

Labor Skills Shortage in the Construction Market: An In-Depth Study of the Lebanese Local Market

Anthony D. Azar, Constantin Militaru, Claudia P. Mattar

Abstract — It has ever been a challenge to find and hire labors with adequate right skills and experience for available positions in the construction trade in Lebanon. The mismatch of the big demand of labors' skills by employer from one hand and those available in the construction industry for hire on the second, ends with skills shortages that impact the construction project itself with poor workmanship, low efficiency, reduced effectiveness, time over-run, defects, reworks, material wastage, extra-costs, delayed completion of projects, etc... This paper describes an in-depth study of the actual labor skills and shortages in the Lebanese local construction market; it identifies the causal factors contributing to such shortage and ranks them depending on respondents' opinion in order to elicit the importance of these factors. It raises the awareness about professional skills in the industry and promotes recommendations for improving them for the benefit of the market.

Keywords— Apprenticeship, Construction, Defects, Labor Skills, Poor Quality, Reworks, Shortage.

1 INTRODUCTION

The construction industry in Lebanon has been known for its prominent role in the economy of the country, where its rapid growth was recorded as a construction boom during the period between 2005 and 2014. During that period, the increased demand for construction artisans and labors occurred; the challenge was to find and hire labors with adequate right skills and experience for the available positions in the construction field. Upon right skills and good experience, labor force can lead to the success of any construction project; However, the mismatch of the big demand of labors' skills by employer from one hand and those available in the construction industry for hire on the second ends with skills shortages that impact the construction project itself with poor workmanship, low efficiency, reduced effectiveness, time over-run, defects, reworks, material wastage, extra-costs, delayed completion of projects, etc...

Many factors contribute to shortages of skills and these are associated with new technology acquisition, higher ages of skilled workers, low number of young people joining the construction trades, limited skills upgrade, low salary levels, temporary and daily basis recruitment, etc...

This paper describes an in-depth study of the actual labor skills and shortages in the Lebanese local construction market with their impact on Lebanese construction projects. It raises the awareness about professional skills in the industry and promotes recommendations for improving them for the benefit of the market.

2 SKILLS SHORTAGE

Skills shortage in the construction industry is not a new phenomenon in any country, especially for the developed ones (Lebanon is one of). Such shortage of skills can be seen as a reflection on the stability of the economy and society of the considered country. Upon a literature review, a number of contributing factors of the skills shortage within the construction sector can be summarized as:

- **Increase number of older workers:** Aging of artisans and labors who hold good skills has ever been a challenge in construction [7]; an actual status of the local construction industry in Lebanon shows that many employees and labors are now in the retirement age while insufficient numbers are available to replace the skills they take with them. Despite the economic crisis the country is passing through and the urgent need to extend their career duration keeping themselves within work (having on-going work salary and social security contributions for permanent employees), older workers are found obliged to retire due to ill health, heavy work-type, long daily working hours, tough constraints, etc...
- **Lack of new recruits joining the industry:** Similar to any other country, the Lebanese construction industry lack behind the problem of new recruits of skilled labors and workforce within the construction industry. The general perception considers such industry as a low-image career, reserved for males, with long working hours, uninteresting and not attractive (dirty, physical challenging, dangerous) and low academic achievement. A myth has made some parents unwilling to recommend a vocational career to their children, with a mind-set that an academic path is more desirable than a technical one [6].

