on concentrated wind power and with the latest addition of solar power, biogas energy and other substitute energy technologies in its portfolio.

DGL trusts in managing business through innovative technologies and customer-centric solutions with its team of seasoned professionals. DGL plans the best economic solutions for all verticals of the corporate market, namely enterprise, government, community, and the industrial sector. The company is envisioned to become the leading EPC company in the domain of renewable energy solutions with a significant market share in Pakistan and is intended to pursue profitable ventures in other developing countries. Annexure - A enlists the solar energy projects in Pakistan carried out by DGL.

1.2. Problem Statement

Currently, Pakistan is facing a shortfall of 6,000 megawatts. In this regard, many organizations are striving to find alternative ways to produce integrated energy system solutions. DGL recently initiated an integrated solar and biogas project but it was delayed. The estimated cost was PKR 20 million but due to the delay in the project, the estimated cost overrun PKR 29 million. The delay caused the cost overrun of PKR 9 million (DGL, 2018). As stated earlier by Munns and Bjeirmi (1996), the role of different project management tools and techniques actually reduces the possibility of failure or delay in the project. Thus, a study is required to explore the factors that caused the delay in the DGL integrated solar and biogas project.

1.3. Research Objectives

The study addresses the following research objectives.

1. To identify the critical factors associated with the delay in the integrated solar and biogas project of Dynamic Green (Pvt.) Limited.

2. To propose a practical solution to prevent further delays in similar future projects of Dynamic Green (Pvt.) Limited.

1.4. Significance of the Study

Delay in a project is always a concern for project managers, whether it occurs in the construction industry, information technology sector or any other industry which involves capital-intensive investment projects. With this study, the researcher contributes in identifying some of the major reasons which cause delay in the construction industry and the power industry, specifically the installation of integrated (biogas and solar) power generation projects. This study not only identifies real-time factors that play a vital role in delaying projects but also recommends a practical solution for them and reduces the chances of their re-occurrence through project management tool and techniques. The implementation of this study will enhance the project management standards. The study inquired into the practitioners' views of the contribution that project managers should make to specific project related activities using project management tools and techniques.

The rest of the paper is organized as follows. Section 2 provides a rigorous review of integrated energy projects. Section 3 highlights the methodology of the research. Section 4 discusses the results. Finally, Section 5 encompasses the conclusion and recommendations for further research.

2. Literature Review

With the uncertain environmental conditions, projects demand new tools, business strategies and processes related to project management to reduce cost, improve quality, and customer satisfaction. Kerzner (2017) argued that a successful project plays a vital role for any organization. In simple words, a project can be a temporary endeavor undertaken to create a unique service, result or product (PMI, 2017). Aziz and Abdel-Hakam (2016) discovered that poor coordination between contractors and consultants can delay the project while studying a project in Egypt. The study found that the delayed supply of material at the site, lack of equipment, frequent design changes, lack of skilled labor, slow managerial decision making process, poor decision making processes and poor documentation were factors involved in delays in an Egyptian project through a questionnaire-based study.

Westerveld (2003) particularly found that the lack of skilled labor and procurement has a direct impact on the critical success factors of the project. Khosa et al. (2015) found that integrated energy projects are very complex projects because the main focus remains on the efficiency of the system. Khoshgoftar, Bakar and Osman (2010) conducted a study to figure out the causes of delay in Iranian

construction projects along with many other construction projects carried out around the world. Some of them were completed within the specified time and budget, while maintaining the quality, and as per the satisfaction of the client. The study found that communication gap between concerned parties (key stakeholders), improper planning, poor coordination between the consultant and contractor, and poor contract documentation are the key reasons for delays in projects.

Al-Kharashi and Skitmore (2009) said that most construction projects carried out by the government are long run projects in which multiple stakeholders are involved and these project are budget intensive. The common attributes of government projects include the fact that they are dynamic and have a high level of uncertainty. In the Saudi Arabian public sector construction projects, causes of delays included a poor relationship with key stakeholders. Moreover, seven other indirect factors contributed to project delays including material handling, unskilled labor, communication gap, lack of technology, poor governance, and autocratic leadership. The survey covered a sample of 86 clients, contractors and consultants working in the Saudi Arabian construction industry (Al-Kharashi & Skitmore, 2009).

According to Batool and Abbas (2017), the demand of energy in the commercial, residential and industrial sectors has increased; however, energy production could not meet the rising demand due to the use of electronic and electrical products flourishing in every field. In the industrial sector, organizations want minimum human error with fast track production. Indeed, competition is excessive in every field based on technology. The study highlighted that the reason for delays in the project were the three key stakeholders including the client, the contractor, and the consultant. Through a questionnaire, most respondents agreed that political issues caused a delay in civil work. Moreover, poor work breakdown structure (WBS) and schedule management were the leading reasons for delays in these projects.

