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## MEASUREMENT AND ANALYSIS OF IMPACT OF SUPERVISION ON CONSTRUCTION LABOUR PRODUCTIVITY: A CASE STUDY OF NORTH-CENTRAL NIGERIA

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### ABSTRACT

Labour productivity is one crucial factor that directly affect profitability of construction contracting firms. Labour productivity is one of the most important issues being frequently discuss among construction firms, construction professionals and stake-holders in the construction industry as it has a significant impact on performance of all construction projects. This study focus on identifying supervision factors affecting labour productivity. The study analyse and quantify the impact of supervision on labour productivity in block laying and concrete activities in North-Central Nigeria. Questionnaire and direct site observation using time study was employed as data collection instrument. The data were analysed using relative importance index and regression model. The result of the analysis revealed that 7 factors were identified by Block layers and Concreters as factors under supervision group and significantly affect their productivity. The regression model result shows that in block laying, alteration of drawings and specifications during execution; Incompetent supervisors and late/unclear instructions were the top most factors having high negative impact (loss of productivity) of 0.745whr/m<sup>2</sup>; 0.637whr/m<sup>2</sup> and 0.61whr/m<sup>2</sup> respectively on labour productivity. In concreting, Inspection delay, supervision absentieesm, alteration of drawings and specifications during execution and incompetent supervisors were the 4 top most factors having high negative impact of 0.653whr/m<sup>2</sup>; 0.571whr/m<sup>2</sup>; 0.537whr/m<sup>2</sup> and 0.518whr/m<sup>2</sup> respectively on labour productivity. All the factors identified in this study have negative impact on labour productivity of the masonry trades considered in this study.

**Keywords:** Labour Productivity; Masonry trades; Block laying; Concreting

### INTRODUCTION

Construction industry is a labour intensive industry and labour productivity is one major influential factor affecting the overall performance of the industry. Labour constitutes about 30% to 50% of the total construction project cost (Shree Raja Gopal and Murali, 2016). Labour output of construction sector constitute 3% to 8% of gross domestic product (GDP) (Robles et al, 2014). In Nigeria and other nations of the world, it constitutes a major part of production input in construction project (Muhammed et al, 2015, Shree Raja Gopal

and Murali 2016). Labour productivity is a ratio of work done or unit of work done to man hours put into the work. It is a ratio of output to input (Robles et al, 2014).

Labour productivity in the construction industry is being negatively affected by a number of factors, either individually or as a group in which supervision is one (Jarkas, and Bitar, 2012; Enshassi et al, 2007). Supervision group of factors have a high impact on labour productivity of construction workers which has resulted to a continuous low level of labour productivity in the construction industry (Enshassi et al 2007). This group a



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number of gr consist of factors, such as incompetent supervisors, Late/ unclear instruction, Alteration of drawings and specifications during execution, inspection delay, rework, and supervision absenteeism (Shree Raja Gopal and Murali, 2016; Khaled and Remond, 2014; Bonviolent and Tinvavi, 2014).

The continuous low level of labour productivity in the industry, particularly in Nigeria has compelled the industry to look for ways of improving productivity and the general performance of the construction industry (Aki et al, 2011). Thus assessment and improvement of labour productivity have become issues of concern to the construction industry stake holders (Mohammed et al, 2015). These factors have similar impact on labour productivity but the magnitude of the impact of each factors differs (Yi and Chan, 2013). The impact of these factors can be analysed and measured at company level with focus on clients, contractors, consultants and

craftsmen (Serdar and Jasper, 2011). Analysis and measurement of these factors exposes the magnitude of their impacts either as a group or as individual factors that affect labour productivity

Previous researchers have studied factors affecting labour productivity in different parts of the world including Nigeria and came up with identification, classification and ranking of these factors (Homer et al,1989; Lim and Alum 1995; Makulsawatudom et al, 2004; Soekiman et al, 2011; Vaish and Kansal, 2014; Alinaitwe et al, 2007). However, an in-depth study in the area of analysis and measurement of impact of supervision as a factor affecting Labour productivity was hardly researched on in Nigeria, particularly in the North- Central Nigeria. Therefore, the main objective of this study is to identify, analyse and measure the impact of factors under supervision as a group factors affecting labour productivity of construction workers in the North-Central Nigeria.

