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FACTORS AFFECTING THE PRODUCTIVITY OF BUILDING CRAFTSMEN – STUDIES OF UGANDA

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Abstract. Poor productivity of construction workers is one of the causes of cost and time overruns in construction projects. The productivity of labour is particularly important especially in developing countries, where most of the building construction work is still on manual basis. This paper reports on a survey made on project managers of building projects in Uganda, where an increase in productivity is being sought. Respondents were required to rate using their experience how 36 factors affect productivity with respect to time, cost and quality. The survey was carried out by a questionnaire and responses received over a period of 3 months. The ten most significant problems affecting labour productivity were identified as incompetent supervisors; lack of skills from the workers; rework; lack of tools/equipment; poor construction methods; poor communication; inaccurate drawings; stoppages because of work being rejected by consultants; political insecurity; tools/equipment breakdown; and harsh weather conditions. Although lack of materials is ranked highest with regard to average rating on loss of time, it was not ranked among the top ten using the importance index that takes into account time, cost as well as work quality. The policy makers and researchers should focus on the identified major factors in order to improve productivity.

Keywords: labour, productivity, factors, developing countries, building sector, craftsmen.

1. Introduction

Construction industries in many countries are greatly concerned about a low level of productivity [1, 2]. Poor productivity of craftsmen is one of the most daunting problems that construction industries, especially those in developing countries, face [3]. Although some research has been carried out on productivity of construction craftsmen in developing countries [3, 4], there are still gaps to be filled.

The construction industry in Uganda constitutes over 12 % of the gross domestic product and has witnessed a steady growth for the last 20 years [5]. In developing countries, building construction consumes about 70 % of the construction investment [6, 7]. The situation in Uganda is not different. The majority of construction workers are employed on building sites as civil engineering works are to a large extent mechanised. Hence the emphasis of this research is on labour productivity on building sites. It is assumed that any effort directed to improving productivity will greatly enhance the country's chances to realise its development goals.

The building industry in Sub-Sahara Africa has unique characteristics. To mention only a few, building is labour intensive as it is largely in situ; the workers are exposed to extremes of hot and wet weather conditions; the pay incentive structures are poor; the working environment is hazardous. The major task currently being addressed by the Uganda National Association of Building and Civil Engineering Contractors (UNABCEC) is how to increase construction productivity [8], hence the need for this research.

The construction industry in Uganda suffers from cost and time overruns [9]. Overruns in the construction industry are indicators of productivity problems. Improving construction productivity will go a long way towards eliminating time and cost overruns [10]. Identifying and evaluating the factors that influence productivity are critical issues faced by construction managers [11]. Some research on factors that affect productivity in developed countries has been carried out [12–14]. Strategies for performance improvement in those industries have been identified and implemented mainly basing on the identified key factors. The critical factors in developed countries are different from those in developing countries. For instance, while addressing the problem of supply of materials, Polat and Arditi [15] have found out that contractors in developing countries stock excess materials just-in-case, while the trend in developed countries is for materials to deliver just-in-time. It is therefore important that factors affecting productivity in Uganda's building industry are well identified so that efforts can be made to

improve the situation. However, the results from earlier research were based on perceived effect with regard to time only. For example, the Importance Index used by Lim and Alum [2] is based on the frequency of encountering the factors. The three common indicators of performance in construction projects are time, cost and quality [16] and all these factors should be included in assessing productivity in order to get a better picture. Having different indicators of productivity is in line with the paradigm of Key Performance Indicators [17].

Some researchers have voiced their concerns about continued declining performance of the construction industry and the increasing challenges [18–20]. To deal with the situation, many companies have adopted different philosophies to reverse the trend such as lean construction that should have some significant effect on performance, productivity and profitability [21]. However, some researchers believe that the payback of these improvement approaches in the construction industry has been small compared to the investment [22]. This leaves the construction companies in the developing world at a loss. The objective of this study is to identify and rank the major factors that affect the productivity of craftsmen in Uganda. The goal is to have an appropriate strategy for building contractors to improve the productivity of craftsmen.