Doloi, Sawhney, Iyer and Rentala (2012) found that the delay factors in construction projects within India are lack of communication, improper planning, lack of clarity in project scope, substandard contract, unskilled labor and poor productivity. Kazaz, Ulubeyli and Avcioglu (2012) argued that in developing and industrialized countries deviation from planned baselines and schedules is one of the frequently occurring problems in construction projects. Time extension is a frequent and prominent issue in Turkey's construction projects. The researcher underlined the factors which affect the construction projects. Design and material changes were found to be the most predominant factors. Similarly, payment delays

and cash flow problems, poor management, lack of labor, unskilled labor, and poor labor productivity were found to be significant contributors causing delay in projects. Poor management also has a direct relationship with factors such as lack of labor, unskilled labor, and poor labor productivity. Table 2 lists the major causes of project delays highlighted by earlier researchers in construction projects.

Table 2
Earlier Studies about the Causes of Project Delays

Article Name	Author Name	Country	Findings/Causes
Problem of projects and effects of delays in the construction industry of Pakistan .	Haseeb, Bibi and Rabbani (2011)	Pakistan	1. Client 2. Contractual work 3. Resource related issues 4. Delay in payment to the vendor 5. Insufficient reserve portion 6. Schedule payments 7. Inflation issues 8. Non-availability of experts 9. Loss of income 10. Wrong-site examination
Causes of construction delay; traditional contracts	Odeh and Battinaeh (2002)	Jordan	1. Contractors 2. Inefficient site administration 3. Inadequate planning 4. Sub-contractors 5. Background of contractors 6. Approaches utilized for construction
Delay mitigation in the Malaysian construction industry	Abdul-Rahman et al. (2006)	Malaysia	1. Monterey issues
Results of CFIB Surveys on the shortage of qualified labor	Bruce (2001)	Canada	1. Lack of labor

Skill and labor shortages: definition, cause and implications	Trendle (2008)	-	1. Increment in the interest for labor 2. Lack of skilled labor happens
Causes of delay in building construction projects in Egypt	Abd El-Razak, Bassioni and Mobarak (2008)	Egypt	1. Poor strategies 2. Lack of proper communication 3. Ineffective supervision 4. Lack of proper road map 5. Poor labor management 6. Poor design
Causes, effects and methods of minimizing delays in construction projects	Wei (2010)	Malaysia	1. Conflicts in sub-contractual work plan 2. Immature planning 3. Poor flaw of financing 4. Poor communication 5. Poor road map 6. Stakeholders' concerns 7. Inexpert sub-contractors 8. Improper execution of construction techniques 9. Impact of sub-service and ground conditions 10. Impact of climate conditions on construction exercises 11. Adjustment in government rules
Improving construction productivity on Albert oil and gas capital project	Jergeas (2008)	Alberta	1. Poor side management 2. Poor planning and scope of work 3. Late payments 4. Lack of material availability 5. Mistakes in construction phase

Analyzing schedule delay of mega projects: lessons learned from Korean train express	Han et al. (2009)	Korea	1. Unforeseen ground realities 2. Consultant related causes 3. Improper side management 4. Poor stakeholder management 5. Lack of resources
Causes and effects of delays in Malaysian construction industry	Sambasivan and Soon (2007)	Malaysia	1. Poor procurement issues 2. Communication related issues 3. Environmental issues 4. Machine and availability issues

3. Research Methodology

This research is exploratory in nature. It is intended to explore the delay factors of the integrated energy project of Dynamic Green (Pvt.) Limited at Sumandri, for which we adopted the qualitative research approach. Thus, in-depth, face to face, semi-structured interviews were conducted with the individuals who were practically involved in the integrated energy project to get an insight into each interviewee's perspective. The study setting was non-contrived; it was conducted in a natural environment. The source of data was primary because the researcher visited the respondents and recorded the interviews and decoded them afterwards. The research design is cross-sectional.

Since the project has been completed and most of the participants who actively performed in the project are now working on other projects at other localities; therefore, it was difficult to take all of them in loop to fill out a questionnaire due to limited budget and time span. Moreover, Van Maanen (1983) recommended qualitative research as it allows the researchers to know the participants' opinion, attitude, behavior, perception, and expectation during the delivery of information. Therefore, non-probability purposive sampling technique was used because we intentionally conducted five (5) in-depth interviews with the respondents who played an active role in the integrated energy project and who were all employees of DGL. Table 3 provides the respondents' designation details at DGL. The data was analyzed through thematic analysis using NVivo software.

Table 3
Respondents' Name and Designation

Respondent Name*	Designation
Mr. A	General Manager
Mr. B	Project Manager
Mr. C	Procurement and Supply Chain Head
Mr. D	Planning and Risk Assessment Engineer
Mr. E	Site Coordinator Engineer

*The name of respondents is not disclosed due to academic integrity.

