

# Quantifying Resources Utilization: Exploring The Role of Quantity Surveyors In Nigeria's Mining Sector.

<sup>1</sup>Nze, Chinonyelum Obianuju Nancy & <sup>2</sup>Nnadi, Ezekiel Ejiofor

<sup>1</sup>Quantity Surveying Department, Enugu State University of Science and Technology, Agbani.

<sup>3</sup>Civil Engineering Department, Kampala International University, Uganda.

---

## ABSTRACT

The mining sector, a major contributor to GDP and global wealth, extracts various minerals like oil, gold, tin, limestone, iron ore, lithium, tin, and coal. However, these resources are often extracted locally, posing environmental risks. To generate revenue and currency, the industry requires reforms, policies, and regulations. A Quantity Surveyor is crucial in contract preparation, documentation, and administration, establishing standards and methods for extracting, managing, procuring, costing, pricing, and combining labor. Survey design was used for research. A survey research method was used for the study while stratified random sampling was applied. The result of the analysis shows that all the techniques and roles of quantity surveyors in the mining industry for a successful project are relevant with all having a mean value of 2.50. The result of the  $f$  coefficient of determination ( $R^2$ ) is given as 0.612914. This implies that 61.29% proper resource utilization is a result of the Quantity Surveyor's project cost control. Quantity surveyors play a crucial role in Nigeria's mining sector, ensuring revenue, environmental compliance, contract disputes, feasibility studies, and regulatory compliance, contributing to GDP growth. Quantity surveyors are expected to have good analytical skills and also update themselves on current technology.

**Keywords:** Quantity Surveyor, Mining, Value, Role, Cost, Estimate, Contract, Policies

---

Date of Submission: 02-11-2024

Date of acceptance: 12-11-2024

---

## I. INTRODUCTION

Quantity Surveyors quantify the work process in terms of cost, time of delivery, specification, and scope including the contractual commitment required to execute such work. A Quantity surveyor's major role is to monitor, manage, control, evaluate, and supervise project total cost from start to finish if a quantity surveyor is to perform its role optimally. According to Nigeria Minerals and Mining Act, (2017), it has established modalities on how ownership of minerals should be, the administration of the act, the role of host communities, regulations on mining, mineral incentives, mineral exploration process, possessions of minerals, purchase of minerals, environmental conditions on mining, accidents/hazards to mineral mining and some other laws around its existence and acquisitions. The updated act Nigeria Minerals and Mining Regulation (2011) was now established to list out schedules, fees, forms, designation of mineral title area, mineral royalty rate, mines inspectorate templates, and mining laws themselves. These laws are already establishing modalities on how mineral mining should be done and the procedures on how it should be managed. The Quantity Surveyor at this point should leverage this to establish a path and a role in total cost management of mining exploration, refining, and exploration as well as the sales and exportation.

This research focuses on the mining process in Nigeria, including acquisition, environmental impact, exploration, refining, exportation, and domestic usage. The Quantity Surveyor plays a crucial role in ensuring the industry's substance and growth towards revenue generation. Environmental impact can be positive or negative, and some mining locations in Nigeria lack licenses, leading to negative degradation of the environment, human, aquatic life, and miners. The Quantity Surveyor can help create contract documentation and conditions that state the environmental requirements, company's role in protecting the environment, exploration methods, mitigation plans, equipment utilization/licensing, exploration extent, quantity, and community involvement.

The Quantity Surveyor is trained in managing contract conditions, which include cost, resources, scope, and specification for mining and exploration. They are also knowledgeable about the Law of Contract and Law of Tort, which establish guidelines on land acquisition and possession for use and its limits. They can establish good contract dispute resolution through Arbitration or common law (Litigation), ensuring orderliness and closure at all stages of mining, especially at the acquisition level. The Standard Method of Measurement (SMM) is used to manage and supervise the refining process of explored mining products. This well-organized format has worked well for building and civil engineering works and can work for the mining industry as well.

The National Iron Ore Mining Company divides the process and roles in the mining sector into operations, mechanical maintenance, quality control, dam and water supply, and fire/safety, which require the Quantity Surveyor to estimate techniques to assign costs, monitor costs, control costs, and delegate costs at each stage.

## **II. LITERATURE REVIEW**

Mining in Nigeria began in 1903 by the British colonial government which was in power in Nigeria after a mineral survey was conducted in the same year by the Northern protectorates which led to another survey being conducted in the southern protectorates in 1904 then Nigeria was the major producer of coal, tin, and columbite. The exploration and mining of coal commenced in 1915 in Enugu of coal (National Bureau of Statistics Report 2010-2012). Mining of natural minerals was the oldest economic activity and can be traced back to when mankind extracted clay for building their shelter and making their home fronts. Nigeria Ministry of Foreign Affairs listed states with their minerals to be Abia (Gold, Lead, Limestone, Oil, Gas, and Salt), Abuja (Clay, Dolomite, Gold, Lead, Zinc, Marble & Tantalite), Adamawa (Bentonite, Gypsum, Magnesite), Akwa Ibom (Clay, Lead, Zinc, Lignite, Limestone, Oil/Gas, Salt and Uranium), Anambra (Clay, Iron-ore, Lead/Zinc, Lignite, Limestone, Phosphate, and Salt), Bauchi (Gold Cassiterite, Columbite, Gypsum, Coal, Wolfram, Limestone, Lignite, Iron-ore and Clay), Bayelsa (Clay, Gypsum, Lead) every state in Nigeria is researched to have abundance of its natural mineral. The key states with important mineral deposits that if adequately harnessed will boost the revenue generation of Nigeria's solid minerals are Zamfara, Kano, Kaduna, Bauchi, Plateau, Taraba, Cross Rivers, Ebonyi, Enugu, Kogi, Kwara, Ekiti, Abuja, Nasarawa and these key minerals are Lead/Zinc, Tin, Iron Ore, Barite, Tantalite, Gold, Limestone (Uriah, Agene & Umar, 2014)

