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CHAPTER 3

ADEQUACY AND EFFECTIVENESS OF MEASURES MITIGATING THE IMPACT OF CLAIMS ON CONSTRUCTION PROJECT COST

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1.1 INTRODUCTION

The construction industry plays a major role in the economy of any country. Construction helps in the advancement and modernization of a country. While it has a cozy relationship to monetary growth, it does not concur that giving motivators and expanding spending on projects fundamentally lead to financial growth. [1], the construction division fundamental capacity is the arrangement of capital infrastructure, which affects financial growth. Such infrastructure conveyance makes huge work through a multiplier impact [1]. [2]stated that "for a construction project to be successful, it must achieve its objectives as indicated in the project plan". [3] on

the other hand argued that it is an important criterion that the project adheres to the quality of targets within the schedule and stipulated budget for it to be a successful project. In another argument, [4] said that once a project meets the time target, is in accordance with specifications, stays within the estimated cost, and stakeholder satisfaction is achieved, it is a successful construction project.

[5], in their study distinguished time overwhelm as probably the most concerning issue that the business faces yet by [6] recognized that numerous nations are looked with serious issues on cost invade. Cost escalations over the years has not decreased and exist globally, as such it appears no learning seems to have been centered on the subject [7]. Because of the basic and noteworthiness of expense in construction improvement, there had been facilitated endeavors among the partners and analysts to check overwhelm of expense on construction projects. In contrast, the advancement of different undertaking control devices/strategies and programming, the issue proceeds and wring the expense and time goals of numerous construction projects [8].

[9], noticed that the construction industry is as of now confronting a noteworthy hazard finish of task inside the evaluated expense. [10] in their examination found that 85% of variables have been illustrated as reasons for expense and time invade in the construction phase. While in the design phase, 28% of elements may cause time and cost invade. At that point completing phase and finally arranging phase, in which 22% and 17% of components can cause cost and time overwhelm separately. With this examination, it is clear that

time and cost overwhelm happen all through the whole life expectancy of a venture, these are: arranging phase, design phase, construction phase and completing phase. So as to determine these issues, the causes and relief measures to defeat the impact of cases on construction venture cost should be assessed.

Construction claims and debates have been on the expansion and have turned into an issue to construction industry [11]. Indeed, even with professionals' comprehension of construction contract and the most hazard portion framework, if ineffectively oversaw by and by; cases will keep on introducing issues of issues [12]. Critically, claims put together by contractors must be as per the means determined in the agreement conditions, subtleties of the extra expenses and time, and should be joined by good confirmation. Indeed, even at that, customers must embrace an exhaustive technique in following and overseeing such claims put together by contractors. Guarantee the executives is the procedure of coordinating and utilizing assets to process a case from recognizable proof, investigation, arrangement and introduction, before moving to exchange and after that at long last the settlement [13].

Over the years, literatures have been written on claims. Most discussed topics in these literatures include causes of construction claims, disputes resolution/avoidance, analysis of time impact claims and assessment of construction changes. Majority of this literature are results of research works carried out in Europe or North America, though very significant research have been conducted in the Middle East.

An examination by [14] created 13 relieving measures to improve time execution and 15 measures to improve cost execution of construction projects in Malaysia. However, this investigation did not explicitly audit or examine the viability of the relief measures as they just gave general proposals or recommendations which are not explicit for the endless supply of the examination. Besides, this type of study has never, been carried out in the study area. This is the gap in research and knowledge this chapter intends to bridge. It is against this background that this study intends to check the adequacy and effectiveness of measures in mitigating the impact of claims on building construction projects with the intent of providing an insight and an understanding on the measures in mitigating the impact of claims on building construction project in Abuja, Nigeria.