Responses were solicited from project managers of building contractors in Uganda through a questionnaire survey. All building contractors registered with the national contractors' association were targeted to provide one project manager who would participate in filling in the questionnaire. A response rate of 53 % was achieved. The survey found out that incompetent supervisors, lack of skills, rework and lack/breakdown of tools and equipment are the main factors that lead to a low productivity of the craftsmen within the building industry in Uganda when time, cost and quality are factored in. Lack of materials is the main factor that leads to a low productivity from the perspective of lost time and frequency of occurrence.

The arrangement of this article is that after this introduction, there is a section on literature review of productivity, then a section on methods is provided. There follows a section on results and discussion and lastly conclusion.

2. Productivity problems

Although some research has been carried out on factors influencing productivity, there is still a lot to be done even in developed countries [23]. To improve productivity, the impact of each factor can be assessed by statistical methods and attention given to those particular parameters that adversely affect productivity [13]. Previous studies looked at the construction industry as a whole, yet the majority of the workers are employed on building sites. Most civil engineering projects are mechanised.

Various factors have been identified by different researchers from the time aspect in different construction industries. Lack of materials, incomplete drawings, incompetent supervisors, lack of tools and equipment, absenteeism, poor communication, instruction time, poor site layout, inspection delay and rework were found to be the ten most significant problems affecting construction productivity in Thailand [23]. Kaming *et al* [3] found out that lack of materials, rework, worker interference, absenteeism, and lack of equipment were the most significant problems affecting workers in Indonesia. Olomolaiye *et al* [4] found that the five most significant factors in Nigeria are lack of materials, rework, lack of equipment, supervision delays, absenteeism, and interference. Lack of materials, weather and physical site conditions, lack of proper tools and equipment, design, drawing and change orders, inspection delays, absenteeism, safety, improper plan of work, repeating work, changing crew size and labour turnover were found out to be the most critical factors in Iran [24]. Lim and Alum [2] found that the major problems with labour productivity in Singapore are recruitment of supervisors, recruitment of workers, high rate of labour turnover, absenteeism at the workplace, communication with foreign workers, and inclement weather. Yet Lema [25] through a survey of contractors in Tanzania found out that the major factors that influence productivity are leadership, level of skill, wages, level of mechanisation, and monetary incentives. Motwani *et al* [11] found out through a survey in USA that five major problems that impede productivity are adverse site conditions; poor sequencing of works; drawing conflict/lack of information; searching for tools, materials, and poor weather. By the literature cited above, there are various factors that affect productivity to different levels in different industries. However, lack of materials comes out as a common problem among the critical ones. The experience of the authors is that most building sites in Uganda normally have stocks of different materials on site and as such may be not the most critical problem.

It is important to note that the questionnaires and ranking used in the studies before were based on time aspect of frequency of occurrence. However, quality and cost are equally important in assessing the factors that affect productivity. Craftsmen can deliver varying quantities of work but the quality and cost should be acceptable. Rosefielde and Mills [26] argued that any measure of construction productivity that does not account for the changes in design and quality would lead to low, if not negative, measures of construction productivity. Hence there was need for this research to capture effects of time, cost and quality, since contractors in Uganda are trying to address the problems of low productivity.

3. Methods

3.1. Research method

Fellows and Liu [27] highlight five research styles: experiment, survey, action research, ethnographic research and case study. Research in construction is usually carried out through experiments, surveys or case studies [27]. Experiments on factors that affect labour productivity in the building industry would take a long time to yield results and they are difficult to control and would therefore be expensive. Case studies would not provide results that are easy to generalise as different companies

face different problems. Surveys through questionnaires were found appropriate because of the relative ease of obtaining standard data appropriate for achieving the objectives of this study.

Surveys are one of the most frequently used methods of data gathering in social research. The survey protocol of random sampling procedures allows a relatively small number of people to represent a much larger population [28]. The opinions and characteristics of a population can be explained by a representative sample. Surveys are an effective means to gain a lot of data on attitudes, on issues and causal relationships and they are inexpensive to administer. However, they can only show the strength of statistical association between variables and they provide no basis to expect that the respondents correctly interpret the questions.