According to PricewaterhouseCoopers International Limited (PwCIL), (2023) report the Nigeria mining industry was once a substantial contributor to the growth of the Nigerian economy which accounted for approximately 4 to 5 percent of the GDP in the 1960 and 1970. The discovery of oil has accounted for the neglect of the industry resulting in a GDP generation of 0.17% from (2018-2022). Nigeria Economic Summit Group 1<sup>st</sup> March, (2016) a multistakeholder group committee constituted to transform the mining, minerals, and metal sectors of Nigeria's economy to boost the nation's GDP and add to the nation's revenue. Some of the reforms created by this group is to hit a 3% revenue target of the sector by 2025, the roadmap was centered on short-term goals, medium-term goals, and long-term goals. The major objectives of this consensus were to make Nigeria self-sufficient in the production of construction materials and other industrial raw materials by 2025 (Ministry of Mines and Steel Development 29<sup>th</sup> January 2019).

### **The Role of Quantity Surveyor in Nigeria's Mining Sector**

The Quantity Surveyor is responsible for creating a contract budget, which is the first initial assignment of a Quantity Surveyor. This budget is based on experience, outline design, preliminary investigation, site survey reports, project history, client brief assessment, cost per unit, and important investigation. A project budget is a projected cost assumed to complete a project over a specific or assumed time. The Quantity Surveyor then prepares a project bill of quantities, which is documented evidence of the total cost required for the complete execution of the contract or project. The bill of quantities contains a detailed cost estimate, including labor, material required for the work, applying necessary taxes according to the Government Finance Act, waste due to adequate dimensioning, and profit/overhead for the work. The generated estimate is considered the work rate. The Quantity Surveyor is expected to produce a detailed client cash flow that is relatable to the client cash disbursement payable at interim valuations.

Contract administration, management, and supervision are also essential responsibilities of the Quantity Surveyor. They are responsible for the economic management of a contract, raising of contract proceedings and procedures, and creating appraisals and negotiations to obtain parameters for monitoring and supervision. Contract management is about controlling and monitoring cost, confirming and ensuring scope management, maintaining quality, and sticking to sustainability. The time of contract delivery is paramount to keeping cost in check. The National Contract Management Association (2024) states that contract management is the process of managing contracts, deliverables, deadlines, contract terms, and conditions while ensuring customer satisfaction. Overall contract monitoring practices ensure that the contract is given attention, yielding results while maintaining progress. The quantity surveyor plays a crucial role in mining contract procurement, which involves stages such as contract creation/authoring, contract collaboration/negotiation, contract award/execution, contract administration, and contract close-out/analysis/renewal. They are involved at every stage of contract procurement, from the contract briefing stage to the handover stage. There are different types of contract procurement in mining, including effective contract management, establishing Clear KPIs, using category management, focusing on supplier relationships, and improving contract flexibility.

Feasibility studies are essential for assessing the objectivity of exploration in the mining industry. Three types of feasibility studies used in mining are conceptual, preliminary, legal, operational, market feasibility, and detailed feasibility. Conceptual feasibility is a crucial assessment that determines a project's viability, while detailed feasibility allows for a preliminary design and assigning elementary facilities to the

workability of the project. Operational feasibility evaluates whether a listed organization can undertake any aspect of the mining project, while market feasibility evaluates how a explored mineral will gain economic benefit and generate revenue for the economy. Legal feasibility confirms if the proposed mining activity complies with all legal requirements and regulations. The quantity surveyor recommends contractual conditions and regulations regarding the proposed feasibility study, the extent of the study, the duties and responsibilities of the parties involved, and the contract process. They also provide a detailed explanation of the work description and format to adopt. From the feasibility study, the quantity surveyor generates the project budget in line with the project brief. Budgeting and cash flow are also important aspects of contract procurement. Contract budgeting is a proposal on financial attachment to work items to have a basis for the contract project sum, while project cash flow is a detailed accounting of the projected amount for funding a contract. Cash flow does not state the actual amount realizable but helps plan cash payments and cash flows.