2.2 CLAIM DEFINITION

The phrase "claim" can be bewildering and the phrase itself can have various implications, (Cambridge English Dictionary) gives two meanings of claims as: (a) to state that something is valid or is a reality, despite the fact that you cannot demonstrate it and other individuals probably would not trust it or (b) to request something of significant worth since you think it has a place with you or on the grounds that you think you have appropriate to it. This general meaning of the phrase "claim" would not be reasonable in the venture setting nor in this examination work, subsequently is an increasingly exact definition required. There are some misperceptions in the declarations of claims among creators

and in research [15]. As indicated by Project Management Institute (2013), claim is characterized as: "A solicitation, demand or attestation of rights by a gathering against another gathering, for thought, remuneration, or installment under the conditions of lawfully restricting contract, for example, for a contested change."

[16], gave a progressively substantial and ideal portrayal of the meaning of claims as: "When one gathering accepts that the other party has not met the legally binding commitments or desires and that they merit money related as well as time pay, they may present a claim." This delineation delineates all the more just the idea of claims in undertaking setting.

Claims can regularly be connected to change or variety in a task. When one gathering recognize that a change is required to the affirmed scope, expectations or portrayal, they inform this by a change demand. PMI (2013), characterizes the phrase "change demand" as: "A formal proposition to alter any record, deliverable or gauge". The uniqueness among claim and change is thin, [11] even utilizes the phrase "claim" to cover commonly for claims and change request circumstances in his book, asserting that "claims regularly begin as change requests, or the other way around". For exchange purpose, there is have to separate between the phrase, though [17] characterizes this error as "What recognizes a claim from a change is the component of difference between the gatherings concerning what is expected or whether anything is expected. In the event that

understanding is come to, at that point the claim vanishes and turns into a change",

Remembering the above characterized phrase, this theory embraced the meaning of Claim as characterized by Project Management Institute (2013). While, change demand then again could be well-considered as a type of claim where one gathering claim that the contracted work cannot be practiced as earlier masterminded in the agreement and a change is required.

Other winning applicable phrases that are regularly utilized as claim in connection to claim seem to be "question" and "strife". The erratic meanings of "contest" between studies make inquire about discoveries tricky to relate and sum up with different examinations [18]. In any case, the entire phrase falls into comparative class in undertaking framework where one gathering has a different feeling or perspective on an issue than another. In this examination work all phrases utilized, however the primary spotlight will be on "claim", while "struggle" could be considered to develop to a "claim", and "contest" could be the consequence of a "claim".

2.3 CLAIMS IN THE CONSTRUCTION INDUSTRY

As indicated by [19] development undertakings are endlessly mind boggling, including numerous different exercises and players. Any principal exercises or a progression of minor exercises in the undertaking errand may produce catches that could form into development questions. Development extends more often than not confront gigantic vulnerabilities,

and the agreement is definitely incomplete as far as inability to anticipate all the likely outcomes [20]. High multifaceted nature and enormous vulnerabilities may heighten with appearance in innovations and necessities. "Development activities are winding up increasingly more intricate because of new measures, trend setting innovations, and proprietor wanted augmentations and changes". Thus, "A development guarantee comprises of two noteworthy parts:

(1) The privilege area, which commonly incorporates a definite portrayal of the activities or inactions of the gathering from whom alleviation is looked for, qualifying the inquirer for compensation; and

(2) The harms area, which presents the computations and backing for the remuneration asserted. Most development undertakings are perplexing, includes a wide range of gatherings, have a long timeframe and require profoundly nitty-gritty plans, determinations and particular structures, high-hazard development techniques, compelling administration, gifted supervision and close observing.

Development undertakings include a few exercises that are between related of various experts. Subsequently, claims are uncontrolled in most development extends in this way causing expense and time invade. Most infrastructural ventures, for example, street, railroads, dam, elevated structure and so forth have mind boggling, long finishing periods, which if not surely knew by the experts included may achieve debates.