3.2. Questionnaire design

Factors affecting the productivity of craftsmen were identified through the literature based on previous research [2–4, 10, 16, 23–25]. A total of 36 factors were identified. The project managers were required to rate the factors in the way they affect productivity in relation to time, cost and quality using their own experiences on building sites. The questionnaire required the respondents to rank their answers on a Likert Scale [29] with the rating of "0" representing no effect; "2" slightly significant effect; and "5" very big effect on labour productivity for each of time, cost and quality separately. The survey package comprised a covering letter, the questionnaire and a pre-stamped self-addressed envelope.

3.3. Pilot studies

Pilot studies were carried out to ensure the clarity and relevance of the questionnaire to contractors. The questionnaire was shown to two researchers in the same field. Based on their feedback, amendments were made and the second phase of the pilot study was conducted on four building project managers among those who were not going to participate in the final survey. Based on the feedback, minor amendments were again made to remove any ambiguities and discrepancies. This pilot study was conducted to validate and improve the questionnaire, in terms of its format and layout, the wording of statements and the overall content. The draft questionnaire was revised to include the suggestions of these participants. In short, the questionnaire was validated through this process and provided the authors with improvement opportunities before launching the main survey.

3.4. Sample selection

The survey gathered data from project managers of building contractors from as broad a geographic area within Uganda as possible. For this purpose, it was determined that all contractors who registered with the contractor's association participate. The target population of contractors was 167, those registered with the contractors' association, UNABCEC, and engaged in formal building work. At the national level, one recognised way of categorising construction companies is by the UNABCEC grade. The classification from A to E takes into account the financial strength, size and ability to carry out jobs. Those in class A are the biggest and undertake works of the biggest magnitude and include some multinational companies. At the time of the survey, UNABCEC had a membership of 189 including civil engineering contractors. For the purposes of this survey, the mailing lists of all those who were engaged in building construction during the year 2005 were used. The chief executive officers were asked to provide one project manager to make a response. A total of 159 questionnaires were sent out. For varied reasons, 22 could not participate. The sample size therefore reduced to 137.The survey was carried within a period of 3 months from mid-July to October 2005.

3.5. Survey response

Table 1. UNABCEC Grades for building contractors who responded

UNABCEC Grade	No Contacted	No Responded	Percentage (%)
A	38	23	60
B	16	9	56
C	31	19	61
D	27	9	33
E	27	13	48
Total	139	73	53

As a result of mailing and follow up, a total of 73 usable questionnaires were completed and returned. The distribution in the various grades of the 137 who were contacted and the 73 who responded is given in Table 1. A review of the responses from the national surveys indicated no measurable differences in the respondents' answers. All the questionnaires were therefore combined for the survey analysis.

The respondent project managers have been in the construction industry for a period with both mean and median of 6 years. The total time the respondents have spent in the construction industry has a mean of 11 years and a median of 9 years. 95 % have either degrees or diplomas in engineering, architecture or quantity surveying. This means that they are generally well educated and have ample experience in the construction industry. The mean number of craftsmen employed on salary terms at the respondents' sites is 31. The mean number of casual workers was 96 but this varies with the amount of work at hand. At the time of the survey, the ratio was about 1:3 of salaried craftsmen to casual ones. All the tradesmen on permanent terms have some training, through either technical vocational schools or on-the-job.

Of the companies that provided responses, 74,6 % have local majority share capital while 4,2 % have all foreign share capital and 12,7 % have majority local share capital and 8,5 % have majority foreign capital. It can be concluded that the companies have got a range of ownership status and also possibly different management styles. 67,1 % of them keep data on productivity while

the rest do not. 85,7 % of the respondents replied that they develop the data in-house. 12,2 % share data on labour productivity with other companies and only 1,2 % share data with companies outside the country. 85 % of the companies replied that they monitor and control labour productivity. The majority of the project managers at 57,6 % have the perception that labour productivity is low. Those who believe that productivity is satisfactory make 37 % and only about 6 % believe that labour productivity is good.