### **Mitigating Factors Against the Growth of Quantity Surveyors in the Growth of Nigeria's Mining Sector**

#### *Lack of adequate professional Awareness*

According to Mohammed, Olatunji, and Oyelami (2019) career progression of Quantity Surveyors growth lies on the adequate awareness created, the Quantity surveyors' roles do not stop at the construction industry and its related fields. The Quantity surveyor is to create awareness of its relevance in energy, mining, oil and gas, communication, and even Agriculture regarding how cost is handled, how contracts relating to this field are managed and created and how professionals registered under the Quantity surveying profession can be adequately used and utilized. Awareness should be created by introducing quantity surveyors' trainees, industrial attachment, and voluntary participation in contracts and projects relating to this industry to partake and be involved for their effectiveness to be seen.

#### *Deficiency in Educational Curriculum of Quantity Surveyors*

Quantity surveying curriculum includes just general studies, foundation courses, and professional courses, but the profession needs a focus base learning courses centering on courses like Contract advisory services, professional practice to communication contract and furtherance, professional utilization and sustainability for oil and gas industry, method of divulging and furthering professional practice in mining and solid minerals, method of learning and teaching of quantity surveying for lecturing, energy evolving practice in quantity surveying and emerging growth, physical planning practice in the banking sector and finance institution and public service practice of quantity surveying. The listed courses will adverse the practice and boost their awareness as well as the utilization of quantity surveyors in all sectors of the economy.

Nigeria National Board for Technical Education (2001) reported that the United Nations Educational, Scientific and cultural Organization (UNESCO) has created elaborate curricula and course specifications for the advancement and better teaching of Quantity Surveying practice in National Diploma programmes, Higher National Diploma Programmes, and technical colleges. The curriculum as reported is industry specific and create more awareness on its practice and professional advancement.

#### *Insufficient Details to Standard Method of Measurement Revision 4*

Standard Method of Measurement Revision 4 contains basic measurement rules for key work item including heavy engineering works but exclude measurement for key sectors such as industries, banking and its physical planning, oil and gas and it taking off instructions, energy and solid mineral and it's taking off method and practice that are industry specific according to the industry framework and act. The Standard method of measurement as capsulized for the practice of Quantity Surveyors is to be detailed enough including other key sectors and manner of handling their works, this process will expose us to the different sectors that Quantity Surveyors are yet to devour and explore. According to Ben, Ngwu and Kanu (2023) it was reported that engineering professionals related to the construction industry are yet to be enlightened more about the application and usage of this book to the practice and procedure of road works and taking off of quantities instead of the use of Building Engineering Method Evaluation (BEME) which do not form a basis for coordinated construction cost and work description.

#### *Inadequate Sensitization of the Profession*

There is need for a frequent organizational visits, organization of Quantity surveyors fairs, industry seminars at different sectors, workshops participation by industry professionals, Inter-professional debates, radio talks, television show attendance, social media interviews, free e-learning to concerned citizens, teachings in secondary schools, teachings in related disciplines, inter-professional career participation, political social functions, membership of key professional institutions, attendance of conferences related to quantity surveying field, organization of conferences with related disciplines, supporting charity outreach, creating a vision and mission that include both the literate and illiterates, the emancipation of technological growth, innovations to

apps and platforms that encourage e-learning and career advancement. Technology through communication is the easiest and most effective way of career sensitization and advancement (Ahamed, 2024). He proposed Understanding the Audience, choosing the right channel, being clear/concise, listening/Responding, building trust/rapport, and reviewing/improving as strategies for boosting audience attention.

*Limited Number of Registered Quantity Surveyors*

More registration of Quantity Surveyors to practice the profession is an effective tool for advancing the profession. It is always said that once we can get a registered quantity surveyor among five families the growth of the profession will increase. The limited number of registered quantity surveyors will lessen the awareness as people are yet to understand their effectiveness and the problems they solve. Ebunoluwa & Ojo, (2020) reported that a limited number of registered quantity surveyors is deeply affecting the recognition of the profession and its survival, they further stated that embracing of technology largely to the enlisting of professionals to the industry will enhance effectiveness and inclusion and that a competitive environment should be created to foster growth and inspire advancement.

*Under-Utilization of Registered Quantity Surveyors*

Most registered Quantity Surveyors are still leveraging only the Building Industry instead of exploring other areas in the construction industry such as civil engineering works to avoid the use of Building Engineering Measurement and Evaluation which is inefficient and insufficient and lacks basis. Divulging the heavy industry sector by categorizing the heavy industry and separating it into communication, oil and gas, energy, solid minerals, mining, and manufacturing to create the adequate framework of measurement is important. The quantity surveyor needs to move away from only the building industry as its the only industry that requires its expertise. Cost management is a field that forms the basis of our practice and every sector requires a cost expert to examine cost conversation and create a process of taking up cost and meaning its outcome. According to Siti, Herman & Qamarina, (2019) reported that there is need for immerse motivation from persons practicing the profession by their superiors in the profession and there is a need to initiate this action through performance and working conditions.

**III. METHODOLOGY**

The researcher used a survey design for the research. The use of survey research method makes the data generated directly from respondents to be more distinct. Data for the research was sourced through primary and secondary data. The data was collected expressly to help solve the research problems. The sequential process involved first, a stratified random sampling for the administration of questionnaires in the survey aspect of the study then followed by the purposive sampling technique for the selection of participants for the interviews. Data collected for this research was analyzed with the aid of Statistical Package for Social Science (SPSS) version 22 software, EvIEWS8 software and MS-Excel. To portray the results for better understanding, the data was presented in tables and charts.