4. Data Analysis and Results

4.1. Word Cloud

Word cloud is an image or a visual representation of textual data in the form of tags, which are single words that indicate the frequency of keywords used in the collected data (Vaquero, Rodero-Merino, Caceres & Lindner, 2008). Figure 1 shows the word cloud of the data collected from the individuals interviewed in this study.

Figure 1. Word cloud

The analysis of the word cloud data using NVivo disclosed the following keywords.

1. Communication
2. Issues
3. Plan
4. Management
5. Project
6. Improper
7. Delay
8. Processes
9. Custom
10. Activates
11. Vendor
12. Immature
13. Stakeholders
14. Evaluation

4.2. Thematic Analysis

Thematic analysis is a popular method for analyzing qualitative data in the fields of data science and psychology. Thematic analysis is among a cluster of methods that focus on identifying patterns (themes) across a dataset (Joffe, 2012). It provides the opportunity to codify and categorize themes. In this study, four themes emerged after the coding and decoding of data.

4.2.1. Communication gap between key stakeholders.

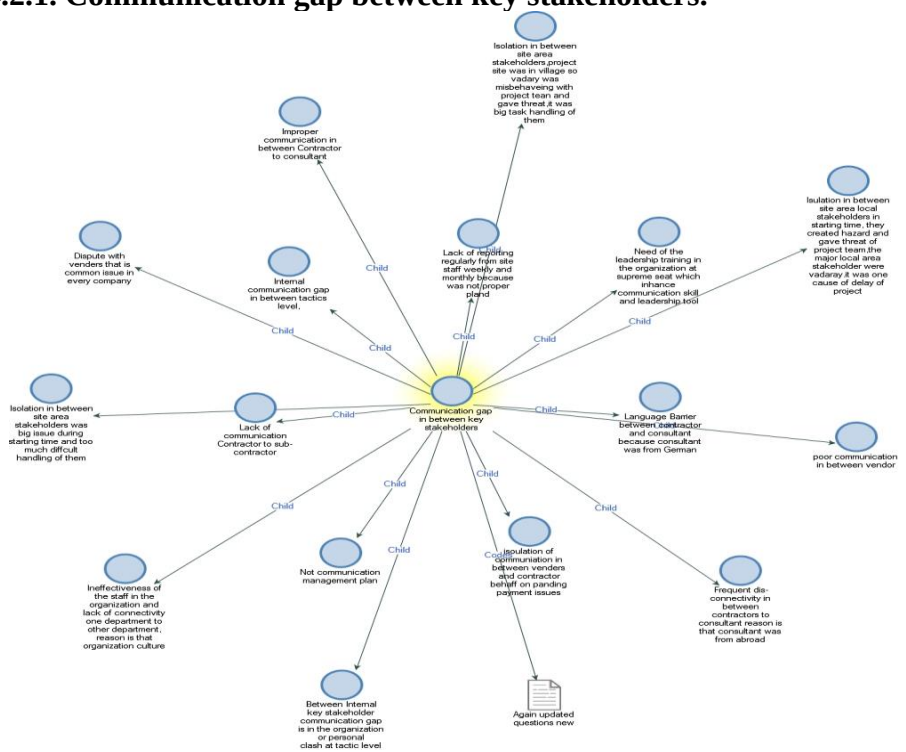

Figure 2. Communication gap between key stakeholders

After conducting interviews and as per respondents' reviews, communication gap between key stakeholders appeared to be an important theme of the following diagram and it was influenced by factors presented in Figure 2. The perceived communication gap was actually a lack of communication between internal and external stakeholders which caused misunderstanding and poor communication between internal and external stakeholders.

