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RISK MANAGEMENT APPROACHES AND CONSTRUCTION PROJECT PERFORMANCE IN THE NATIONAL CONSTRUCTION INDUSTRY COUNCIL, MALAWI

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Abstract: *The article examines risk management approaches and construction project performance in the National Construction Industry Council of Malawi (NCIC). Established in 1996, NCIC is a mother body in the construction industry, which has over 994 construction companies registered (NCIC Directory 2019). In line with contingency theory our research looked at the risks from internal and external perspective. Guided by a conceptual framework the research was led by a concept that presents an interaction between independent variables (risk management approaches) and intervening variables influencing construction project performance. A mixed research design was adopted in data gathering using structured interview and questionnaire to a sample of 46 construction companies where a response rate of 76% was obtained. Findings showed that due to complexity of risk appraisal in financial, contractual, health and safety approaches, most small scale contractors keep lagging behind project delivery leading to service delay to the public, less contribution to the GDP of Malawi with about 7.3%, and also causing physical harm to construction workers to a certain extend. We concluded that risk management approaches implemented in NCIC were effective, however it is the cost of these approaches that causes companies not to adhere to the set quality assurance principles and guidelines. The study recommends that SMC should contract experienced consultants to map out appropriate cost effective strategies that could be applied by all the stakeholders in the industry. For further studies, research could be done on factors that affects adherence to risk management approaches in the construction sector in the Country.*

Key Terms: Malawi, Risk, Management, Approaches, Construction, Project, Performance

1.1 Introduction

The construction industry of Malawi is characterised by small- and medium-scale contractors (SMCs) who constantly face emerging challenges in implementing risk management approaches that affects project performance. These SMCs have been struggling to move up to a global standard due to inadequately trained work force and unfavourable economic climate causing construction projects cost overruns, delays and termination. This research was led with reference to existing hypothetical writing, distributed and published.

Uncertainties emerge in our day to day operations leading to exposure of business to threat and also presenting opportunities (Hilson, 2011). Risk has always demonstrated a significant impact towards construction project performance hindering cost, time and quality of products. These risks were found to fall under financial, contractual, Compliance, health and safety risks category (Nicholas, 2012). Henderson (2010) discussed that, in order to achieve quality, time and budget goals, construction companies across the globe had to adopt a systematic approach towards risk management in construction projects. From early 1980's, mobile IT systems were developed in place of traditional methods to act as application service providers (ASP) for implementation of construction projects (Farrada 2014). Since then, a lot of construction companies across the globe came on scene and were highly productive until after the financial crisis in 2008, when construction performance was unpleasant, resulting into project losses (Ihab, 2010). A need for restructuring risk management approaches was presented to the construction industry to minimize these losses.

Failure to adhere to risk management approaches has caused poor project delivery by construction firms in Malawi, which has led to a slow economic performance, promoting unemployment, poverty and even loss of life. The construction industry, contributed 2.8% of Gross domestic product from 2010 to 2012, and increased to 7.1% by 2016. In 2016, reports reviewed that the performance was still slow due to economic factors and in 2018 reports showed a 0.2 increment, indicating that the construction sector and other economic sectors of Malawi are not making it easy for the economy. With a public debt of 50.8% of its GDP, the country is being listed to be one of the poorest countries in the world, where 50.7% of the population is living below poverty line. In 2014 Deloitte's statistical records stated that underestimated safety measures and unrealistic project appraisals has led to about 36% of Malawi's general deaths. In 2018 Malawi faced one of the most devastating incidents where a public classroom block constructed by government funds collapsed and killed 4 learners under the age of 12, in one of the districts of Malawi, Zomba. Reports show that out of 1,327 construction projects executed by Small and Medium scale contractors in Malawi between 2007 and 2011, 19.5% were completely unsuccessful, where 46% were completed out of their time frame and even not completed at all, however 34.5% were successful (Kulemekka, Kalulanga & Morton, 2015).

1.2 Empirical Literature

Financial, Health and Safety Risks that influences project performance

Adnan Enshassi describes the construction industry to be one of the most hazardous sectors in his research report "*Factors affecting the performance of construction projects in the Gaza strip, 2009*". His argument was under the basis that constructors in Developing countries rarely prioritize implementation of safety precautions towards health and safety risk. Supporting this literature, Mbuya and Lema "*Health and Safety Management on Construction Projects Sites in Kenya 2014*" further discussed that safety is never considered as a priority during project implementation which

has caused project setbacks in countries like Malawi, Congo, Nigeria and Tanzania. Mbuya and Lema's research findings of 2014 also revealed that construction workers on the ground are constantly exposed to health hazards originating from internal and external sources.