**IV. DATA ANALYSIS**

**Table 1: Management techniques employed by quantity surveyors in mining sector**

S/N	Management Techniques for efficient resource allocation within mining projects	W	4	3	2	1	ΣFX	$\bar{X}$	REMARK
1	QS expertise ensures projects adhere to regulatory standards, maintain quality, and meet client expectations.	F WF	98 392	80 240	45 90	32 32	255 754	2.96	Accepted
2	They not only ensure financial prudence and operational efficiency but also enhance project outcomes and stakeholder satisfaction.	F WF	107 428	99 297	42 84	7 7	255 816	3.2	Accepted
3	Quantity surveyors conduct thorough analyses of project requirements, market dynamics, and historical data to create detailed and reliable cost estimates.	F WF	110 440	96 288	32 64	17 17	255 809	3.17	Accepted
4	Their meticulous approach to cost management helps prevent budget overruns by continuously monitoring expenditures and implementing proactive cost-saving measures.	F WF	103 412	100 300	36 72	16 16	255 800	3.14	Accepted
5	Quantity surveyors play a crucial role in strategic decision-making by advising on budget allocation, resource optimization, and procurement strategies.	F WF	98 392	80 240	45 90	32 32	255 754	2.95	Accepted
6	Quantity surveyors contribute significantly to project profitability through optimized cost management and efficient resource allocation.	F WF	107 428	99 297	42 84	7 7	255 816	3.2	Accepted
7	Quantity surveyors foster collaboration among project stakeholders, ensuring alignment of	F WF	110 440	96 288	32 64	17 17	255 809	3.17	Accepted

*Quantifying Resources Utilization: Exploring The Role Of Quantity Surveyors In Nigeria's ..*

	financial objectives with project goals.								
8	QS meticulously analyze design alternatives, materials, and construction methods to achieve the most efficient use of resources.	F WF	103 412	100 300	36 72	16 16	255 800	3.14	Accepted
9	By scrutinizing every aspect of the project lifecycle, quantity surveyors ensure that cost reductions do not compromise the integrity, performance, or client requirements of the project.	F WF	100 400	99 297	38 76	18 18	255 791	3.10	Accepted
10	The application of value engineering by quantity surveyors leads to enhanced project efficiency and optimal value for money.	F WF	98 392	98 294	40 80	19 19	255 785	3.08	Accepted
11	Quantity surveyors integrate sustainability principles into project management, promoting environmentally responsible practices and enhancing project sustainability.	F WF	96 384	97 291	41 82	21 21	255 778	3.09	Accepted
12	They collaborate closely with stakeholders, communicate risk assessments effectively, and implement proactive measures to mitigate risks before they escalate.	F WF	93 372	94 282	44 88	24 24	255 766	3.00	Accepted
13	Quantity surveyors excel in managing the procurement process, from sourcing materials to negotiating contracts with suppliers and subcontractors. They ensure adherence to project specifications, quality standards, and budgetary constraints.	F WF	100 400	80 240	45 90	30 30	255 760	2.98	Accepted
14	Quantity surveyors specialize in overseeing contractual agreements among project stakeholders, ensuring clarity and adherence to terms.	F WF	107 428	97 291	42 84	9 9	255 812	3.18	Accepted
15	They meticulously draft, review, and negotiate contracts to protect the interests of all parties involved.	F WF	110 440	96 288	32 64	17 17	255 809	3.17	Accepted
16	By enforcing contract compliance, quantity surveyors prevent misunderstandings and disputes during project execution.	F WF	105 420	100 300	38 76	12 12	255 808	3.17	Accepted
17	They monitor contractual obligations, manage variations, and facilitate timely resolution of issues to maintain project continuity.	F WF	98 392	80 240	45 90	32 32	255 754	2.96	Accepted
18	They provide expert advice on contract interpretation, dispute resolution, and adherence to regulatory requirements, minimizing disruptions and ensuring project progress.	F WF	102 408	100 300	44 88	9 9	255 816	3.20	Accepted
19	quantity surveyors play a crucial role in promoting transparency and accountability among stakeholders.	F WF	110 440	98 294	30 60	17 17	255 811	3.18	Accepted
20	They facilitate effective communication, document contractual changes, and ensure fair treatment of all parties involved.	F WF	105 420	101 303	38 76	11 11	255 810	3.18	Accepted
21	They conduct regular inspections, quality assessments, and compliance checks to ensure adherence to industry standards and project specifications.	F WF	100 400	99 297	36 72	20 20	255 789	3.09	Accepted
22	Therefore, quantity surveying enhances project management by ensuring rigorous quality control, regulatory compliance, and reputation management	F WF	100 400	100 300	40 80	15 15	255 795	3.12	Accepted
23	QS expertise ensures projects adhere to regulatory standards, maintain quality, and meet client expectations.	F WF	96 384	97 291	41 82	21 21	255 778	3.05	Accepted
24	They not only ensure financial prudence and operational efficiency but also enhance project outcomes and stakeholder satisfaction.	F WF	90 360	95 285	45 90	25 25	255 760	2.98	Accepted
25	Quantity surveyors conduct thorough analyses of project requirements, market dynamics, and historical data to create detailed and reliable cost estimates.	F WF	98 392	80 240	45 90	32 32	255 754	2.96	Accepted
26	Their meticulous approach to cost management helps prevent budget overruns by continuously monitoring expenditures and implementing proactive cost-saving measures.	F WF	107 428	99 297	40 80	9 9	255 814	3.19	Accepted
27	Quantity surveyors play a crucial role in strategic decision-making by advising on budget allocation, resource optimization, and procurement strategies.	F WF	110 440	96 288	32 64	17 17	255 809	3.17	Accepted
28	Quantity surveyors contribute significantly to	F	105	102	30	18	255	3.15	Accepted

