

# Design Change in Ghanaian power projects: identifying important cause factors

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## INTRODUCTION

- The construction sector is an important part of every country's growth and economic output, accounting for up to 10% of GDP.
- Design change is one of the most influential change causing factor in construction projects and has detrimental influence on project performance.
- On the contrary, there is limited study when it comes to design changes in power projects.



Source: <https://www.singaporeassignmenthelp.com/>

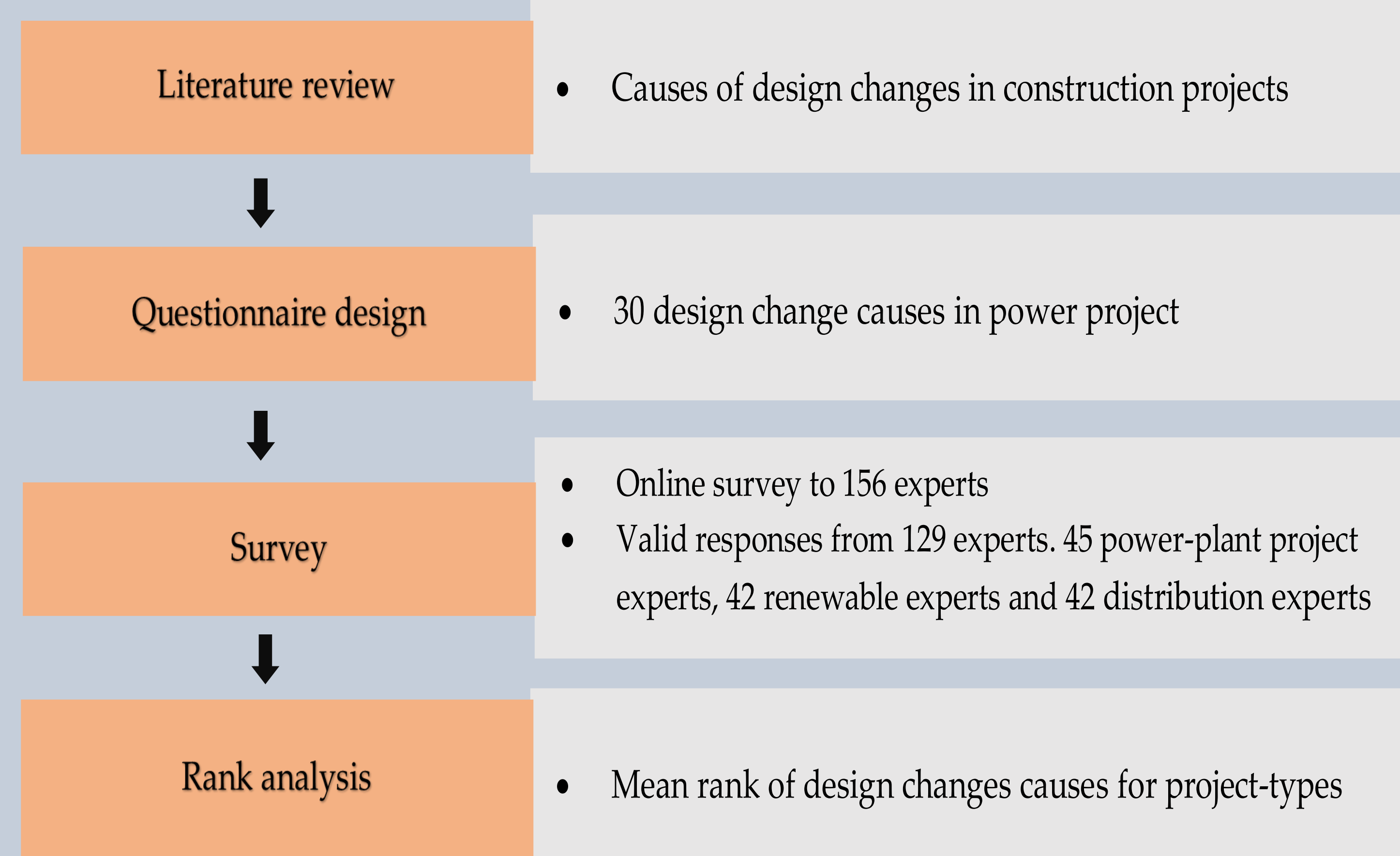


Source: <https://www.canadianenergycentre.ca/construction-ramping-up-on-lng-canada/>

The study categorizes power projects into 3 types.