Development claims and debates have been on the expansion and has turned into an issue to development industry [11]. Indeed, even with experts' comprehension of development contract and the most hazard distribution framework, if inadequately oversaw practically speaking, cases will keep on introducing issues of issues [12]. Critically, claims presented by contractual workers must be as per the means determined in the agreement conditions, subtleties of the extra expenses and time, and should be joined by good confirmation. Indeed, even at that, customers must receive a thorough strategy in following and overseeing such claims put together by contractual workers. Cases the board is the procedure of coordinating and utilizing assets to process a case from ID, investigation, planning and introduction, before moving to arrangement and after that at long last the settlement [13]. The fundamental goal of case the executives procedure is to determine the issues in a compelling and effective manner. Case and intervention evasion in case settlement is one great practice that fruitful experts ought to have as a top priority [21].

2.4 TYPE OF CLAIMS

An examination by [22] decided diverse kind of cases as legally binding cases, extra authoritative cases, claims identifying with postponements, extra grata claims, guarantees because of blunders, adjustments and alterations, asserts that the contractual worker is broken and guarantees because of slip-ups.

2.4.1 Contractual Claims

[22] characterized legally binding cases are those sorts of cases that falls inside the provisions indicated by the agreement. In Contracts that are all around organized and acknowledged, heaps of arrangements that qualifies the two gatherings for case for the proper remuneration, for example, valuation, late issue of data, ground conditions, varieties and deferral in assessing completed work.

2.4.2 Extra Contractual Claims

This sort of cases results because of rupture of agreement that perhaps communicated or suggested, for example, additional work caused because of imperfect material provided by the customer yet includes no particular grounds inside contract [22].

2.4.3 Extra grata Claims

Ex-gratia cases are the kind of cases that the temporary worker to an agreement accepts that he has the rights on the ethical grounds, for example, extra expenses brought about because of expanded costs in materials however there is no such good ground existing in the agreement or the law,

In the event that it is to be worked out, statement 44(5) of ICE gives that:

"In the event that up on assurance of the agreement under this condition, the contractual worker is of the assessment that he has endured hardship by reason of the activity of this condition, he may allude the conditions to the specialist who

on being fulfilled that such hardship exists, or has existed will offer such leniency, assuming any, as he would like to think is sensible and his choice on the issue will be conclusive and decisive".

What the sub provision means is to empower the business to make ex-gratia claims installment in the event that he so wishes. The arrangement of this sub-condition isn't clear, then again, actually it creates the impression that the temporary worker's monetary privilege under this sub-proviso is exceptionally restricted [22].

2.4.4 Extension of time Claims

Each development task contract stipulates plainly the fruition time frame that the temporary worker should hold fast to. The reason of indicating culmination period is to encourage claims for harms by the Employer for any postponements made by the temporary worker in completing their work. The finish time frame/date of the undertaking will be indicated, either in delicate archives, or as consented to by the contractual worker, before the agreement grant. For the situation where no particular finishing period/date is referenced in the agreement, the law suggests that the work must be finished by the contractual worker inside a time span which is sensible. On the off chance that the undertaking isn't finished inside a predetermined time or that time span which is sensible by the temporary worker and the deferrals are said to be brought about by the contractual worker, the customer is qualified for Liquidated and Ascertained Damages to recoup his/her harms from the contractual worker. This can

be in type of a charge dependent on a day by day, week by week, or regularly scheduled installment [22].

2.5 CAUSES OF CLAIMS

As indicated by an examination directed by [12], there are twenty-six (26) reasons for cases in the United Arab Emirates (UAE) among which are: change or variety orders, delay brought about by proprietor, oral change arranges by proprietor, delay in installments by proprietor, low cost of agreement because of high challenge, changes in material and work costs, proprietor character, varieties in amounts, subcontracting issues, delay brought about by temporary worker, contractual worker isn't efficient, contract based worker monetary issues, terrible nature of temporary worker's work, government guidelines, assessing blunders, booking mistakes, structure blunders or oversights, execution blunders, awful correspondence between gatherings, subsurface issues, details and drawings irregularities, end of work, ineffectively composed contracts, suspension of work, mishaps and arranging mistakes.