-
- *First Author: Anthony D. Azar, PhD candidate
IMST, Polytechnic University of Bucharest, Romania;
Mechanical Engineer, PH-009613736845 (Lebanon).
e-mail: levelplus-anthony@hotmail.com*
 - *Co-Author-1: Constantin Militaru, Prof. Dr. Eng. Ec.
IMST, Polytechnic University of Bucharest, Romania, PH-0040214341117.*
 - *Co-Author-2: Claudia P. Mattar, Dr. Eng.
IFFT, University of Balamand, Lebanon; PH-009613665520*

- **Acquisition of new technology [7]:** the technological improvement via modern construction tools, equipment and materials is going in a fast track; Besides the positive pros of such construction new technologies to make work less labor intensive and improve workers' health, the limited skills and knowledge of the majority of the Lebanese artisans and labor force to handle such modernization within the local market remains an important factor causing skill shortages related to modern up-to-date constructions.
- **Skills upgrade:** in general, skills imbalances lead to substantially inhibited production and in long term may make a country less competitive in a fast moving global economy. As for the local market, most artisans and labors do not enroll within higher qualifications training; also employers do not encourage them to become better skilled [4]. The miss of continuous training programs within construction is found a severe factor causing skill shortage in the local workforce.
- **Low salary levels / instability within the industry:** another reason of skills shortage within the Lebanese local construction industry is related to a mind-set of having an instable profession with low salary for the artisans and labors working in construction; Due to the economic problems the industry is facing, and in the aim to cut down expenditures, job cuts and measures to reduce costs are applicable; the majority of companies are forced to recruit part-time and casual labors instead of enrolling permanent ones. Instability with low wages becomes major factors in skills shortage within the industry.

3 IMPACT ON CONSTRUCTION PROJECTS

It has ever been known that construction projects in any country are subject to different factors that impact these projects in terms of low-quality (poor workmanship), low-productivity and increased inefficiency. skills shortage can be seen as one of the factors stated as construction projects' defects which typically applies to the Lebanese industry as well.

Low-Quality: Quality in construction is not only looked at as a final project, but also to the way materials, tools and techniques are used; accordingly, poor workmanship could be one of the major root causes of construction defects, where reworks, material wastage, extra-costs, delayed completion of projects may apply. Most significant factors contributing to poor workmanship can be summarized as lack of experience and competency of labors, lack of responsibility, poor communication, inadequate transfer of information, insufficient skilled manpower [1].

Low-Productivity: When Productivity is defined as "measure of input/output parameter", the level of skills and experience of the workforce is the most important aspect for site productivity in construction industry [2]. As per Enhassi et al (2009), an experienced skill improves both intellectual and physical abilities of labor, and contributes a positive impact to increased productivity on site [3]. thus, skills and knowledge are perceived to affect labor productivity. Whenever the skill ratio

– defined as unskilled to skilled site workers is greater-productivity gets affected.

Inefficiency: Efficiency of construction projects can be expressed as the ability to deliver products in the most cost-effective way possible while maintaining quality of both final product and execution process. Consequently, construction companies are constantly searching for ways to improve labor output in order to maximize their projects efficiency (Orth, Welty and Jenkins, 2006) [5]. Unlike direct costs, efficiency loss is often not tracked or cannot be discerned separately and instantaneously, especially when considering the construction industry. However, skills shortage and its related contributing factors are of major concerns when dealing with such inefficiency.

4 IN-DEPTH STUDY OF LEBANESE CONSTRUCTIONS

Based on the previously summarized literature review, an in-depth study had been conducted to elicit the prominent factors related to skill shortage in construction projects. The recommended procedure for a Systematic Literature Review by Transfield et al (2003) [8] have been adopted in order to ensure a process developing a reliable knowledge of studies. Related papers were selected using specific keywords as Construction Industry, Skill Shortage, Labor Shortage, Skill Gap... from which, relevant data were extracted and analyzed; A questionnaire survey coupled to personal interviews are used to elicit the attitude of the construction industry main key-players – consultants, contractors and developers – can be considered as supporting aid in such analysis.

They were carried out in Lebanon and especially in North Lebanon Caza, where the researcher has ease of access to the North-Lebanese Order of Engineers and Architects (OEA-Tripoli) to which he has been a member since 2001. The researcher's practice and expertise in the construction domain as mechanical consultant registered in that Order can be considered an added value that facilitates contacts with other consultants, contractors and also developers who are engaged within the legislative contracts in OEA-Tripoli. The study is based on the data collected from a total of 85 distributed questionnaires with 60 respondents, corresponding to a 70.5% response rate (acceptable rate level).