4.2.2. Improper planning.

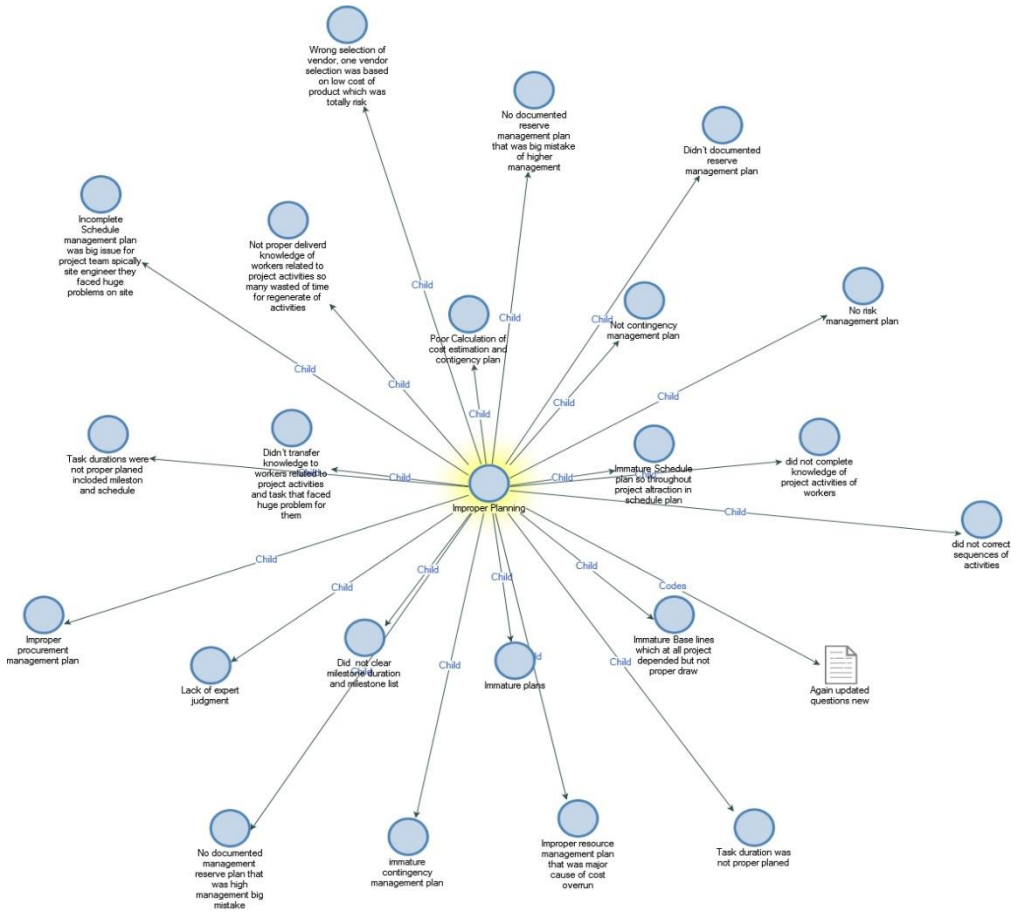

Figure 3. Improper planning

After conducting interviews and as per respondents' reviews, improper planning was found out to be another important theme and it was influenced by factors presented in Figure 3. These factors include improper planning with regard to the lack of using proper project management tools and techniques, lack of documentation, no risk assessment and improper resource management plan.