- Power plant project-type
- Renewable project-type
- Distribution and transmission project-type

## METHOD OF STUDY



## OBJECTIVE OF STUDY

The outcomes of this study will help clients, consultants, and contractors in determining the major reasons of design changes in power projects. Therefore objective of this study is;

- To investigate the most important cause of design change for all power project-types.
- Analyze the gaps between different power project-types.

## SURVEY RESULT

	Power plant		Renewable		Distribution & Transmission	
	Mean	Rank	Mean	Rank	Mean	Rank
Change of Plans	2.82	18	3.02	20	3.33	3
Technology changes	2.62	28	2.93	24	2.36	30
Conflict between contract documents	3.07	5	3.12	16	2.93	13
Lack of technical knowledge to comprehend and visualize project	2.8	20	3.14	13	2.67	18
Financial problems	3.67	1	3.93	1	3.71	1
Poor project objective definition	3.04	7	3.29	9	3.14	5
Long decision making time	2.93	11	3.33	7	3.21	4
Additional work	2.73	22	3.07	18	3.14	5
Change of designers	2.71	23	2.64	30	3	12
Estimation errors	2.64	26	2.86	26	2.67	18
Ineffective supervision	2.64	26	2.83	27	2.55	26
Equipment and Material failure	2.87	17	3.31	8	2.74	16
Health and Safety considerations	2.93	11	3.21	10	3.1	10
Lack of coordination and communication	3.02	9	2.88	25	2.64	21
Deficient resources in quality and quantity	2.89	14	3.64	2	3.12	8
Inadequate construction experience	2.89	14	2.98	23	2.67	18
Lack of awareness about governmental regulations, statues and their modification	2.93	11	3.14	13	2.52	27
Inadequate pre-construction study and review of design documents	2.89	14	3.38	6	2.64	21
Contractor's desire to improve their financial situation	2.29	30	3	22	2.57	25
Design complexity	2.82	18	3.07	18	2.71	17
Errors and Omission in design	3.47	2	3.4	4	3.12	8
Noninvolvement of other parties during design phase	3.07	5	3.19	11	2.9	14
Modification of original design	3.16	4	3.1	17	3.05	11
Lack of design experience	2.96	10	3.14	13	2.6	24
Application of inappropriate standards	3.04	7	3.17	12	2.9	14
Problems or unforeseen Site conditions	3.29	3	3.4	4	3.43	2
Political Instabilities	2.78	21	2.81	28	2.45	29
Very poor weather conditions	2.67	24	2.71	29	2.48	28
Changes in governmental policies	2.6	29	3.02	20	2.62	23
Inflations and interest and exchange rates	2.67	24	3.57	3	3.14	5

Table 1. Rank and Mean score for 30 causes of design change for power project-types