In line with the above summarized factors related to the skills shortage within the construction sector, and taking into consideration the specialty of the Lebanese local industry (data retrieved from the survey), we find that a shortage of skilled labors in the construction industry in Lebanon is applicable and still arising day after day; the impact of such shortage can be obviously seen within the available local constructions in terms of defects, quality of products and process as well, and also in the financial costs and revenues; this is due to:

- **Problems arising from the initial design phases of any construction project:**

Design error appears to be found in all types of construction projects and can significantly degrade the project performance by generating reworks necessitating additional time, cost and resource expenditure. Even though the design and production are two separate functions, usually

performed by different parties (consultants and contractors), the impact of the first is so critical on the second. When majority of design firms omit design audits, reviews and verifications to maximize their fees and profits, the responsibility of the contractors and his labor staff becomes much higher with special upgraded skills.

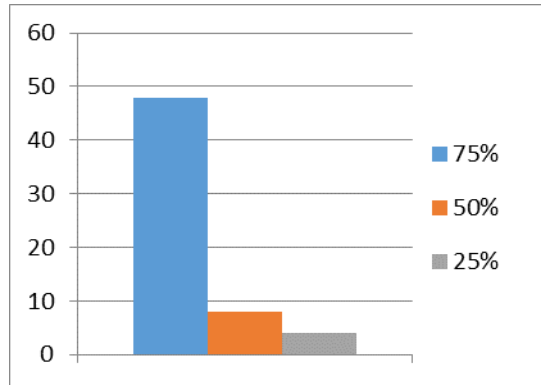


Fig. 1. Incorporating construction personnel in the design stage

Fig 1, shows that 48 out of the 60 respondents are of the opinion that incorporating construction personnel in the design stage may reduce up to 75% the design problems.

- Decreasing number of older labors on construction sites:** Many employees and labors have reached their retirement age while insufficient numbers are available to replace the skills they take with them. The older these labors are, the greater is their tendency to shift towards another profession, and this can be related to dissatisfaction, ill health problems, heavy work-type, long daily working hours, tough constraints, social security problems for permanent workers, etc... In response to such issue, local contracting firms were used – many years ago – to recruit from adjacent local industries, or even from neighbor countries especially Syria (no visa entry required and flexible working contracts on daily basis with no minimum constraints).

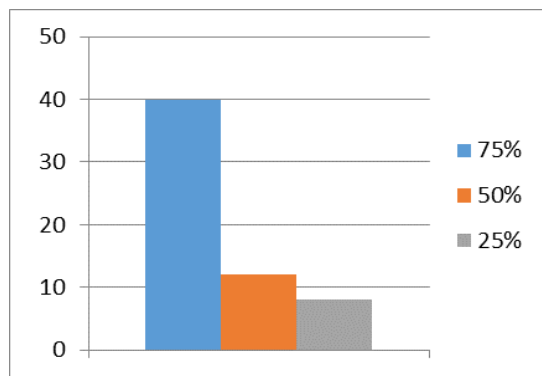


Fig. 2. Importance of the number of older labors on construction sites

As shown in Fig 2, 40 out of the 60 respondents agree that there is a well identified decreasing number of older labors on construction sites. They consider that overcoming such an issue may end up with more than 75% skill shortage limitation.

• Skill drain and emigration:

The local Lebanese economic crisis has been lasting for many years back with impact on the social stability in working industries where the construction is a major one of. Workers and skilled labors were obliged to find alternative solutions to the worse living conditions such industry ensure to them; the skill emigration was the only expected good solution to those labors trying to find their future in much more stable countries around the world. Upon personal interviews with some of them (while spending their vacation in their original country), the majority agree that their decision to migrate and explore their skills out there in Europe, Canada, USA and Africa was the best alternative they ever made. Their expertise was well evaluated in terms of revenues and social benefits.