4. Results and discussion

4.1. Data analysis and results

The average rankings were calculated basing on 4 different criteria: mean ratings for effect on time; effect on cost; effect on quality and combined importance index. The means for time, cost and quality were calculated using the formula

$$R_m = \frac{\sum R_x}{I};\ x = \text{time, cost or quality,} \qquad (1)$$

where R_m is the mean rating with respect to time, cost, or quality from the "***I***" number of raters. R_x is the rating given by the respondents.

The mean combined importance index from the rankings was calculated using the formula

$$I = \frac{\sum R_t x R_t x R_q}{NxM^3}, \qquad (2)$$

where R_t is the rating basing on time, R_c is the rating on cost and R_q is the rating on quality. Table 2 gives the summary of the calculated mean values for the different factors and also their ranking within the groups.

4.2. Discussion

This section contains the results from the ratings as given in Table 2 and a discussion about the factors. There follows a section on analysis of the reliability of the ratings obtained from the survey. Discussion is made on the ten highest ranked within the category of overall ranking and five highest ranking in terms of time, cost and quality where they are not yet dealt with. The assumption is made that the highest ranked have the greatest influence in line with Pareto rule. The highest ranked according to the Overall Importance Index are: incompetence of supervisors; lack of skills of the workers originating from inexperienced poorly trained workers; rework eg from poor work done; lack of tools/equipment; poor construction methods including poor sequencing of work items; poor communication which includes inaccurate instructions; inaccurate drawings; stoppages because of work rejected by consultants; political insecurity, for example, insurgency, wars, and risk; tools/equipment breakdown; harsh weather conditions.

The factor of materials shortages and delays is ranked first in terms of time only. This is similar to what was found out in earlier research [3, 4, 24]. However, basing on the overall Importance Index, it is ranked seventeenth. Material shortages consume a lot of the contractors' time but the effect of cost and quality is relatively lower. The main cost incurred due to shortages is for the idle time that craftsmen have to wait for materials. But since a good number are employed on short contracts and casual terms, it implies that when there are no materials, they can also afford to wait without transmitting extra costs to the contractor. The factor of Incompetent supervisors is rated highest on the overall Importance index. This could be partly because supervisors do not attend refresher courses. Most of the supervisors are trained but their formal training stops when they leave school. There are also a good number of supervisors who have only attained on-the-job training. Those may not be well versed with many requirements of supervision. There is therefore need for continuous training of the supervisors. The other issue is that they may not be well facilitated to do their work. Incompetence of supervisors affects many other factors.

Lack of skills is a major problem and seriously affects the time to accomplish tasks, the cost of labour and the quality of products achieved. The hope is that since the government of Uganda is promising to introduce technical schools at all sub-counties, the right skills will be developed in future but this will take some time to have impact on the industry. As the government introduces universal secondary and technical training, it is necessary to make needs assessment and to identify the key trades and right numbers to train if the situation is to change. On-the-job training through which the majority of skilled workers pass should be studied with a view to improving it and possibly formalising it so that those that have been trained obtain certificates. Rework is rated third overall on Importance Index. It is ranked second, first and seventh against time, cost and quality respectively. It is mainly caused by failure to follow specifications. Specifications should be made clear and explained to the executing team to avoid rework. Repetition of instructions everyday with visual management aids could possibly make it easier for the workers to access them. At the moment, the specifications are usually kept in office and relayed only when they are needed.

Lack of tools and equipment is ranked fourth overall. Tools are mainly provided to the craftsmen engaged on full time basis. Casual workers are expected to bring their own partly because these workers end up taking the very tools they are provided with. Some equipment is not readily available in some places even for hiring. There is a need to improve the availability of tools to make the workers more productive. The factor of poor construction methods is ranked fifth on the overall importance index. Poor construction methods are mainly due to poor planning of the work. Poor planning may partly be attributed to the incompetence of the supervisors. The other problem is that of designs that are not easily buildable. Lack of buildability is due to designs that do not take into account the available resources for construction purposes and inadequate appreciation of construction techniques. Supervisors should be encouraged to develop work statements before the work starts.