4.2.3. Incomplete processes.

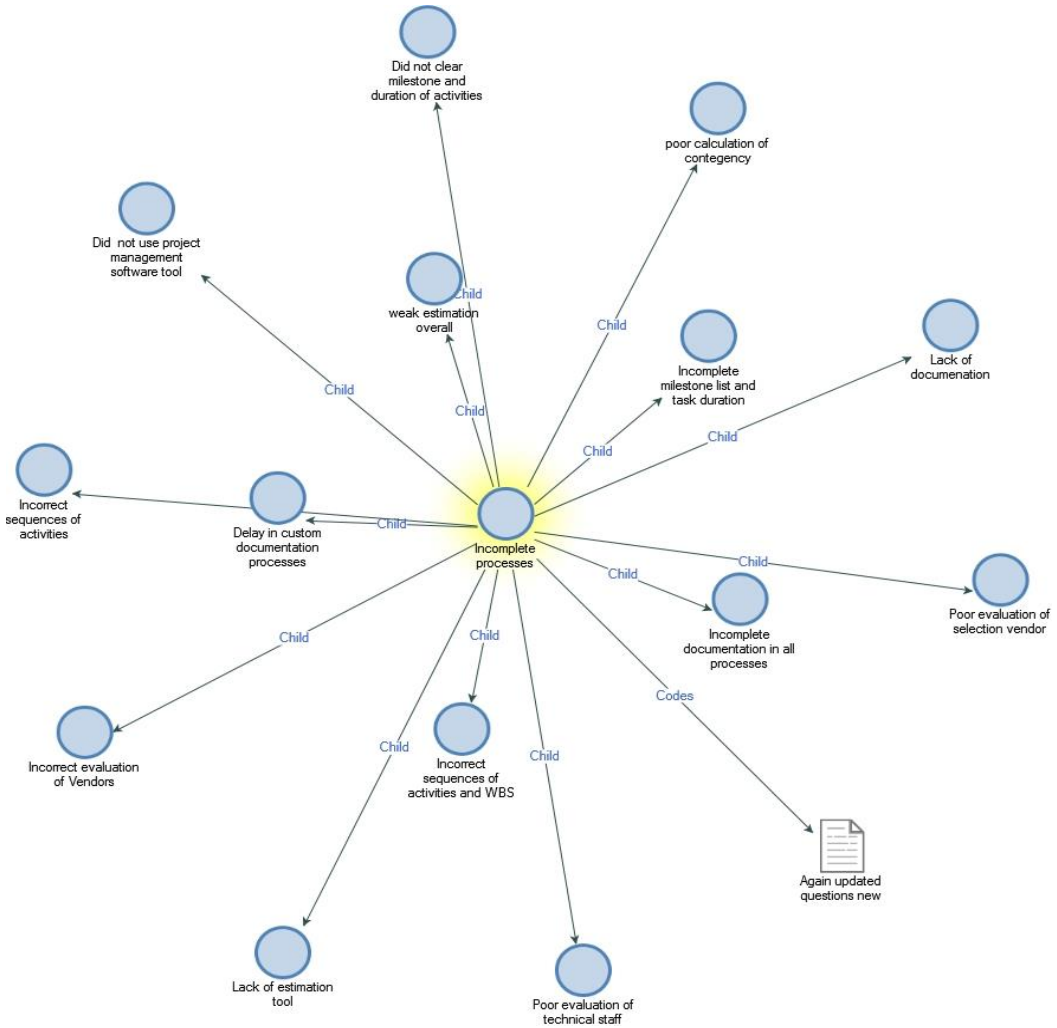

Figure 4. Incomplete processes

The third theme discovered after conducting interviews were incomplete processes and factors attached to this theme are presented in Figure 4. This theme was based on different factors such as poor evaluation of technical staff, lack of documentation, incomplete milestone and task duration, incorrect sequence of activity, weak estimation, and lack of estimation tools. All of these factors caused delay in the project.

4.2.4. Procurement factors.

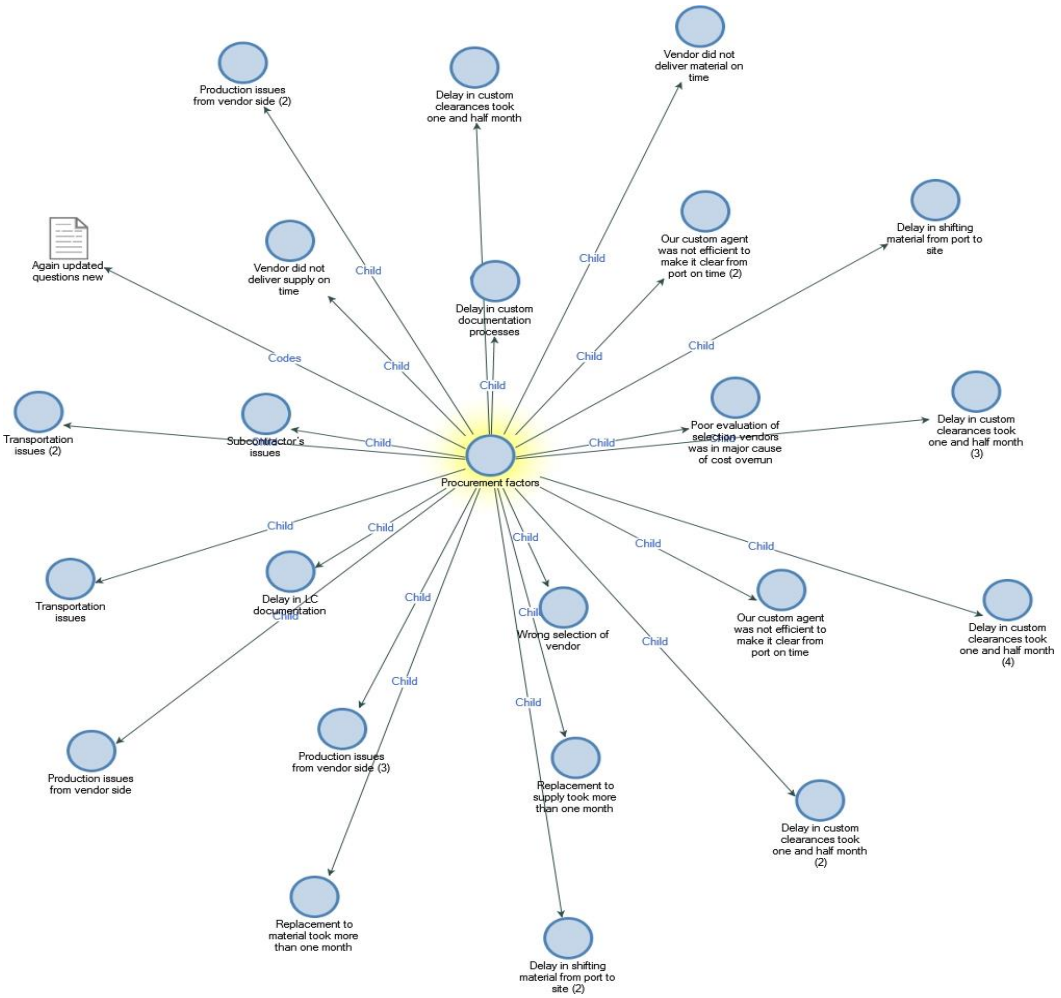

Figure 5. Procurement factors

Procurement turned out to be a major theme and the determinants of procurement are presented in Figure 5. It was found that transportation issues, production issues from vendor side, delay in material due to incomplete documentation, unconformities in order, delay in shifting material, custom clearance issue, wrong selection of vendor, and inefficiency of custom agent to clear the material from port on time are all the factors which caused delay and cost overrun in the integrated energy project.