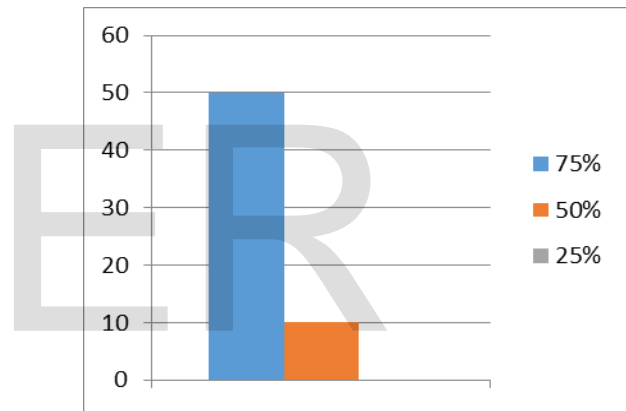


Fig. 3. Skills drain impact on labor skills shortage in construction

As per Fig 3, 50 out of the 60 respondents are with the opinion that more than 75% of shortage is related to the skill drain and emigration due to the local Lebanese economic crisis; the rest, considers a 50% percentage.

• Negative attitude towards the construction industry:

A general perception widely spread within the local Lebanese industry considers construction work as a low-image career, reserved for males, with long working hours, (dirty, physical challenging, dangerous) and low academic achievement, and led some parents orienting their children towards the academic path seeing it much more desirable than a technical one. With regard to such propaganda, the route towards academic colleges and universities is becoming much more wider in Lebanon; this can be obviously seen via the increasing number of graduate engineers lately registering in the order of engineers and architects (Beirut and Tripoli). The myth considers engineering practice much more valuable than

skilled labor-force with no barest consideration of the big number of engineers without work in the country.

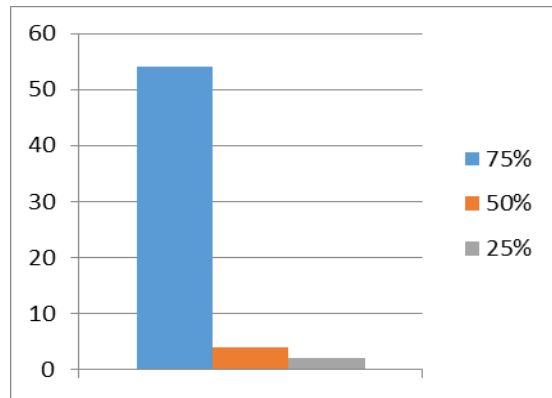


Fig. 4. Social attitude impact on skills shortage within the construction industry

54 out of the 60 respondents are of the opinion that the change of the social attitude to be positive towards the construction industry may reduce up to 75% the skills shortage problems, Fig 4. However, such an issue is not so easy working on culture and myths change.

- **Lack of new recruits joining the industry:**

The Lebanese construction industry's problem related to new recruits of skilled labors roots back to many years ago; the industry has been seen as an uninteresting and not attractive one; the un-attractive conditions of services coupled to low wages paid to the artisans – which will be discussed later –, made young people less interested to be involved within the industry. The widely spread reputation of having academic education towards other businesses influence the choice of young teenagers while selecting their future career; never to forget the impact of the academic schools in the orientation of their pupils towards future career without any consideration of the actual status of the labor market and its demand of any specific type of work. From a “better reputation” point of view, academic orientation is much more reliable to count on. Schools are almost competing by terms of academic results of their graduates at future university levels and this can be obviously seen by the huge number of academic schools compared to technical ones.