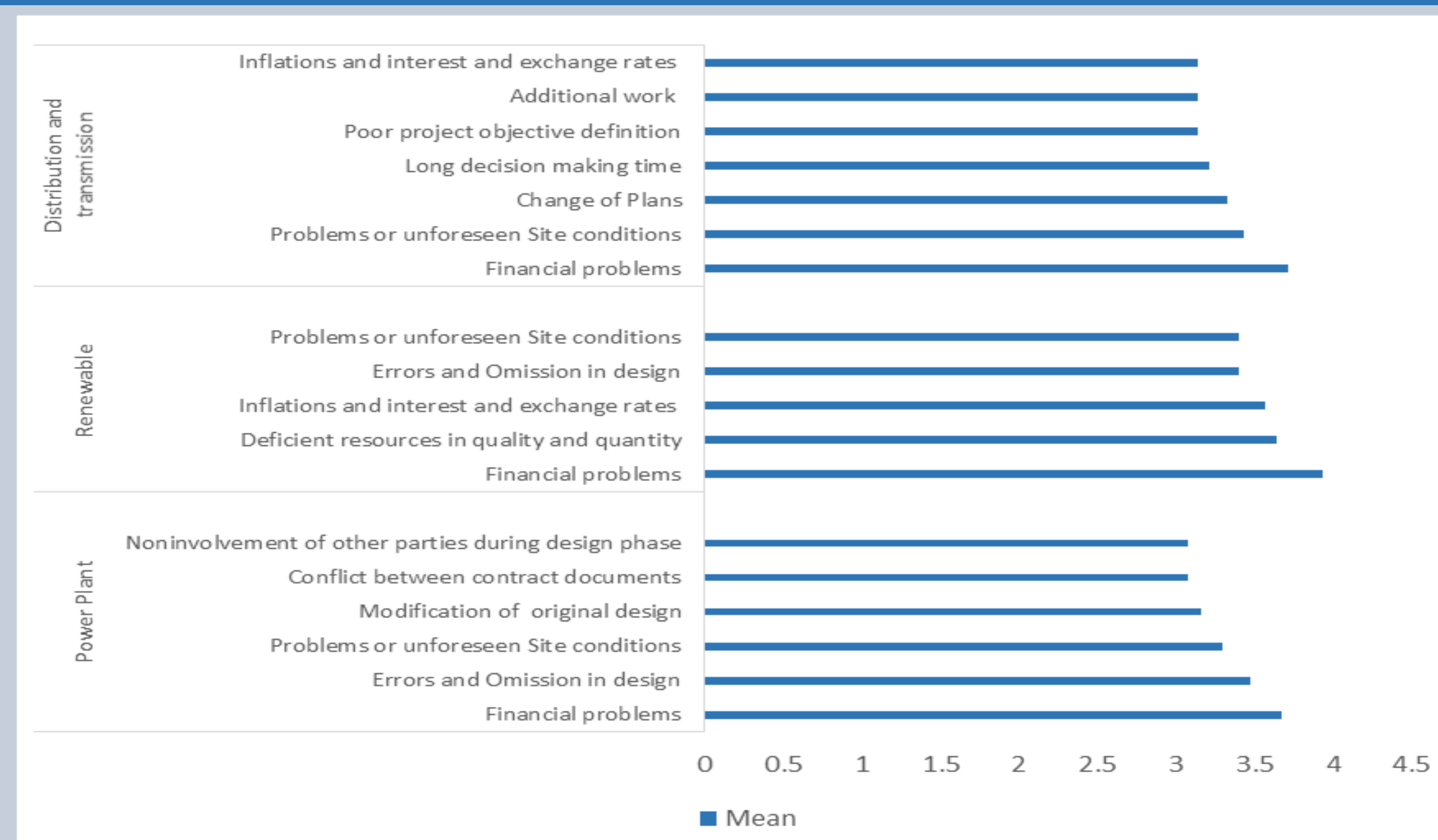


Figure 1. Graphical representation of top 5 important causes ranking for project-types