On the other hand, [23] in their research work categorised the causes of claims into five (5) Major causes with the five major causes having sub-causes viz are: Project Management Related with absence of PM firms are (i) owner's behaviour, and (ii) contractor's behaviour. Design Related include (i) change order, (ii) incompleteness, (iii) estimating errors, and (iv) design errors. Financial Problems comprise of (i) owner's problem, (ii) inflation and exchange rate, and (iii)

contractor's problem. Unforeseen Conditions consist of (i) resource shortage, (ii) obstacles, and (iii) soil conditions. While Technical Capabilities include (i) contractor related, and (ii) owner representative related.

2.6 MITIGATING MEASURES

[24] built up a model joined with Artificial Neural Network (ANN) for information mining techniques in checking precision of cost estimation as one of the central point for cost invade. Different measures proposed as of late incorporates reference class gauging and open division responsibility [25-28] referred to in [29]. The reference class evaluating uses the genuine execution in a reference class to expand precision by perceiving huge reference class of past and relative activities, developing probability dissemination for the recognized reference class and differentiating the specific endeavor and the reference class assignment to set up the conceivable consequence of the endeavor. Notwithstanding the way that, [30] in his examination to anticipate a model for expense overpowers, highlighted nonattendance of trustworthy data for reference class deciding or circumstance assessment and suggested improvement in decision help before development; the executives and checking during development and analysis and association of learning after development.

[31] proposed an improved site the board and supervision of temporary workers to control cost attacks. Yet huge, yet not capable in directing expense attack in light of the way that cost overpower is begun from the beginning of an

assignment as demonstrated by [29], he in any case pointed out that most cost overpowers occur in the structure and organizing stage. Verifiable examination by [32] prescribed well-made specific aptitudes to control cost in present day ventures.

Similar quantifiable transports by [33] to a great deal of genuine ventures with different characteristics got ready for envisioning cost attacks revealed no tremendous complexities in expense overpowers among activities with different procurement methodology.

An assessment driven by [34], suggested measures that can be used in easing the impact of cases to decrease or discard cost overpower of activities specifically: practical key orchestrating, genuine endeavor masterminding and booking, visit adventure meeting, authentic complement on past understanding, use of experienced subcontract and Suppliers, use of fitting development strategies, use of bleeding edge development utilization, clear information and correspondence channel, visit co-arrangement between the social events, play out a preconstruction masterminding of undertaking assignments and resources need, progression of HR in the development business, expansive contract association, exact control instruments and fruitful site the board and supervision.

2.7 EFFECTIVENESS OF MITIGATION MEASURES FOR CONTROLLING TIME AND COST OVERRUN

Development errand delay and over spending plan have been a critical setback in the latest decades and is a much logically troublesome issue in making nations. Care with respect to this marvel seems, by all accounts, to be high while huge effort has been set in recognizing its providers and help structures yet time and cost attack still remains a huge point inside the business.

Keeping development extends inside evaluated expenses and timetables require sound techniques, extraordinary practices, and wary judgment. There are, nevertheless, steps that can be taken to restrict their causes and effects of time and cost attack, the genuine one is using beneficial endeavor the executives instruments and practices. Along these lines, past specialists have given proposition or proposals to help accomplishing time and cost overpower decline in development ventures. An assessment by [31] endorsed systems to endure or soothe the effect of postponement. Most of the interviewees agreed that site social occasions are central in dealing with the issues with the condition that it should not be too visit from that point forward it will be a pointless activity, and those going to should be seniors and are endorsed to choose. This sort of specific system attested the importance of site social affairs to the top administration find in the overview revelations. From the examination, recommended frameworks to fabricate the efficiency were by staying at work longer than required or working by developments (29.2%) trailed by mentioning extension of time (24%). If the issue was the deficiency of benefits, 32.3%