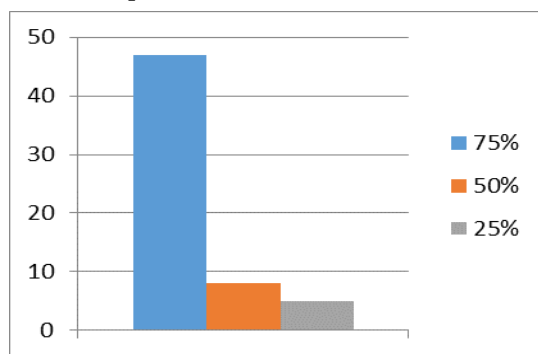


Fig. 5. Lack of new recruits' impact on skills shortage

As per Fig 5, 47 out of 60 respondents (78.3%) agree with the fact that more than 75% of the problems related to skill shortage in construction is linked to the lack of new recruits joining it, while 10.3% consider that such factor cannot be with an impact greater than 50%.

- **Changing nature of the construction markets:**

The construction market has ever been in a changing nature in Lebanon where it is subject to a fluctuating supply and demand. Upon such continuous fluctuation, the demand for skills and experiences labors vary, and the availability of artisans and workers to join the industry will be affected. The conditions of services impact most labors with short term contracts and casual employment. Such ever-changing nature of the market, encourage labors to enroll away from the construction industry, seeking a kind of stability in other specialties.

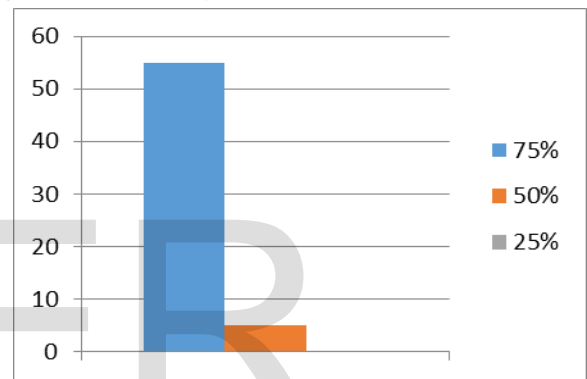


Fig. 6. Changing nature of construction impact within the Construction industry

Upon Figure-6, the majority of the respondents (91.6%) agree that the Lebanese construction industry is in an everlasting changing nature and continuous fluctuation, considering 75% of the skill shortage problems are related to such nature; Only (8.3%) consider a lower impact percentage of around 50%.

- **Less wage and salaries in the industry:**

The Lebanese local construction industry is related to a mind-set of having an instable profession with low salary for the artisans and labors working in within; Due to the economic problems the industry is facing, and in the aim to cut down expenditures, job cuts and measures to reduce costs are applicable: the majority of companies are forced to recruit part-time and causal labors instead of enrolling permanent ones. Instability with low wages and non-payment of the social security contributions become two major problems upon which qualified artisans are tending to go for self-employment rather than regular monthly salaried engagement because of better returns associated with working on their own, especially when

contractors are hiring those with less qualification because they are less expensive to projects.

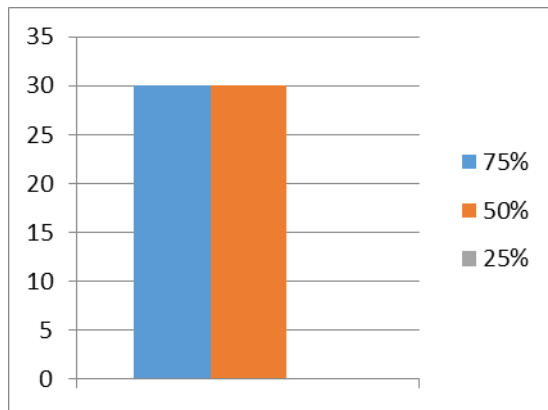


Fig. 7. Less salaries' impact on skills shortage

As per the Fig 7, respondents were split into two opinions with regard to the labors salaries and their impact on the shortage within the construction industry; while 50% of respondents agree that more than 75% of skills and performance problems are related to salaries and wages, the other 50% do not consider the issue with such a high impact and limit it to not more than 50%. While the first group insists on instability, low wage and social security problems as major issues, the second assumes that revenues within the construction industry are acceptable, and the problem is more related to the different factors (already mentioned in other sections).