These external factors were identified as rains, strong winds, mud slides, earthquakes, sand storms, and volcanoes. Internal factors were identified as faulty equipment, moving objects, electrical faults, Overheated Areas, fragile surfaces, Working on Heights, Noise, Airborne fibres and toxins. To some extent our study agrees with Adnan and Anigbogu (2009) and Mbuya and Lema (2014) as well as whose findings accounts for an average of 79% major injuries to be a result of health and safety risk in construction project. However, one of the most critical aspects that these researchers did not scrutinize was financial risk. According to Shyam (2008), project appraisal should always be done thoroughly to identify financial and contractual risk that can be assessed to find likelihood of occurrence. Based on a concept framework of this study, financial risk is considered to originate from an internal and external source.

This study is led with an assumption that internal risk in construction projects are for the most part identified with the control of the management team. According to Aleshin (2001), internal financial risk begins inside the project, while the external risk are observed from outside the project. According to Hassanein and Afify, externally, financial risk factors does not always have a direct relationship with the construction project process, however they do have an impact on the achievement of the project. El-Sayegh (2008) classified external risk into the following groups: political, socio-cultural, economic, and natural.

Risk Management Approaches that Influences project performance in NCIC

In 2010, engineering department personnel from university of Malawi, Grant Kululanga and Witness Kuotcha, published their research findings on *Measuring Project risk Management Process for Construction contractors with statement indicators linked to numerical scores*. They conducted this research after observing a gap in construction project performance by construction companies. Grant and Witness indicated that this was a result lack of adherence of formal risk management techniques in construction projects. To their findings, at **p**-value of ($p < 0.01$), the adherence of formal risk management techniques has been highly influenced by the size and experience of the construction workers.

Ashley and Bonner (1987); Baloia and Priceb (2003), discussed various approaches that deals with uncertainties in NCIC. These authors discussed that during project appraisal, contractor's focuses on scope of the project, looking at cost, workforce and overhead costs and income in relations to taxes, foreign currency and exchange rates. However in most developing countries, economic prediction may not be that perfect due to unstable economic environment. Most of small scale contractor are considered to lack financial solvency were it creates so much risk. Mills (2001) mentioned that contractors have the tendency of minimizing profit margins in order to win project approval but it ends up affecting productivity, performance and increase cost overrun. Our study argues that it is very important that all parties undergoes a learning approach towards risk identification. Looking into past projects, it can create an opportunity for future project success.

The NCIC risk management framework contains approaches such as systematic risk approach, and Knowledge Based approach which were derived from the international construction policy

framework (Nan Li, 2015). Construction risk management systems (CRMS) was one of the Systematic approaches that were introduced to help contractors identify and manage risk (Ismail, 2008). CRMS are tools that works by applying Monte Carlo Simulation and act as a substitute for traditional approaches that some contractors still use up to date. Modern risk management approaches have been used by construction regulatory bodies as a requirement for construction companies to have for certification and approval of construction projects

1.3 Methodology

This research is a case study of the National Construction industry Council of Malawi, where initial surveys were conducted. Construction companies registered under NCIC are Located in Lilongwe, the capital city of Malawi which is 8.3 kilometres from the city centre and just along the M1 road (Google n.d.). Lilongwe has a total area of about 727.79km² (Google n.d.). NCIC and construction companies are located in an industrial area where most establishments are engaged in industrial pursuits. Initially we targeted a total population of 216 civil construction companies of which targeted respondents are managers responsible for risk management for the company.

These construction were specifically those that ae located in Lilongwe and are registered under the NCIC. However, out of these 216 companies, 66 were found to be inactive due to temporary suspension and some due to unfavourable market conditions. This left us with a target population of 150 local contractors.

Sample Size and Data Collection

To determine our sample size, we used a table below formulated by Bartlett et al (2001) showing different sample sizes acceptable in social research where the estimated proportion of the population which has the attribute in question. Our target population size was 150 which from the table above we obtained a sample size of 46 construction companies which gives us a total number of 46 construction risk managers to provide us with data. We chose to investigate 1 senior risk manager per company. This was due the idea that, risk managers have more insight on the subject matter. Moreover with time constraint we could not investigate the whole risk auditing team. Sample size was derived by using Bartlett et al (2001) framework for minimum required sample size for a given population size of continuous data. Our research used qualitative approach which is commonly used for any data collection strategy or analysis technique that produces non-numerical information (Saunders, Lewis, Thornhill, 2009). Our key respondents was Senior Risk Managers/ risk auditors. The data collection methods included content analysis from NCIC and questionnaire to obtain detailed information from the respondents' narrations, suggestions, opinions, views and comments.