*Quantifying Resources Utilization: Exploring The Role Of Quantity Surveyors In Nigeria's ..*

	project profitability through optimized cost management and efficient resource allocation.	WF	420	306	60	18	804		
28	Quantity surveyors foster collaboration among project stakeholders, ensuring alignment of financial objectives with project goals.	F WF	98 392	80 240	45 90	32 32	255 754	2.96	Accepted
30	QS meticulously analyze design alternatives, materials, and construction methods to achieve the most efficient use of resources.	F WF	107 428	99 297	44 88	5 5	255 818	3.21	Accepted
31	Quantity surveyors track financial progress, identify potential risks, and adjust budgets to maintain financial discipline throughout the project lifecycle.	F WF	110 440	96 288	32 64	17 17	255 809	3.17	Accepted
32	QS stay updated with industry trends, technological advancements, and regulatory requirements to enhance their cost management strategies continually.	F WF	103 412	98 294	38 76	16 16	255 798	3.13	Accepted
33	QS expertise extends to negotiating contracts, evaluating supplier bids, and ensuring cost efficiency without compromising quality.	F WF	102 408	99 297	39 78	15 15	255 798	3.13	Accepted
34	Quantity surveyors track financial progress, identify potential risks, and adjust budgets to maintain financial discipline throughout the project lifecycle.	F WF	98 392	98 294	40 80	19 19	255 785	3.08	Accepted
35	They uphold ethical standards, promote best practices, and uphold industry regulations to safeguard project integrity and stakeholder trust.	F WF	100 400	90 270	41 82	24 24	255 778	3.05	Accepted
36	They leverage their expertise in cost estimation, procurement, and contract management to enhance project resilience and achieve long-term project success.	F WF	93 372	94 282	44 88	24 24	255 776	3.04	Accepted
37	They stay abreast of technological advancements, market trends, and regulatory requirements to continually refine their approach and deliver superior project outcomes.	F WF	103 412	100 300	36 72	16 16	255 800	3.14	Accepted
38	By streamlining processes, optimizing resource allocation, and minimizing waste, they maximize project outcomes within predefined budgetary constraints.	F WF	100 400	99 297	36 72	20 20	255 789	3.09	Accepted
39	They recommend innovative solutions that enhance value without sacrificing durability, safety, or aesthetic appeal.	F WF	98 392	98 294	40 80	19 19	255 785	3.08	Accepted
40	QS stay updated with industry trends, technological advancements, and regulatory requirements to enhance their cost management strategies continually.	F WF	93 372	98 294	42 84	22 22	255 772	3.03	Accepted
41	QS expertise extends to negotiating contracts, evaluating supplier bids, and ensuring cost efficiency without compromising quality.	F WF	93 372	94 282	44 88	24 24	255 766	3.0	Accepted
<b>Role of quantity surveyors in implementing risk management strategies to mitigate financial and operational risks in mining ventures in Nigeria.</b>									
1	Quantity surveyors providing accurate cost projections, monitoring financial progress throughout projects, and mitigating financial risks. This role ensures projects are executed within budgetary constraints while maximizing resource utilization and minimizing wastage.	F WF	103 412	100 300	36 72	16 16	255 800	3.14	Accepted
2	QS identify potential cost overruns, evaluating alternative solutions, and advising on cost-effective measures to mitigate risks.	F WF	100 400	100 300	35 70	20 20	255 790	3.10	Accepted
3	Provision of comprehensive cost reports, conduct financial audits, and recommend adjustments to enhance financial sustainability and project success.	F WF	98 392	98 294	40 80	19 19	255 785	3.08	Accepted
4	Quantity surveyors play a crucial role in achieving cost-effectiveness and ensuring project success.	F WF	98 392	97 291	40 80	20 20	255 783	3.07	Accepted
5	They identify potential threats, evaluate their impact, and develop strategies to mitigate risks effectively.	F WF	93 372	94 282	44 88	24 24	255 766	3.0	Accepted
6	QS conduct thorough market research, evaluate supplier bids, and negotiate favorable terms to optimize cost efficiency without compromising quality.	F WF	100 400	95 285	40 80	20 20	255 785	3.08	Accepted
7	Through proactive contract management, quantity	F	99	99	42	15	255	3.11	Accepted

	surveyors mitigate risks of disputes and legal challenges which reduces risk of cost overrun.	WF	396	297	84	15	792		
8	Through proactive cost management and strategic decision-making, quantity surveyors contribute to the overall success of construction projects.	F WF	96 384	97 291	41 82	21 21	255 778	3.05	Accepted
9	QS have a comprehensive expertise in cost estimation, budget control, and risk management which plays a pivotal role in driving success and innovation in the construction and mining industry.	F WF	93 372	94 282	46 92	22 22	255 768	3.01	Accepted