5. Discussion and Conclusion

The study highlights the factors causing delay in the integrated energy project of Dynamic Green (Pvt.) Limited at Sumandri. Thematic analysis identified four major factors that have been a major cause of delay in the completion of the project. A gap of communication between key internal and external stakeholders was identified as one of the key causes of delay. The internal communication gap was due to poor coordination between contractors and consultants who were key stakeholders in the project. The communication gap between contractor and consultant was due to language barriers because the consultant was from Germany and the DGL engineer was not very familiar with English or German languages. So, there was a lack of consultation with the contractor which deprived him of the latest updates in the execution phase and during other activities of the project.

Al-Kharashi and Skitmore (2009) argued that there was a lack of coordination at the departmental and the tactical levels due to a culture of silo leadership in the organization. Resultantly, they shared information with other departments. In the same scenario, there is a *seith* system or *seith* culture in DGL based on an autocratic leadership which is not applicable in project based organizations because they need synergized work. Westerveld (2003), Wei (2010), Khoshgoftar et al. (2010), and Doloi (2013) also highlighted this issue in their case study that weak communication between vendors and contractors resulted in disputes among them. Moreover, Batool and Abbas (2017); Aziz and Abdel-Hekem (2016); Kharashi and Skitmore (2009) also identified communication gap as a delay factor in projects in their respective case studies.

The study also found the lack of proper project planning as another vital factor. Planning is a major part of a project and all baselines are made in this phase. On the flipside, DGL management missed certain details, such as they did not document reserve management plan and task durations were also not properly planned including milestones and schedules. The improper resource management plan was the major cause of cost overrun. The lack of contingency management plan and ignoring the fluctuation of currency rates also shows poor planning. The findings are consistent with the studies of Khoshgoftar et al. (2010) and Doloi (2013) that also highlighted incomplete planning processes.

The procurement factor was found to be the third major cause of delay in the integrated energy project. One of the major causes of delay in procurement was late payment by the client from the beginning. Mostly, the contractor depended on advance payment by the client and its delay contributed to the delay in placing an order to the vendor in China and Germany for supplying the required equipment.

DGL could not initiate the procurement process as per the contract's terms. During this period, a new issue created by third party (bank) LC documentation was not completed according to vendor's requirements due to the lack of awareness on the behalf of the contractor of this process. Moreover, the selection of the vendor was wrong because its selection was based on the low cost of equipment. However, when the equipment finally arrived after a long delay it did not meet the required standards.

Lastly, the logistic arrangements were also weak. Customs agent was not efficient to clear the material from the port on time because of which the contractor was not sure about the delivery of the equipment at the right time. Resultantly, the supply arrived three weeks later than the scheduled date. Moreover, logistic issues, transportation issues, delay in shifting material from port to site, delay in custom documentation processes, late delivery of supply by the vendor, and production issues from vendor side, all of these factors created logistic problems that delayed the project.

5.1.Recommendations

The following recommendations are made for DGL keeping in view the integrated energy project.

- In order to achieve sustainable competitive advantage, the management of the company needs to give its employees training related to PMP to meet the international standards.
- The autocratic leadership culture at the tactical level creates a communication gap between key stakeholders and departments.
- DGL is working as a project contractor with the Pakistani government's renewable energy sectors and its core business is installing different projects. So, it's a project based organization. Therefore, it must apply the processes and practices of Project Management Body of Knowledge (PMBOK), its project management tools and techniques and update them from time to time.
- The project management plan consists of a risk management plan, a stakeholder management plan, a cost management plan, a schedule management plan, and a communication management plan. Therefore, PMBOK must be prepared considering lessons learned from ongoing changes taking place in the external environment and analyzed by a project team including Project Manager and other Subject Matter Experts (SMEs) and their findings should be reexamined by a competent practitioner.

- Before the submission of the bidding project deadline, it must take into account factors such as cost, schedule, and enterprise environmental factors. So, there must be a 15 percent contingency buffer to be added in the project schedule and in cost estimation using PMBOK tools and techniques.

References

Abd El-Razak, M. E., Bassioni, H. A., & Mobarak, A. M. (2008). Causes of delay in building construction projects in Egypt. *Journal of construction engineering and management*, *134*(11), 831–841.

Abdul-Rahman, H., Berawi, M. A., Berawi, A. R., Mohamed, O., Othman, M., & Yahya, I. A. (2006). Delay mitigation in the Malaysian construction industry. *Journal of construction engineering and management*, *132*(2), 125–133.