Table 2. Ranking of factors according to time, cost, quality and combined importance index

	Average rating, according to time	Rank, according to time	Average rating, according to cost	Rank, according to cost	Average rating, according to quality	Rank, accord-ing to quality	Importance index	Rank, according to importance index
Maximum values	5	36	5	36	5	36	1	36
Incompetent supervisors	3,973	4	3,795	2	3,904	2	0,577	1
Lack of skills of the workers (eg inexperienced, poorly trained)	3,945	5	3,753	3	4,192	1	0,574	2
Rework, eg poor work done	4,000	2	4,082	1	3,260	7	0,502	3
Lack of tools/equipment	4,000	3	3,658	5	3,548	4	0,486	4
Poor construction method (eg poor sequencing of work items)	3,658	14	3,397	13	3,726	3	0,475	5
Poor communication (eg inaccurate instructions, inaccurate drawings)	3,726	12	3,603	8	3,356	5	0,446	6
Stoppages because of work being rejected by consultants	3,932	6	3,616	7	2,890	15	0,441	7
Political insecurity (eg insurgency, wars)	3,836	10	3,630	6	2,918	14	0,438	8
Tools/equipment breakdown	3,671	13	3,753	4	3,027	13	0,397	9
Harsh weather conditions	3,658	15	3,397	14	3,055	12	0,390	10
Stoppages because of insolvency	3,890	7	3,534	11	2,753	18	0,385	11
Poor recruitment and changing of foremen	3,479	17	3,315	16	3,123	10	0,365	12
Stoppages because of disputes with owners/consultants	3,849	8	3,562	10	2,589	20	0,361	13
Incomplete drawings and design changes	3,808	11	3,027	24	3,164	9	0,355	14
Alcoholism and drug abuse	3,301	20	2,726	30	3,233	8	0,349	15
Poor economic conditions of workers (eg poor pay)	3,247	23	2,986	25	3,301	6	0,328	16
Material shortages/delays	4,192	1	3,411	12	2,301	30	0,314	17
Poor labour composition (eg poor ratio of tradesmen to labourers)	3,288	21	3,137	20	3,055	11	0,313	18
Absenteeism of workers	3,836	9	3,082	22	2,534	22	0,292	19
Disruption of power/water services (eg power load shedding)	3,548	16	3,315	15	2,370	29	0,289	20
Labour disputes (eg industrial action)	2,986	28	3,137	21	2,479	24	0,283	21
Poor site conditions (eg height, shape, etc)	3,123	25	3,219	19	2,795	17	0,278	22
Poor health of workers (eg sickness, general weakness)	3,205	24	2,945	26	2,521	23	0,268	23
Workers turnover, recruitment and changing crews	2,877	30	2,603	31	2,863	16	0,256	24
Design complexity	3,000	27	3,315	18	2,452	26	0,254	25
Poor access (eg poor scaffolds)	3,260	22	2,904	28	2,644	19	0,254	26
Design changes	3,466	18	3,603	9	2,055	34	0,252	27
Inspection delay	3,342	19	3,055	23	2,452	25	0,249	28
Accidents at work sites	3,014	26	3,315	17	2,164	33	0,230	29
Overcrowding on the site	2,452	34	2,918	27	2,562	21	0.,207	30
Interference from other trades or other crew members	2,575	32	2,767	29	2,397	28	0,202	31
Too much instruction time (eg to workers)	2,904	29	2,425	33	2,411	27	0,186	32
Working overtime	2,836	31	2,425	34	2,192	32	0,150	33
Adherence to regulatory requirements	1,986	35	2,274	36	2,260	31	0,141	34
Attendance to social factors (eg deaths of relatives, parties, etc)	2,534	33	2,384	35	1,534	36	0,135	35
Small construction volume	1,959	36	2,466	32	1,781	35	0,122	36

Poor communication due, for instance, to inaccurate instructions and inaccurate drawings is ranked sixth on the overall importance index. This is largely attributed to the low levels of literacy of the workers and the level of technical training. The most common form of communication is verbal and, moreover, face-to-face. The other reason is that most of the contracts are traditional. The frequency of meetings between contractors, clients, and designers may not be as often as it should and this brings in communication gaps.