- **Less work experience and skills:**

The Lebanese market shows an important mismatch of the skills demanded by the employer and those available in the industry. This is validated by the poor quality works the construction industry is facing and which is due to the low levels of competencies among labors skills; In fact, construction site workers need good and sufficient skills to understand building standards and techniques, regulations, how to read drawings for the good quality of work; the lack of such skills lead to safety and quality standards and procedures being compromised [2]. The relatively high number of informally trained artisans is also related to the cheap labor promoted by contractors who are trying to maximize their profits with no barest care about the quality of the product they are submitting. On a second hand, the number of trade and technical schools in Lebanon is not enough to ensure the necessary demand of the market; Even though artisan skills could be partially learned on site wherever a clear skills acquisition system is taking place, the major concern is that lot of contractors do not care about the certificates and proof of qualification of labors and prefer to limit their expenses to lower wages, promoting a culture of cheap labor. Never to forget the

financial difficulties facing majority of labors and artisans in career advancement. The miss of continuous training programs within construction is found a severe factor causing skill shortage in the local workforce.

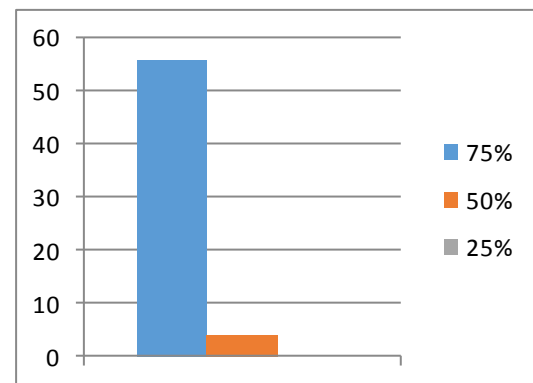


Fig. 8. Less work experience impact within the construction industry

As per Fig 8, the majority (93.3%) of respondents, counting 56 out of 60, agree that there is a big problem related to the level of skills and experience of labors within construction, and in their opinion this is related to more than 75% of the problems of shortage within this industry. They are obliged to deal with informally trained artisans since well experienced and skilled ones are missed in the local market.

- **Acquisition of new technology [7]:**

In general, construction new technologies are considered prominent factors in the improvement of the industry; however, such implementations within the local construction industry somewhat stay limited. The limited skills and knowledge of the majority of labor-force working within the Lebanese market make it difficult for them to handle modern up-to-date constructions. Accordingly, both physical and intellectual abilities are also limited and negatively impact the productivity on site. However, with the worldwide technologies advancement and the globalization of the construction industry, it is essential to acquire technologies in order to renew, increase knowledge and acquire more appropriate technological products; and this will be a major concern when dealing with low-skills and un-experienced labors within the industry.

4 RESEARCH METHOD FOR RANKING PARAMETERS

The proposed research methodology is based on questionnaire survey targeting different key-players within the construction industry and aiming to rank the different parameters and factors that lead to skills shortage and consequently the low quality and performance of the industry. Likert Scale scoring of 1-5 was used for ranking answers of the questionnaire, depending on the importance of each item scaling as follows:

5 is relative to "very important", 4 is relative to "important", 3 is relative for "medium importance", 2 for "low importance" and 1 for "very low importance".

The statistical questionnaire results have been validated by:

- The **Relative Importance Index RII** methods, to determine the ranks of all factors:
- The **Cronbach's Alpha coefficient**, to measure internal consistency of variables within respondents.

Table-1 shows the computed RIIs and the corresponding ranks as per respondents replies and answers. Note that the Cronbach Alpha's coefficient is calculated to measure the internal consistency of variables. It is found $\alpha = 0.918$ which is relatively very close to 1 and which indicates that the questionnaire is valid and reliable.