Aibinu, A. A., & Odeyinka, H. A. (2006). Construction delays and their causative factors in Nigeria. *Journal of construction engineering and management*, *132*(7), 667–677.

Akogbe, R. K. T., Feng, X., & Zhou, J. (2013). Importance and ranking evaluation of delay factors for development construction projects in Benin. *KSCE Journal of Civil Engineering*, *17*(6), 1213–1222.

Alaghbari, W. E., Kadir, M. R. A., & Salim, A. (2007). The significant factors causing delay of building construction projects in Malaysia. *Engineering, Construction and Architectural Management*,*14*(2), 196–206.

Al-Kharashi, A., & Skitmore, M. (2009). Causes of delays in Saudi Arabian public sector construction projects. *Construction Management and Economics*, *27*(1), 3–23.

Association for Project Management (APM). (2019). *APM: Body of knowledge* (5th ed.). High Wycombe, Buckinghamshire: Author.

Ashfaq, S., Zhang, D., & Malik, T. N. (2018, November). *Sequence components based three-phase power flow algorithm with renewable energy resources for a practical application*. Paper presented in the 2018 Australasian Universities Power Engineering Conference (AUPEC), IEEE.

Atici, K. B., Simsek, A. B., Ulucan, A., & Tosun, M. U. (2015). A GIS-based multiple criteria decision analysis approach for wind power plant site selection. *Utilities Policy*, *37*, 86–96.

Aziz, R. F. (2013). Ranking of delay factors in construction projects after Egyptian revolution. *Alexandria Engineering Journal*, *52*(3), 387–406.

Aziz, R. F., & Abdel-Hakam, A. A. (2016). Exploring delay causes of road construction projects in Egypt. *Alexandria Engineering Journal*, *55*(2), 1515–1539.

Batool, A., & Abbas, F. (2017). Reasons for delay in selected hydro-power projects in Khyber Pakhtunkhwa (KPK), Pakistan. *Renewable and Sustainable Energy Reviews*, *73*, 196–204.

Bruce, D. (2001). *Help wanted: Results of CFIB surveys on the shortage of qualified labour*. Ottawa: Canadian Federation of Independent Businesses.

Correljé, A., Cuppen, E., Dignum, M., Pesch, U., & Taebi, B. (2015). *Responsible innovation in energy projects: Values in the design of technologies, institutions and stakeholder interactions*.Dordtrecht: Springer.

Dawn News. (2012). *Electricity shortfall in the country reaches 8,500 MW*. Received August 17, 2019, from https://www.dawn.com/news/727263

Dimbleby, G. W. (2017). *The domestication and exploitation of plants and animals*. New York: Routledge.

Doloi, H. (2013). Cost overruns and failure in project management: Understanding the roles of key stakeholders in construction projects. *Journal of Construction Engineering and Management*, *139*(3), 267–279.

Doloi, H., Sawhney, A., Iyer, K. C., & Rentala, S. (2012). Analysing factors affecting delays in Indian construction projects. *International Journal of Project Management*, *30*(4), 479–489.

Dresselhaus, M. S., & Thomas, I. L. (2001). Alternative energy technologies. *Nature*, *414*(6861), 332.

DGL. (2018). *Annual Report 2018 of Dynamic Green Limited*. Faisalabad: Author.

Han, S. H., Yun, S., Kim, H., Kwak, Y. H., Park, H. K., & Lee, S. H. (2009). Analyzing schedule delay of mega project: Lessons learned from Korea train express. *IEEE Transactions on Engineering Management*, *56*(2), 243–256.

Haseeb, M., Bibi, A., & Rabbani, W. (2011). Problems of projects and effects of delays in the construction industry of Pakistan. *Australian Journal of Business and Management Reresearch*, *1*(5), 41–50.

Hill, G. M. (2007). *The complete project management office handbook (3rd ed.)*. Florida: Auerbach Publications.

Hobbs, B., Aubry, M., & Thuillier, D. (2008). The project management office as an organisational innovation. *International Journal of Project Management*, *26*(5), 547–555.

Jergeas, G. (2009). *Improving construction productivity on Alberta oil and gas capital projects*. Retrieved from https://open.alberta.ca/dataset/5b389bc8-861b45d0bb532172aabdae28/resource/faba85d0d3984d2a9de02010d698b80e/download/improving-construction-productivity.pdf

Joffe, H. (2012). Thematic analysis. In David Harper & Andrew R. Thompson (Eds.), *Qualitative Research Methods in Mental Health and Psychotherapy: A guide for students and practitioners.* New Jersey: John Wiley.

Kamran, M. (2018). Current status and future success of renewable energy in Pakistan. *Renewable and Sustainable Energy Reviews*, *82*, 609–617.

Kazaz, A., Ulubeyli, S., & Tuncbilekli, N. A. (2012). Causes of delays in construction projects in Turkey. *Journal of Civil Engineering and Management*, *18*(3), 426–435.