proposed rescheduling the activities inside the available resources, 27.8% by using progressively wide and talented works and 12.8% by using subcontractors. This infers there are no specific strategies to mitigate or annihilation delays in tasks anyway it depends generally on the causes, the nature of the issue, and the openness of advantages. Regardless, this examination showed that the controlling measures are not related to the specific factors or reasons for the postponements. Therefore, this noteworthy research leaves an opening which the recurring pattern study attempts to fill, to be explicit to find the specific help measures for the parts of time and cost overpower in development ventures. By then, the examination of development delays in Hong Kong was inquiring about the proposals as communicated in the report of the Construction Industry Review Committee (CIRC). The Committee contains people with incredible standing and learning in the development and related fields similarly as those from various reasons for living who are responsible for taking a gander at the current state of the development business to the extent its yield amount, the nature of work, its biological kind demeanor, site prosperity, its workforce and the course of action of supervision are suitable to and fruitful at directing the contrasting deferrals. In this manner, this examination revealed that though some control measures have been proposed in the CIRC report, the respondents' perspective on their reasonability are not completely as per the centrality of the relating reasons for development delay.

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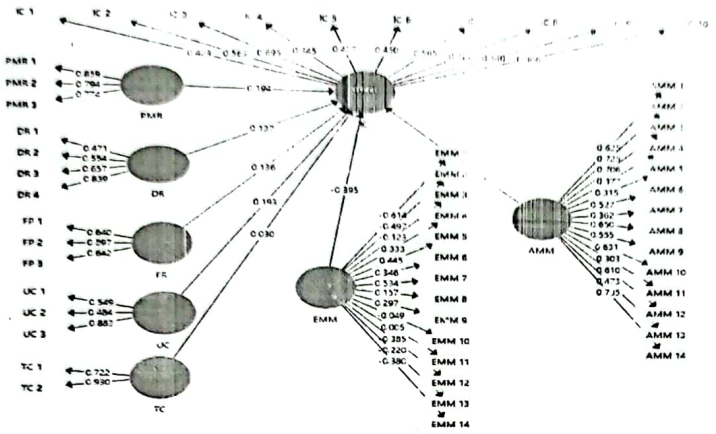

Figure 1: Initial Path Model

The conceptual model was analyzed using the Partial Least Squares (PLS) approach. The path model generated from the software was used for examining the effect of the causal factors on claims and measures mitigating the impact of claims on the cost of construction projects using a reflective construct. Reflective constructs assume correlation of indicators in order to maximize the overlap in the indicators to make them interchangeable. The PLS model criteria was calculated using a two-step approach adopted from [35] study. The steps are:

- Outer model (measurement model) evaluation to determine the reliability and validity of the construct [36]. This is done by examining each item loading, and each item internal composite reliability and discriminant validity [37].

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- Inner model (structural model) evaluation to assess the relationship between the latent independent and dependent variables in respect of variance accounted for [36]. In the structural model, the research questions are answered by assessing the path coefficients "which are standardized betas" [38]. Non-parametric bootstrapping [39] with 5000 replications was applied to test the significance of the variables.

The sequence listed above ensures the establishment of the reliability and validity of the measures before drawing conclusions regarding the relationships between the latent variables [40]. The measure of the goodness of fit was also used to access the explaining power of the model.