Stoppages because of work being rejected by consultants is rated seventh overall. This is linked to the overall quality management process. A number of contractors do not follow the quality management procedures and many are not Total Quality Management certified. Specifications are at times kept in the offices and only used when there is a need for reference. Political insecurity, for example, due to insurgency, wars is rated eighth on the overall importance. The factor of risk and insecurity has not been rated high before. This might have come up because Uganda has not been at peace for a long time. Currently a big portion of the country faces insecurity from rebels and this affects execution of building contracts.

Tools/equipment breakdown is ranked ninth according to the overall Importance Index. This is in relation to breakdown of equipment including vibrators, water pumps, and powered machinery. These breakdowns due to poor maintenance and lack of regular service. Many of them are also not in the best condition as they lack spares. There is a need for good garages and workshops to take care of the repairs and maintenance and for contractors to understand that there is optimal age for replacing such tools and equipment.

The factor of harsh weather conditions is ranked tenth from the overall importance index. Uganda, being in the equatorial region, experiences wet and dry conditions. The rains are heavy but in many cases last for a short time. They cause damage to unprotected building components under construction that are mainly carried out in situ. The afternoons are generally hot at average maximum of about 28 – 35 ^{o}C.

4.3. Reliability of ratings

To test the consistence of the ratings, a null hypothesis H_o was set that: "there was no significant agreement among the respondents on the rating of the factors". The alternative H_1 was that "there was significant agreement among the respondents on the rating of the factors". The analysis aimed at establishing that the ratings had not been arrived at by chance but rather that there was true agreement in the ratings and therefore the results are reliable.

To test the hypotheses, non-parametric tests using the Kappa Coefficient of Agreement (K) were used [30]. These tests do not rely on the distribution of data, unlike most other parametric tests. The statistics is used in a typical situation where a group of $\boldsymbol{N}$ objects, each of which is to be assigned $\boldsymbol{m}$ categories by a group of $\boldsymbol{I}$ raters. There were $\boldsymbol{N} = 73$ factors to be rated, evaluated by $I = 73$ raters each assigning factor on time, cost and quality on $M = 6$ rating scales. The value of K is the ratio of the proportion of times that the raters agree (corrected for chance agreement) to the maximum proportion of the times the raters could agree [30].

$$K = \frac{P(A) - P(E)}{1 - P(E)}, \tag{3}$$

where $P(A)$ is the proportion of time that the raters agree; $P(E)$ is the proportion of time that the raters would be expected to agree by chance. If there was a complete agreement among the raters, then $K = 1$; and if there is no agreement, other than that which would be expected to occur by chance, then $K = 0$.

$$P(E) = \sum_{j=1}^{m} p_j^2, \text{ where } p_j = \frac{C_j}{NI}, \tag{4}$$

C_j – number of times a factor is assigned to category j. It is the sum of the column frequencies under the ratings.

$$P(A) = \left[\frac{1}{NI(I-1)} \sum_{i=1}^{N} \sum_{j=1}^{M} n_{ij}^2 \right] - \frac{1}{I-1}, \tag{5}$$

N – number of factors being rated = 36; M – number of rating scales = 6; $\boldsymbol{I}$ – number of raters = 73; n_{ij} – scores in the rating matrix.