Kerzner, H. (2017). *Project management metrics, KPIs, and dashboards: A guide to measuring and monitoring project performance*. New Jersey: John Wiley.

Khan, I. U., Othman, M. H. D., Hashim, H., Matsuura, T., Ismail, A. F., Rezaei-DashtArzhandi, M., & Azelee, I. W. (2017). Biogas as a renewable energy fuel–A review of biogas upgrading, utilisation and storage. *Energy Conversion and Management*, *150*, 277–294.

Khosa, F. K., Zia, M. F., & Bhatti, A. A. (2015, December). *Genetic algorithm based optimization of economic load dispatch constrained by stochastic wind power*. Paper presented at the 2015 International Conference on Open Source Systems & Technologies (ICOSST), IEEE.

Khoshgoftar, M., Bakar, A. H. A., & Osman, O. (2010). Causes of delays in Iranian construction projects. *International Journal of Construction Management*, *10*(2), 53–69.

Kroposki, B., Pink, C., DeBlasio, R., Thomas, H., Simoes, M., & Sen, P. K. (2010). Benefits of power electronic interfaces for distributed energy systems. *IEEE Transactions on Energy Conversion*, *25*(3), 901–908.

Martin, N. L., Pearson, J. M., & Furumo, K. A. (2005, January). *IS project management: size, complexity, practices and the project management office*. Paper presented at the Proceedings of the 38th Annual Hawaii International Conference on System Sciences, IEEE.

Munns, A. K., & Bjeirmi, B. F. (1996). The role of project management in achieving project success. *International Journal of Project Management*, *14*(2), 81–87.

Ndahimana, D., & Kim, E. K. (2017). Measurement methods for physical activity and energy expenditure: Areview. *Clinical Nutrition Research*, *6*(2), 68–80.

Odeh, A. M., & Battaineh, H. T. (2002). Causes of construction delay: Traditional contracts. *International Journal of Project Management*, *20*(1), 67–73.

Pandey, B., & Bajgain, S. (2007). Feasibility study of domestic biogas in Pakistan. New York: UNDP.

Pemsel, S., & Wiewiora, A. (2013). Project management office a knowledge broker in project-based organisations. *International Journal of Project Management*, *31*(1), 31–42.

Project Management Institute (PMI). (2017). *Pulse of the profession*. Philadelphia, PA: Author.

Rafique, M. M., & Rehman, S. (2017). National energy scenario of Pakistan: Current status, future alternatives, and institutional infrastructure – An overview. *Renewable and Sustainable Energy Reviews*, *69*, 156–167.

Rosen, M. A. (2009). Combating global warming via non-fossil fuel energy options. *International Journal of Global Warming*, *1*(1-3), 2–28.

Sambasivan, M., & Soon, Y. W. (2007). Causes and effects of delays in Malaysian construction industry. *International Journal of Project Management*, *25*(5), 517–526.

Shaikh, A. W., Muree, M. R., & Soomro, A. S. (2010). Identification of critical delay factors in construction. *Sindh University Research Journal-SURJ (Science Series)*, *42*(2), 11–14.

Sokhanvar, S., Matthews, J., & Yarlagadda, P. (2014). Importance of knowledge management processes in a project-based organization: A case study of research enterprise. *Procedia Engineering*, *97*, 1825–1830.

Spinner, M., & Spinner, M. (1992). *Elements of project management: Plan, schedule, and control*. London: Prentice Hall.

Trendle, B. (2008). *Skill and labour shortages-definition, cause and implications*. Queensland: Department of Education, Training, and the Arts.

Uddin, W., Khan, B., Shaukat, N., Majid, M., Mujtaba, G., Mehmood, A., ... & Almeshal, A. M. (2016). Biogas potential for electric power generation in Pakistan: A survey. *Renewable and Sustainable Energy Reviews*, *54*, 25–33.

Van Maanen, J. (1983). *Qualitative methodology*. Beverly Hills, CA: Sage.

Vaquero, L. M., Rodero-Merino, L., Caceres, J., & Lindner, M. (2008). A break in the clouds: Towards a cloud definition. *ACM SIGCOMM Computer Communication Review*, *39*(1), 50–55.

Wei, K. S. (2010). *Causes, effects and methods of minimizing delays in construction projects: A project report*. Malaysia:Faculty of Civil Engineering, Universiti Teknologi Malaysia.

Westerveld, E. (2003). The project excellence model: Linking success criteria and critical success factors. *International Journal of Project Management*, *21*(6), 411–418.

Zeb, A., Ahmad, S., Haider, A., Basit, A., & Salman, M. (2018, September). *How to resolve energy problems of Pakistan*?Paper presented at the 2018 International Conference on Power Generation Systems and Renewable Energy Technologies (PGSRET), IEEE.