1.4 Research Findings and results

Among all respondents the majority was male with a proportion of 85.71% and females with 14.29%. We found out that in as much the sector accommodates all gender, there is a high dominance of male construction managers. Findings also showed that majority of the respondents had a five year level of experience. The least experienced respondents had less than 1 year of experience.

Using a 1-to-5-point Likert scale, where 1 represented "Not risky" (highlighted green), 3 represented "medium risky" (highlighted yellow) and 5 represented "very risky" (highlighted red),

respondents were asked to rate the impact of each obtained risk towards construction performance. Below is a table 1 that shows health and safety risks that influences project performance in Malawi

Under health and safety risk, electrical faults was rated five (5) for being very risky. Airborne fibres and toxins were rated to be risky with an average Likert scale rating of four point seven (4.7). Constraints due to Manual Handling materials were rated to be moderately risky and obtained an average Likert scale rating of three-point one (3.1).

Vibrating machinery and overheated areas, obtained an average Likert scale rating of one point nine (1.9) and one point four respectively, as they are observed as “not risky”.

Table 1: Health and Safety Risks that Influences Project Performance in Malawi (NCIC).

| Theme and Sub-Themes | Frequency | Relative Frequency | Liker Scale Rating (Mean) |
|---------------------------------------|------------------|---------------------------|----------------------------------|
| A. Construction Equipment Risk | | | |
| • Vibrating Machinery | 7 | 20 | 1.9 |
| • Defective machinery | 9 | 26 | 2.6 |
| • Safety feature failure | 11 | 31 | 2.5 |
| • Manual handling Material | 14 | 40 | 3.1 |
| • Asbestos | 14 | 40 | 1.7 |
| • Electrical Faults | 20 | 57 | 5 |
| B. Operating environment | | | |
| • Overheated Areas | 7 | 20 | 1.4 |
| • Slippery floors | 13 | 37 | 3.7 |
| • Fragile surfaces | 13 | 37 | 4.5 |
| • Working on Heights | 15 | 43 | 4.6 |
| • Construction Noise | 22 | 63 | 2.8 |
| • Airborne fibres and toxins | 32 | 91 | 4.7 |
| A. Object Movements | | | |
| • Unexpected collapse | 30 | 86 | 4.9 |
| TOTAL | 207 | 591 | 43.1 |

Source: Field data, 2020

Our study also had interest in determining financial constraints that affect construction performance. Below is table 2 shows financial risk factors that affect project performance in Malawi

Under financial risk, “Insurance” and “bankruptcy” were reported to be risky and obtained an average Likert scale rating of four point five (4.5). A similar observation made was that inflation was reported to be risky and obtained an average Likert scale rating of four point eight (4.5). Tax rates” were also rated to be risky and obtained an average Likert scale rating of four point five (4.5). Constraints due to “allocation of responsibility” also obtained an average Likert scale rating of four (4) for being risky. Fluctuation of currency, appeared to have a least response rate of forty-three (43) percent, and rated (3.6) for being moderately risky. Our study also had an interest in investing contractual constraints that influences construction project performance.

Table 2. Financial Risk that influences Project performance in Malawi (NCIC)

| Themes and Sub-Themes | Frequency | Relative Frequency | Likert Scale Rating (Mean) |
|-----------------------------------|------------|--------------------|----------------------------|
| A. Internal Financial Risk | | | |
| • Allocation of responsibilities | 2 | 8 | 4 |
| • Liquidity risk | 5 | 14 | 2.2 |
| • Lack of solvency | 17 | 49 | 2.6 |
| • Bankruptcy | 31 | 89 | 4.5 |
| • Insurance risk | 33 | 94 | 4.5 |
| B. External Financial Risk | | | |
| • Fluctuation of the currency | 15 | 43 | 3.6 |
| • Rate of interest | 20 | 57 | 3 |
| • Rise in fuel prices | 30 | 86 | 1.9 |
| • tax rate | 33 | 94 | 4.5 |
| • Inflation | 35 | 100 | 4.8 |
| TOTAL | 221 | 634 | 35.6 |

Source: Field data, 2020

Below is a table of contractual risk that influences construction project performance in NCIC.

Compliance constraints reported were due to “fulfilling contractual commitments”. And this was due to an average Likert scale rating of four-point six (4.6), with a relative frequency of ninety-four (94) percent. Under the same theme of compliance risk, constraints due to “corruption” was also reviewed to be risky factors as they obtained an average Likert scale rating of four point seven and relative frequency of sixty-three (63) percent. Under contractual design risk theme, constraints due “poor contract design” were reported to be risky as they obtained an average Likert scale rating of four-point eight (4.8) with relative frequency of thirty-seven (37) percent.