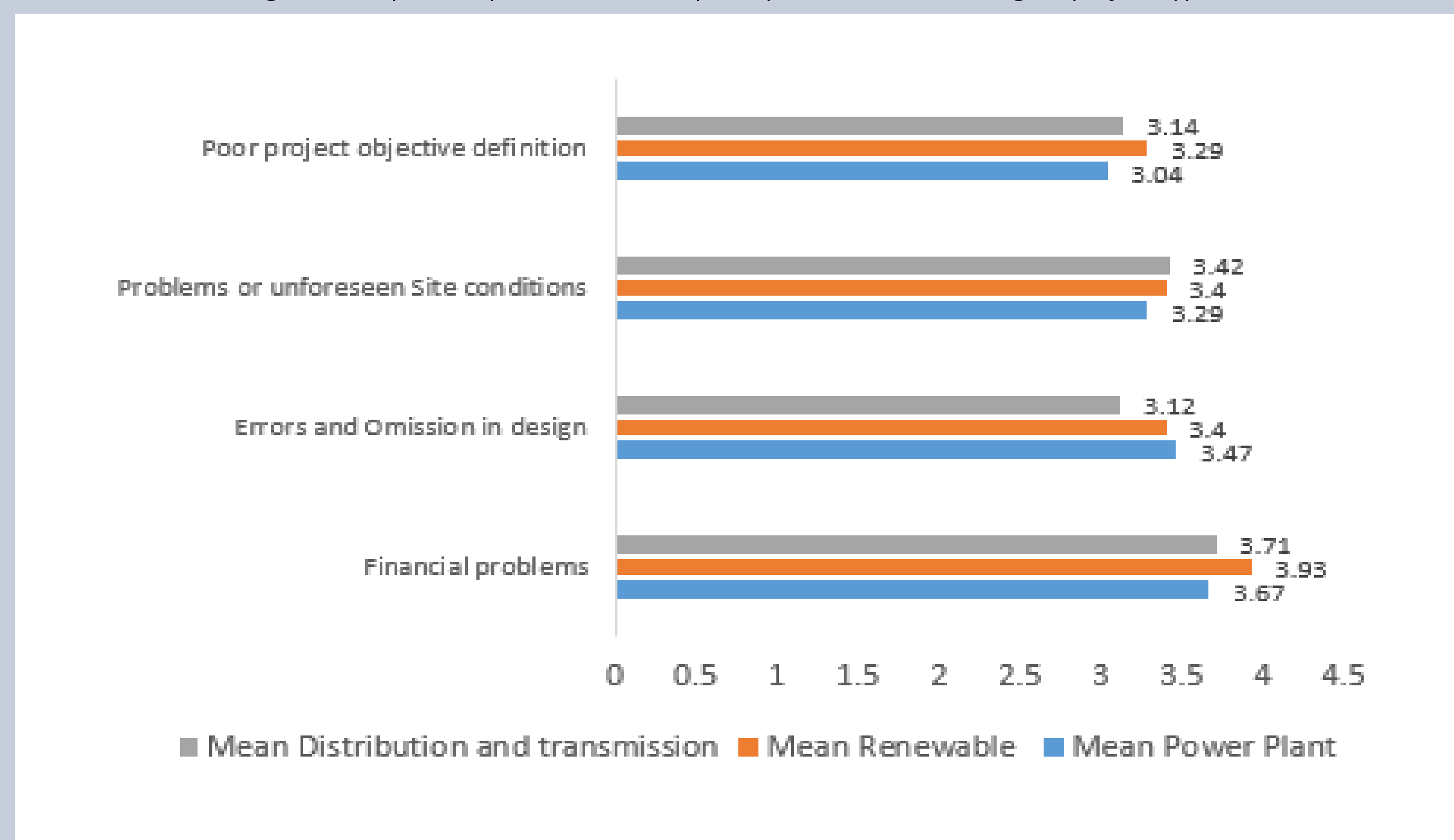


Figure 2. A mean comparison of four common factors that rank in the top ten for all project types.

## DISCUSSION AND CONCLUSION

- The findings show that owner-related financial problems are the most important cause of design change across all project-types, highlighting the significance of this issue in Ghanaian power projects.
- Findings point out financial problems, errors and omission in design, problems or unforeseen site conditions and poor project objective definition as common causes in top 10 rank for all three project-types as shown in figure 2.
- Owner's inability to satisfy contractor's demand financially owing to increasing business and market demands as well as estimation errors places serious pressure on contractors.
- The findings in this paper will allow key construction participants to adopt strategies that will help them mitigate the negative effects of design changes while also improving project performance.
- Variations in findings is as a result of scope and nature of work, projects complexity, the type of contractual agreement and involved stakeholders for each project-type and depending on the country.
- This study will be helpful for future energy projects including nuclear power plants that a country will undertake mostly in developing countries.