TABLE 1. RANKING OF THE CAUSES RELATED TO THE SKILL SHORTAGE IN CONSTRUCTION INDUSTRY:

No	Variables	RII	Rank
1	Less wage and salaries in the industry	0.855	1
2	Lack of new recruits joining the industry	0.822	2
3	Skill drain and emigration	0.800	3
4	Negative social attitude towards the construction industry	0.778	4
5	Decreasing number of older labors on construction sites (expertise)	0.725	5
6	Less work experience and skills	0.713	6
7	Changing nature of the construction markets	0.702	7
8	Acquisition of new technology	0.686	8
9	Problems arising from the initial design phases of any construction project	0.679	9

An explicit interpretation of the collected data from interviewees shows that respondents of different types (consultants, contractors and developers) have conversion in their opinion with regard to each of the variables discussed in the proposed questionnaire. The same concern of the three groups of respondents can be validated by the same constraints all key players are facing within the construction sector in Lebanon.

5 CONCLUSION

With regard to the above presented study, we can summarize that the presented factors are essential parameters related to the skill shortage in construction industry, which by turn, impact the overall performance of the project. These factors are critical in the local Lebanese construction market and should be targeted to minimize them and maximize the overall performance of any construction project. The support of the local authorities as well as the Order of Engineers and Architects can be of big revenues on the quality standards of the project, and the labors' skills specifically (which are critical for such quality standard). The implementation of new strategic actions can be considered as mitigation measures listed as follows (but not limited to):

- Retain skilled employees and labors within the industry to safeguard such skills for the future.
- Enhance the young generation to join the construction trade, and be interested in taking vocational courses which contribute to skills shortage limitation.
- Study and implement new strategies to address employee motivation within this sector.
- Establish a wage scaling system to be applied within the construction industry.
- Allow foreign labor to work in the local country but with strict conditions for immigration in order not to damage the local construction forces.
- Increase investment on education and training, specifically the technical / practical one;
- Introduce skills and apprenticeship certification within a well-structured working system.
- Apprenticeship should be mandatory in construction, either public or private sector.

Never to forget that the stated problem should be the concern of all the participants - owners, developers, consultants, contractors, and end-users - in the construction sector where their joining efforts will lead to better performance and revenue to the project.

REFERENCES

- [1] Ali A.S and Wen K.H (2011). "Building defects: possible solutions for poor construction workmanship". Journal of Building Performance, vol. 2(1), pp.59-69.
- [2] Charles C. Kaoma (2006). "Crafts skills gaps in the construction industry in Zambia"; dissertation submitted to the University of Zambia in partial fulfilment of the requirements for the Degree of Master of Engineering in Construction Management.
- [3] Enshassi Adanan, Mohamed Sherif and Ekarriri Alaa (2009), "Essential Skills and Training Provisions for Building Project Stakeholders in Palestine". Journal of Construction in Developing Countries, Vol. 14(1), pp. 31-49
- [4] Jordan N and Barry (2009). "Investigating the reasons for lack of skilled artisans in South Africa". The perspective of artisans, South African Journal of Engineering, Vol 20(1), pp. 173-184.
- [5] Offei-Nyako.K, Osei-Tutu.E, Fugar, F.D and Adinyira E. (2014). Skilled artisan availability in the construction industry, Covenant Journal of research in the built environment Vol (1), pp. 6-8
- [6] Oseghale, B.O.; Abiola-Falemu J.O, and Oseghale G.E (2015). "An Evaluation of skilled labour shortage in selected construction firms in Edo state, Nigeria"; American Journal of engineering research.Vol. 4(1), pp 156-167
- [7] Shah Chandra and Burke Gerald (2003). "Skills shortages: concepts, measurement and implications". Monash University-ACER Centre for the Economics of Education and Training (CEET), working paper no. 52, November
- [8] Tranfield, D., Denyer, D., & Smart, P. (2003). "Towards a methodology for developing evidence- informed management knowledge by means of systematic review". British journal of management, 14(3), 207-222.