Table 3: Contractual Risk factors that influences Project performance in Malawi (NCIC).

| Themes and Sub-Themes | Frequency | Relative Frequency | Likert Scale Rating (Mean) |
|---------------------------------------|------------|--------------------|----------------------------|
| A. Contractual Compliance Risk | | | |
| • Lack of equity | 11 | 31 | 3.5 |
| • Quick Contract Signing | 13 | 37 | 1.9 |
| • Unexpected liquidation | 15 | 43 | 1.9 |
| • Breach of contract | 16 | 46 | 2.8 |
| • Team Experience | 22 | 63 | 3.7 |
| • Corruption | 22 | 63 | 4.7 |
| • Commitment not fulfilled | 33 | 94 | 4.6 |
| B. Contractual Design Risk | | | |
| • Poor Contract Design | 13 | 37 | 4.8 |
| • Design changes | 18 | 51 | 4.1 |
| • Complexity of contract design | 18 | 51 | 4.1 |
| TOTAL | 181 | 516 | 36.1 |

Source: Field data, 2020

Constraints due to “Change of design” and “complexity of design” appeared to have a similar response rate of fifty-one (51) percent and similar average Likert scale rating of four point one (4.1) for being risky.

Risks Management Techniques Applied for Health and Safety Risk

To determine the effectiveness of these techniques, a 1-to-5-point Likert scale rating was used, where a rating of 1 represented “very effective”, 3 represented “moderately effective” and 5 represented “less effective”. Table 4 below presents risk management techniques applied under each approach that is used for health and safety risk. Under systematic approach, “Quality management systems” were identified to be “very effective” techniques applied for health and safety risk in the construction sector of Malawi. This was because it obtained an average Likert

scale rating of one point one (1.1) and a relative frequency of eighty-nine (89) percent.

Table 4 Risk Management Techniques applied for Health and Safety Risk

| Themes and Sub-themes | Frequency | Relative Frequency (%) | Effectiveness Likert Scale Rating (Mean) |
|------------------------------------|------------|------------------------|--|
| A. Systematic Approach | | | |
| • Probabilistic analysis | 2 | 6 | 3 |
| • Standard operating procedure | 28 | 80 | 1.2 |
| • ISO 31000 | 29 | 83 | 1.1 |
| • Quality management systems | 31 | 89 | 1.1 |
| B. Knowledge based approach | | | |
| • Training | 15 | 43 | 1.6 |
| • Constructability | 20 | 57 | 1.1 |
| • Risk Avoidance | 30 | 86 | 1 |
| TOTAL | 155 | 444 | 10.1 |

Source: Field data, 2020

The least effective technique under systematic approach was “probabilistic analysis”, which obtained a relative frequency of six (6) percent, and an average Likert scale rating of three (3) for being “Moderately effective”.

1.5 Discussion of findings

Health and safety constraints cause direct physical challenges to individuals working on construction sites and this has led to delays in project delivery in such a way that these workers tend to no longer be fit for the job. Respondents reported that without appropriate protective gear, health and safety risk such as electrical faults and vibrating machinery can cause critical injuries or even loss of life. Our findings relates to McCoy (2014), whose research reported showed out that forty seven point nine (47.9) percent of construction incidents are due to electrical faults between. Also, Shen (2017) discussed that vibrating machinery were found to be risky such that inappropriate control and frequent use can cause a condition called Hand-Arm Vibration Syndrome. Our current study shows that sources of such health and safety risk appeared to be more from an internal source. However, Mbuya and Lema’s (2014) research findings reported that health and safety risk can be originated from both internal and external influences. They discussed external health and safety risk such as “strong rains”, “strong winds”, “mud slide”, “earthquakes”, and “sand storms”. Based on this literature, and our theoretical aspect we deduced that health and

safety risks can occur from both internal and external factors. Therefore during risk mitigation process it is best to analyse both internal and external factors as our adopted theory (contingency theory) states that risk allocation is based on internal and external influences.

Financial risks were categorised based on their source, external and internal source. Inflation as an external risk, it does not occur from within the construction company, rather it emerges from an external economic condition which then affects the performance of a specific project. Our current findings relate to findings by Andi (2006) who discussed financial risk such as inflation and rate of interest, having a huge impact towards project performance in countries like UAE, Kuwait, China, and Indonesia. Moreover, our current findings also agree with findings from a statistical report (Deloitte's, 2018), which states that Malawi has demonstrated unfavourable economic conditions such as inflation, leading to poor construction project performance. Baloiya and Priceb, (2003); Kaming et.al., (1997); Raftery, (1994), discussed that project owners tend to be highly affected during unfavourable economic conditions, such that it prompts poor work planning, delivering unreasonable time span and an expansion in costs higher than initially budgeted for. Due to limited capital investment and unfavourable economic conditions in Malawi, respondents also discussed that small-scale contractors fail to insure their projects or even avoid paying insurance which ends up affecting project performance. Small scale contractors do not insure their companies that during construction uncertainties they face losses and they fail to recover what was lost.