Source: Researcher's field survey, 2024

VI (4)=Very Important; LI (1)=Less Important;  $\bar{X}$  = Mean;  $\sum FX$ = Sum of all the mean  
 WF= Weighted Frequency of the response F= Frequency of the response  
 Table 1 above shows that all the techniques and roles of quantity surveyors in the mining industry for a successful project are relevant with all having a mean value of 2.50.

**Table 2: Impact of quantity surveyors' project cost control on optimizing resource utilization throughout the mining project lifecycle.**

$Y = a + bX$

Dependent Variable: RU  
 Method: Least Squares  
 Date: 21/07/24 Time: 15:19  
 Sample: 1 38  
 Included observations: 10

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RU	67817140	1.80E+08	0.313723	0.6871
QSC	0.156674	0.947455	0.152808	0.7905
R-squared	0.612914	Mean dependent qsc		87975175
Adjusted R-squared	0.591675	S.D. dependent qsc		3.37E+08
S.E. of regression	2.51E+08	Akaike info criterion		30.69779
Sum squared resid	5.05E+17	Schwarz criterion		50.75831
Log-likelihood	-206.4889	Hannan-Quinn criter.		40.13140
F-statistic	0.023966	Durbin-Watson stat		2.493105
Prob (F-statistic)	0.835337			

Source: Eviews8 Computation

Where,

X= QSC= Quantity surveyors cost control (Independent variable)  
 Y= RU = Resource Utilization (dependent variable)

The result of the coefficient of determination ( $R^2$ ) is given as 0.612914. This implies that 61.29% of proper resource utilization is a result of Quantity Surveyor's project cost control.

**Table 3: Specific training and skill development needs for quantity surveyors to enhance their effectiveness in resource utilization within the Nigerian mining industry.**

S/N	Training skills	W	SA-----SD				$\sum FX$	$\bar{X}$	Rank
			4	3	2	1			
1	Analytical skill training	F	127	79	42	7	255	3.25	1 <sup>st</sup>
		WF	508	237	84	7	836		
2	Good sense of judgment	F	125	81	33	16	255	3.24	2 <sup>nd</sup>
		WF	500	243	66	16	825		
3	Technological skills	F	110	96	39	10	255	3.20	3 <sup>rd</sup>
		WF	440	288	78	10	816		



4	Update on the use of current technology	F	110	90	45	10	255	3.18	4 <sup>th</sup>
		WF	440	270	90	10	810		
5	Knowledge of the mining process	F	108	88	40	19	255	3.12	5 <sup>th</sup>
		WF	432	264	80	19	795		
6	Understanding the mining environment	F	106	87	41	21	255	3.09	7 <sup>th</sup>
		WF	424	261	82	21	778		
7	Training on the supply chain in the mining industry	F	103	84	44	24	255	3.04	10 <sup>th</sup>
		WF	412	252	88	24	776		
8	Ability to use different software in a mining process	F	103	90	41	21	255	3.04	10 <sup>rd</sup>
		WF	412	270	82	21	776		

VI= Very Important

LI= Less Important

$\bar{X}$  = Mean

$\sum FX$  = Sum of all the mean

WF= Weighted Frequency of the response

F= Frequency of the response

Table 3 shows that all the required skills mentioned above are very important for quantity surveyor to succeed in a mining industry with all skills having a mean value above 2.5.