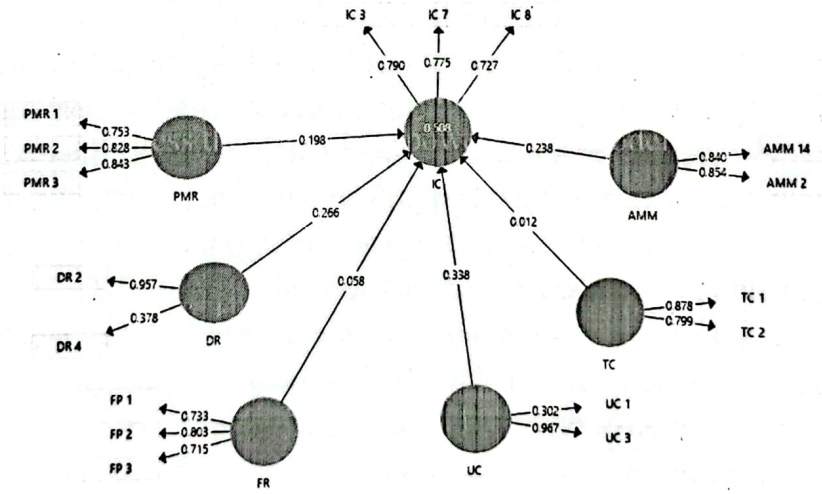

Figure 2: Final Path Model

Outer Model Evaluation

The measurement loadings are standardized path weights connecting the factors to their indicators. The outer model is checked for both convergent validity and discriminant validity [41] and to ensure that the indicators measure the attributes they are supposed to measure, the internal consistency is checked by convergent validity. The composite reliability scores which are similar to the Cronbach alpha to test the reliability of the path model. The commonly suggested threshold value for a good model is to have a Cronbach alpha value more than 0.6 and composite reliability scores more than 0.7 [31].

The Average variance extracted stated that AVE should be higher than 0.5 which means that the latent variable should explain at least 50% of each indicator's variance.

According to [42] and [36], factors with low loadings are advised to be reviewed or dropped as they add little to no explaining power to the model. Researchers as such advice that loadings below 0.4 be dropped while others argued that item with loading below or less than 0.5 should be dropped [37]. The closer the loadings are to 1.0, the more reliable the latent variable. Hence, a well-fitting model should have path loadings higher than 0.7 should be considered highly satisfactory [35, 43]. Regarding items with loading between 0.4 and 0.7, the potential significance needs to be checked before elimination. If an indicator's reliability is low and eliminating this indicator goes along with a substantial

increase of composite reliability, it makes sense to discard this indicator [35].

Table 2: Item Reliability and Construct Validity

Constructs	Factor Loadings	Composite Reliability	AVE
AMM - Adequacy of mitigating measures		0.8400	0.7200
AMM 14 - Effective site management and supervision	0.8400		
AMM 2 - Proper project planning and scheduling	0.8500		
DR - Design related factors		0.6500	0.5300
DR 2 – Incompleteness	0.9600		
FP - Financial related problems		0.7900	0.5600
FP 1 - Owner's problem	0.7300		
FP 2 - Inflation and exchange rate	0.8000		
FP 3 - Contractor's problem	0.7100		
IC - Impact of claims		0.8100	0.5900
ICT 3 - Logistic delay	0.7900		
ICT 7 - Unnecessary procurement	0.7800		
ICT 8 - Loss of productivity	0.7300		

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PMR - Project management related factors		0.8500	0.6500
PMR 1 - Absence of project mgmt. firms	0.7500		
PMR 2 - Owner's behaviour	0.8300		
PMR 3 - Contractor's behaviour	0.8400		
TC - Technical capabilities		0.8300	0.7000
TC 1 - Contractor Related	0.8800		
TC 2 - Owner representative related	0.8000		
UC - Unforeseen Conditions		0.6200	0.5100
UC 3 - Soil conditions	0.9700		

The result in table 2 indicate that the variance extracted for the five scales used for the causal factors of claims, impact of claim, and mitigating measures possessed convergent validity because they ranged from 0.51 to 0.72 (Table: 2). The discriminate validity of a model is adequate when constructs have an AVE loading greater than 0.5 meaning that at least 50% of measurement variance was captured by the construct. This criterion is satisfied by the data in Table 2, hence the model possesses discriminate validity. Therefore, only the indicators in Table 2 above have significant effect on the latent variables.

Inner Model Evaluation

In the structural model, the research questions are answered by assessing the path coefficients "which are standardized betas" [38]. Non-parametric bootstrapping with 5000 replications was applied to test the significance of the variables.