According to Siegel and Castellan, K is normally distributed with zero mean and variance, var(K), given by equation (6).

$$\text{Hence, } z = \frac{K}{\sqrt{\text{var}(K)}}, \tag{6}$$

$$\text{var}(K) \approx \frac{2}{NI(I-1)} \frac{P(E) - (2I-3)P(E)^2 + 2(I-2)\sum p_j^3}{\left[1 - P(E)\right]^2}. \tag{7}$$

The z statistic was used to test the null hypothesis, H_o: $K = 0$ against the alternative hypothesis, H_1: $K \neq 0$. From equations (1), (2) and (3) above, the values of $P(A)$, $P(E)$ and K were computed as indicated in Table 3.

Table 3. Calculation of Z values

Factors rated against	$P(A)$	(PE)	K	Var(K)	Z
Time	0,249 635	0,216 655	0,042 102	1,28E-05	11,789
Cost	0,218 021	0,201 863	0,020 244	9,96E-06	7,173
Quality	0,195 068	0,176 393	0,022 674	3,22E-06	12,639

The computed values of var(K) and z are given in Table 3. At 5 % level of significance, $z = 1{,}645$. Since the computed values are greater than $z_{0,05}$, it can be concluded that there was a significant agreement in rating the factors and the degree of agreement is beyond that which could have occurred by chance. The null hypothesis is therefore rejected and the ranking given represents consensus among the respondents.

5. Conclusion

The objective of this study was to identify and rank the major factors that affect the productivity of craftsmen in Uganda. The goal is to find an appropriate strategy for improving the productivity of craftsmen in this country, with emphasis on the most critical factors taking into account the effects on time, cost and quality. From the survey, five highest ranked factors that affect labour productivity are incompetent supervisors, lack of skills; rework; lack of tools/equipment; and poor construction methods. Since contractors in Uganda are trying to find ways of improving productivity, UNABCEC, researchers and policy makers should mainly dwell on the identified critical factors. The level of supervision and level of skills of craftsmen particularly have to be improved. Contractors should focus on improving these areas by giving refresher courses, rewarding on the basis of skill and output, and participating in structured training on workers in the construction industry. Research geared at improving productivity should focus on the identified factors preferably those on top of the list by importance index that has taken into account time, cost and quality of the building products.

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VEIKSNIAI, LEMIANTYS STATYBOS DARBININKŲ DARBO NAŠUMĄ (UGANDOS PAVYZDYS)

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Santrauka

Menkas statybos įmonių darbininkų darbo našumas yra viena iš priežasčių, lemiančių statybos projektų pinigų ir laiko nuostolius. Darbo jėgos našumas yra ypač svarbus besivystančiose šalyse, kur dauguma statybos darbų atliekama rankomis. Šiame straipsnyje pateikiama pastatų projektų darbų vadovų apklausa Ugandoje, kur ypač siekiama didinti darbininkų našumą. Respondentų buvo prašoma, naudojantis savo patirtimi, pateikti 36 veiksnius, kurie lemia našumą atsižvelgiant į laiką, išlaidas bei kokybę. Ši apklausa buvo daroma anketomis, ir visi atsakymai buvo gauti per 3 mėnesius. Buvo išskirta dešimt pagrindinių veiksnių, lemiančių darbo jėgos našumą, t. y. nekompetentingas vadovavimas, darbininkų įgūdžių stoka, klaidų taisymas, įrankių (įrangos) trūkumas, pasenę statybos metodai, bloga informacijos perdavimo sistema, netikslūs brėžiniai, darbų stabdymas dėl konsultantų, politinis nesaugumas, įrankių (įrangos) gedimas, prastos oro sąlygos. Nors medžiagų stoka yra vienas iš labiausiai gaišatį lemiančių veiksnių, tačiau, naudojant reikšmingumo indeksą, į kurį įeina laikas, išlaidos bei darbo kokybė, tarp dešimties išvardytų veiksnių nepateko. Politikai ir mokslininkai turėtų daugiau dėmesio skirti nustatytiems veiksniams, kad gerėtų statyboje dirbančių darbininkų darbo našumas.

Reikšminiai žodžiai: darbo jėga, našumas, veiksniai, besivystančios šalys, statybos sektorius, darbininkas.

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