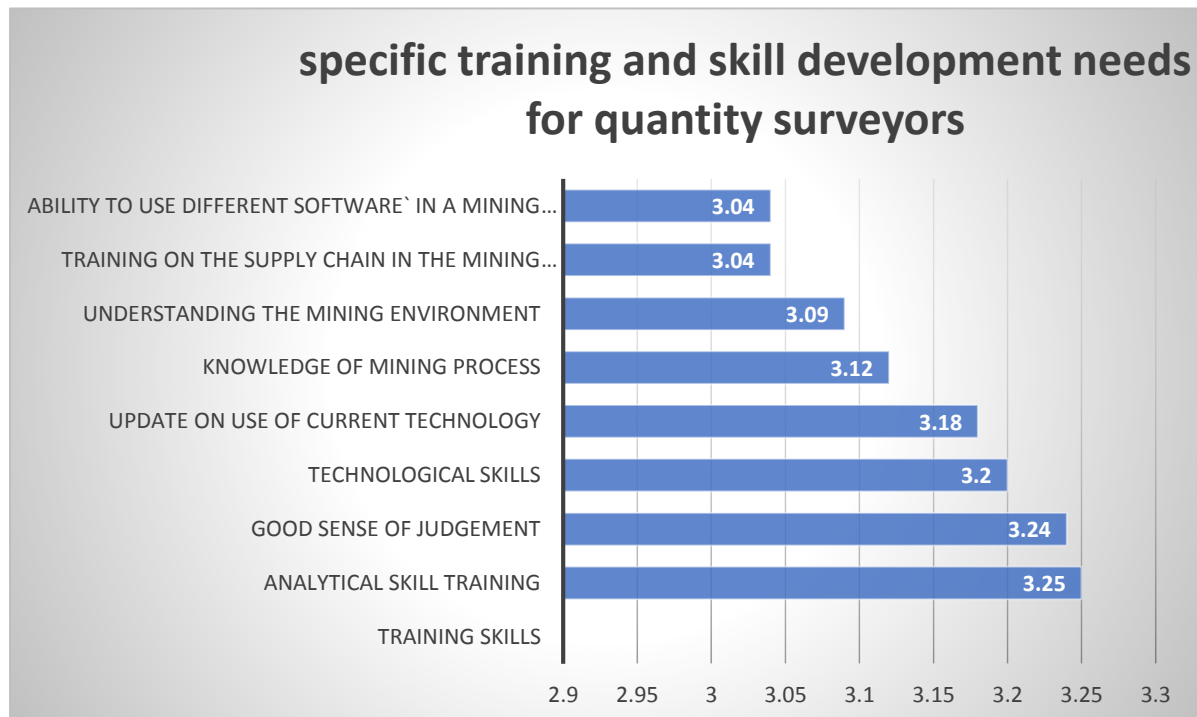


Fig. 1: Specific training and skill development needs for quantity surveyors to enhance their effectiveness in resource utilization within the Nigerian mining industry.

## V. CONCLUSION

Quantity surveyors are essential in the mining sector, ensuring the industry's growth and revenue generation. They create contract documentation, manage contract conditions, and are knowledgeable about the Law of Contract and Law of Tort. They can resolve contract disputes through arbitration or common law, ensuring orderliness and closure at all stages of mining. The National Iron Ore Mining Company divides the process into operations, mechanical maintenance, quality control, dam and water supply, and fire/safety. Nigeria, with a rich history of natural mineral deposits, has a mining sector that aims to boost the nation's GDP and revenue. Quantity surveyors create contract budgets, prepare project bills of quantities, manage contracts, and conduct feasibility studies to assess the objectivity of exploration in the mining industry. They ensure the proposed mining activity complies with regulations and is responsible for ensuring the project's success.

### 1. CONTRIBUTION TO KNOWLEDGE

This study has provided a good emphasis showing that Quantity surveying profession is a good profession that have an impact into every sector of the economy. It has shown competent to deliver, to create and to be a profession of repute in cost management and cost control through its technical skill of treating and handling cost. This research has exposed the wide gap that Quantity surveyor needs to fill and manage so as to make the mining sector a rich industry where there is orderliness and generate the needed income for economic growth.



## 2. AREA FOR FURTHER STUDY

The mining sector is a sector that is wide and large as it requires a lot of steps and stages to make it profitable and income generating. This study has exposed the hidden role of quantity surveyor in the mining sector but in extension there is need to study further on the survival strategies the mining industry has gone through without the impact of Quantity Surveyor practice, the cost management best practice for the mining industry for its efficient growth, the estimating practice that is profitable for the mining sector, the contracting practice of mining sector through the involvement of Quantity Surveyor and the contract documentation process of the mining sector through the use of Quantity surveyor technical skill need all to be studied.