Table 3: Path Coefficients and t-values

Path	Coefficient	t value	p Value	Inference
AMM --> IC	0.2400	2.2300	0.0300	Significant
DR --> IC	0.2700	2.8600	0.0000	Significant
FP --> IC	0.0600	0.6400	0.5200	Not significant
PMR --> IC	0.2000	2.1300	0.0300	Significant
TC --> IC	0.0100	0.1400	0.8900	Not significant
UC --> IC	0.3400	3.2700	0.0000	Significant

The relationship between the impacts of claims and the latent constructs; design related factors, project management factors, unforeseen conditions, and adequacy of mitigating measures is significant with β = 0.00, 0.03, 0.00, and 0.03 respectively (Table 3 values at the 5% level of significance). All the constructs have a positive significant or insignificant influence on claims and its impact.

Model Evaluation

According to [44], the goodness of fit is an index for the overall fit of the model that is used in validating the partial least squares path model globally which is the geometric mean of the average communality and the average R^2. In this study, the global fit index of the model is 0.508, which indicates that the empirical data fits the model very well and the predictive power is 50.8%.

3.0 DISCUSSION

From Table 1 above, the characteristics of the respondents show that 67% of them work in a construction consulting firm while 29% work for contractors and 1% in government construction establishment. A large proportion of the respondents, 49%, had been practicing for more than 10 years and majority, 96%, have handled more than 10 projects in the past fifteen years which makes them competent enough and capable to participate in the survey.

Taking all criteria of Partial Least Square into consideration, in fig. 1, 5 iterations were carried out to remove the indicators with low correlation. After the first iteration, only three constructs Financial Problems (FP), Project Management Related (PMR) and Technical Condition (TC) had AVE values more than 0.5 while the remaining five constructs had values less than 0.5. In order to increase the measure of the AVE, factor loadings less than 0.4 were deleted. This reduced the number of constructs that were less than 0.5 to three. In the 5th and last iteration factor loadings less than 0.7 were eliminated which resulted in all the

constructs having an AVE measure greater than 0.5 therefore confirming the adequate reliability and convergent validity of the measurement model. All the indicator variables for Effectiveness of Mitigating Measures (EMM) construct ended up being deleted as they add little or no significance to the power of the model and also has the same variables with the Adequacy of Mitigating Measures (AMM) construct, so they were interchangeable which supports the notion that once a mitigating measure is adequate, then it is effective. The resulting and final model is indicated in fig.2 after dropping loadings that did not add to the explanatory power of the model

The result in table 2 indicate that the variance extracted for the five scales used for the causal factors of claims, impact of claim, and mitigating measures possessed convergent validity because they ranged from 0.51 to 0.72 (Table: 2). The discriminate validity of a model is adequate when constructs have an AVE loading greater than 0.5 meaning that at least 50% of measurement variance was captured by the construct. This criterion is satisfied by the data in Table 2, hence the model possesses discriminate validity. Therefore, only the indicators in Table 2 above have significant effect on the latent variables.

3.1 CONCLUSION

This study has been able to examine the relationship between the impacts of claims and the latent constructs; design related factors, project management factors, unforeseen conditions, and adequacy of mitigating measures is significant with $\beta =$

0.00, 0.03, 0.00, and 0.03 respectively (Table 3 values at the 5% level of significance), the adequacy and effectiveness of measures mitigating the impact of claims on construction project cost.

Thus, the following conclusion was drawn. All the indicator variables for Effectiveness of Mitigating Measures (EMM) construct ended up being deleted as the same variables with the Adequacy of Mitigating Measures (AMM) construct, so they were interchangeable. This interchange ability supports the notion that once a mitigating measure is adequate then it is effective. The resulting and final model is indicated in figure 2 after dropping loadings that did not add to the explanatory power of the model. Out of the fourteen measures mitigating the impact of claims on construction project cost, only Effective site management and supervision and Proper project planning and scheduling were adequate and effective in mitigating the impact of claims on construction project cost.

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