As discussed in the background of this study, the construction sector of Malawi adopted systematic and Knowledge based risk management approaches. Above mentioned techniques were therefore categorized based on this criteria. One of the similarities observed in our current findings was that all techniques were rated to be very effective except for probabilistic analysis. However, research findings from Witness Kuotcha (2010) discussed that even if the construction sector of Malawi has effective risk management techniques, poor construction performance is mainly due to lack of adherence to these techniques. She discussed that at p -value of ($p < 0.01$), the adherence of formal risk management techniques has been highly influenced by the size and experience of the construction workers. Moreover, Rogerson's (2000) findings showed that most contractors in Malawi work on quick fixes due to lack of experience and such has led to challenges in adherence to risk management techniques. Reported systematic risk management techniques such as "quality management systems" involves conducting health and safety audits (safety gears, safety equipment), which is only done by project managers of construction companies under NCIC but not the council itself, therefore there is no formal verification by NCIC on whether required technique is being applied by these construction companies. Grant, Paul and Danny's (2010) recommendation to this grey area was to encourage NCIC to continuously review the risk management policies and conduct audits in order to keep small Scale contractor updated and in line. Training obtained a lower response rate from our result, but it was discussed to have more influence to project managers in adherence to health and safety techniques. Training project participants on how to mitigate risk throughout the construction process promotes confidence on workers during project implementation

1.6 Conclusion

Based on the background of study, literature and results discussed in chapter 4, conclusion can be made regarding the future disposition of risk approaches in correlation to project performance in

the construction sector of Malawi. In a nutshell, impacts of project health and safety risk negligence, fiscal alterations, poor contract knowledge, communication process and procurement procedures were considered as influential factors in project performance of construction companies under NCIC. Data collected from questionnaires, and interviews were earmarked to capture the required information related to the fulfilment of the objective of the study.

As such, adherence to risk management approaches and defining risk approaches in the construction industry of Malawi has continued to yield minimal outcomes causing a gap in performance of the sector. Due to the complexity of risks appraisal in contractual risk approaches, and health and safety approaches, most small scale contractors keep lagging behind project delivery leading to less contribution to the GDP of Malawi with about 7.3%, and also causing physical harm to construction workers. Lack of training and experience has also affected much on critical analyses of risk management approaches that are being used. A 1-to-5 point Likert scale rating of risk management approaches mentioned by our key informants allowed our study to examine their effectiveness and we were also able to formulate a list of approaches that can be recommended for the industry

Lastly the study's conclusion is that risk management approaches implemented in NCIC of Malawi are effective, however it is the cost of risk management approaches that causes companies not to adhere most of these approaches. A need to adopt less costly approaches that similar sectors implement in other countries is required by the NCIC. Respondents suggested a few workable approaches that can be adopted by the construction sector of Malawi. This chapter concludes with recommendation of areas of improvement in risk approaches, policy framework, contractual frameworks, resource mobilization and project performance standards in NCIC.

1.7 Recommended Action:

- i) Recommendations for National Construction Industry Council are as follows;
 - NCIC should develop bespoke education which target less costly construction risk appraisal systems i.e. widening micro-course offered at tertiary level of education.
 - Annually NCIC should provide bespoke Training to Project Managers under: Relationship management techniques, reporting techniques, financial and contractual assessment and adherence to effective risk management approaches.
 - Every contractor under NCIC should be assessed on health and safety protective gears incorporated in Projects.
- ii) Recommendation for small-Medium scale contractors in Malawi are;
 - Contract special consultants skilled in the construction sector for project evaluation, risk appraisal, go to strategies; mapping financing alternatives.
 - Map alternative resource mobilization strategies, which can enable meet costs or act as joint financing were deficits exist in the project.
 - Create a knowledge management platform which will enable project players to access project information easily and timely.
- iii) Recommendation for researchers and scholars are;
 - Incorporate construction risk management research initiatives at local, National, and global level.

Recommended Policy Intervention

- a) Recommendation made for NCIC;
 - The NCIC to introduce frameworks which fully incorporates both local and international in project delivery approaches.
- b) Recommendation for government;
 - Introduce ecology tax exempts for construction project investments that directly benefits the environment.

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