## REFERENCES

- [1]. Adamu, M., (2023); Quantity Surveyors as Construction Contract Administrator: A Panacea for Efficient and Effective Construction Project Delivery. Vol.3 IRE Journals Issue 2, ISSN: 2456-8880
- [2]. Adegbite, T., & Danjibo, N.D., The Environmental Impact of Mining Activities in the Local Community: A structural Equation Modelling Approach.
- [3]. Ahmed, V., (2024); What are the best practices for Quantity Surveyors to Communicate with Contract and Client Effectively; <https://www.linkedin.com/pulse/what-best-practices-quantity-surveyors-communicate-clients-ahamed-mmi3f/>
- [4]. Ani, P., Fajar, A.S., Aga, N., (2023); Mediation as Dispute Resolution in People's Mining; An Article publication on ResearchGate, 1270(1):012010
- [5]. Ben, S., Ngwu, C., Kanu, D. O., (2023); Assessment of the Utilization of Standard Method of Measurement Rule in the Quantification of Road Project in Akwa Ibom State, Nigeria. A publication on the International Journal of Advances in Engineering and Management (IJAEM); Volume 5 Issue 1, pp:334-343.
- [6]. Deloitte, (2020); Deloitte Budgeting, Planning and Forecasting Accelerator for Mining using Workday Adaptive Planning. <https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Technology/gx-workday-mining-workday-adaptive-planning-solution.pdf>
- [7]. Drury, A., & Perez, Y., (2024) Feasibility Study; Publication on Investopedia; March 2<sup>nd</sup>, 2024.
- [8]. Ebuloluwa, E., and Ojo G., (2020); Factors influencing Quantity Surveying Services Performance in Nigeria; An Article Publication on ResearchGate on Built Environment 17(2):49.
- [9]. Harvard Law School, (2024); Program on Negotiation, what are the Three Basic Types of Dispute Resolution? What to Know About Mediation, Arbitration and Litigation? <https://www.pon.harvard.edu/daily/dispute-resolution/what-are-the-three-basic-types-of-dispute-resolution-what-to-know-about-mediation-arbitration-and-litigation/>
- [10]. Huber, K.J., Value Engineering & Value Management, Mining; Reducing Operational Cost; VM Services; [https://cdn.ymaws.com/www.saimceche.org.za/resource/collection/2E635296-8ED1-4A94-8A73-8476E2FC8C7B/Value\\_Management\\_in\\_a\\_Goldmine\\_-\\_Reduce\\_Operational\\_Costs.pdf](https://cdn.ymaws.com/www.saimceche.org.za/resource/collection/2E635296-8ED1-4A94-8A73-8476E2FC8C7B/Value_Management_in_a_Goldmine_-_Reduce_Operational_Costs.pdf)
- [11]. International Federation of Consulting Engineers (FIDIC), (2017); Conditions of Contract for Construction; ISBN 978-2-88432-084-9
- [12]. Joni, A., Michele, B.J., Wahidul, K.B., Nawshad, H., (2017); Life Cycle Cost Estimation and Environmental Valuation of Coal Mine Tailings Management. An Article Publication on ResearchGate; Journal of Sustainable Mining 16(3).
- [13]. Kwon, H., Kang, C.W., Improving Project Budget Estimation Accuracy and Precision by Analyzing Reserves for Both Identified and Unidentified Risk. Article Publication on ResearchGate November, 2018; DOI:10.1177/8756972818810963.
- [14]. Lim, B.T.H., Zhang, W., Oo, B., (2018), Sustainable Procurement in Australia: Quantity Surveyors' Perception on Life Cycle Costing. An article Publication on ResearchGate 10(2): 1-6
- [15]. Mohammed, M.A, Opatunji, O.A, & Oyelami, E., (2019); Awareness of Professional Service of Quantity Surveyors Among Private House Owners in Nigeria; An Article Publication on ResearchGate 07(11):5058
- [16]. National Contract Management Association, (2024); What is Contract Management; <https://ncmahq.org/Web/Web/Membership/What-is-Contract-Management-.aspx#:~:text=Contract%20Management%20is%20the%20process,when%20the%20contract%20is%20awarded.>
- [17]. Nigeria Economic Summit Group 1<sup>st</sup> March, 2016
- [18]. Nigeria Mineral and Mining Act, 2011
- [19]. Nigeria Mineral and Mining Act, 2017
- [20]. Nigeria National Board for Technical Education (2001); Quantity Surveying: National Diploma (ND); Curriculum and Course Specification; ED/STV/2001/PI/22; 169P.
- [21]. Nigeria National Iron Ore Mining company (2017)
- [22]. Oladokun, M., Oladokun, A.A., Odesola, I. A., Accuracy of Pre-Tender Cost Estimate of Consultant Quantity Surveyors in Nigeria. Journal Publication on ResearchGate.
- [23]. Olarewaju, A., & Anahve, P.J., (2015); Duties and responsibilities of quantity surveyors in the procurement of building services engineering; A creative construction Conference 2015 (CCC2015) 123 (2015) 352-360
- [24]. PricewaterhouseCoopers International Limited, July (2023)
- [25]. Rajeev, S., (2023); Significance of Contract Management in Projects; Asian Journal of Managerial Science; Vol. 12 N0.2, 2023, pp.10-18.
- [26]. Rathnayake, G.C., Bandara, K.P.S.P.K., Withanage K., The Role of Quantity Surveyor for the Success of Small-Scale Construction Projects in Sri Lanka. Conference Paper on ResearchGate
- [27]. Rebrowa, N., Kovalev, A., and Frik, O. (2020); Budgeting as an Instrument of Increasing Competitiveness and sustainability of Mining Enterprise. An Article of Conference publication on researchGate; DOI:10.1051/e3sconf/202017404054.
- [28]. Robinson, M., Contract Budgeting; Article Publication on ResearchGate; DOI:10.1111/1467-9299.00193.
- [29]. Sampias, K., (2016); Avoiding the Contract Management Cave-In in Mining; <https://www.linkedin.com/pulse/avoiding-contract-management-cave-in-mining-kathryn-katie-cook/>
- [30]. Shahab M., Benefit of Quantity Surveyor Services for Effective Cost Management. An Article on LinkedIn <https://www.linkedin.com/pulse/benefits-quantity-surveyor-services-effective-cost-management-mes/>
- [31]. Siti, S., Herman, s., & Qamarina (2019); The Motivation Factors of Quantity Surveyors in Malaysia; An Indian Journal of Applied Research publication on ResearchGate; 7(12):3

- [32]. Uriah, A.L., Agene J.I., Umar, A.I., Geophagic Clay Minerals from Nigeria: A potential Source of Heavy Metals and Human Health Implications in Mostly Women and Children who Praticice it. A Text publication on ResearchGate