## MATERIALS AND METHODS

### Research Method

This study uses mix- method of research design to gather all the necessary information needed in an effective way. It uses literature review, questionnaire and direct site observation to collect facts for the study. The literature review was used to generate productivity factors under supervision as a group factor. Seven factors were generated under supervision on the basis of related research work on construction labour productivity. The structured questionnaire was designed to seeks the perception of the craftsmen (Block layers and Concreters) on identifying and ranking each factors under supervision based on their severity. The direct observation on site was meant to collect data to measure the impact of each supervision

factors on labour productivity of the craftsmen on construction site.

The target population in this study includes: construction firms who holds valid registration from Private Developers Association of Nigeria within North- Central Nigeria and Craftsmen (Block layers and Concreters). A total of 42 construction firms were presented across the states in North Central Nigeria and a systematic random sampling was used to ensure a good representation of all the construction firms and the Craftsmen within North-Central Nigeria using the formula:

$$m = Z^2 X P X (1- P)/e^2$$

$$n = m/1 + m - 1/N$$

Where m = unlimited sample population

n = limited sample population  
 $Z = (1.96)$  for 95% confidence level  
 P = Degree of variance between the elements of the population (0.5)  
 e = maximum error of the point estimate.  
 $M = (1.96)^2 \times 0.5 \times (1-0.5)/(0.5)^2 = 385$ .  
 $n = 385 / 1 + 385 - 1/42 = 38$ .

A total of 38 construction firms was randomly chosen for the study. The same procedure was used to determine the total population of the craftsmen. In all a total of 38 construction observations. The regression model is defined by:

$$Im = Par - Pbl + P L1 X1 + PL2 X2 + PL3 X3 + \dots + PL7 X7$$

Where : Im = Impact of supervision factors.

firms, 86 block layers and 104 concreters were used across North- central Nigeria for this study.

Data collected through questionnaire was analyse using relative importance index ( RII ).

$$RII = 5n5+4n4+3n3+2n2+n1/5(n1+ n2 + n3 + n4 + n5)$$

To determine the impact of supervision factors on labour productivity, inferential statistics was used in form of regression model to analyse the data collected through direct site

Pav = Average daily productivity

Pbl = Baseline productivity

PL1 PL2 PL3 +..... PL7 = Loss of productivity

X1 X2 X3 +.....X7 = Supervision factors.

## RESULTS

### Ranking of Factors.

In this study, seven factors essentially determined under supervision that negatively affect labour productivity in construction projects have been identified and ranked

according to relative importance index (RII) by block layers and concreters in North-Central Nigeria. The impact of these factors on labour productivity of craftsmen is determined using regression model.

**Table1:** Ranking of Factors under Supervision. (Block layers Perception)

Factors	Index	Ranking
Alteration of drawings and specification during execution	86.65	1
Rework	82.2	2
Late/unclear instruction	81.34	3
Inspection delay	80.12	4
Incompetent supervisors	78.42	5
Insufficient supervision of sub-contractors	75	6
Supervision Absenteeism	74.53	7

Source: Research data (2022)

Table1 shows the ranking of factors under supervision as a group factor. The block layers ranked alteration of drawings and specifications during execution as the most

influential factor under supervision with RII of 86.65%. This factor was also ranked first among the 4 factors that negatively affect labour productivity under supervision group

in building project in the Gaza Strip (Enshassi et al, 2007). It was also ranked 4<sup>th</sup> among the 10 factors affecting labour productivity in Wolaita, Ethiopia (Alyew et al, 2019).

Rework was ranked second with RII of 82.20%. This value indicated that rework has high impact on labour productivity of block layers. This result was supported by Enshassi et al, (2007) who ranked rework 11 among 45 factors and 3 under supervision group. The block layers ranked late/unclear instruction as the 3<sup>rd</sup> factors that has high impact on their labour productivity. This result was supported by Robles et al, (2014) who ranked unclear instruction first under management category. Inspection delay is another important factors

that has high impact on the labour productivity of the block layers. This factor was ranked 4<sup>th</sup> with importance index of 80.12%. However, Mohammad et al, (2015) evaluated factors affecting labour productivity in construction industry in Nigeria and ranked inspection delay as the 4<sup>th</sup> factors that negatively affect labour productivity under management group. The block layers also ranked incompetent supervisors, insufficient supervision of sub-contractors and supervision absenteeism as 5<sup>th</sup>, 6<sup>th</sup> and 7<sup>th</sup> factors having high impact on their labour productivity.

**Table 2:** Ranking of Factors under Supervision (Concreters Perception)

Factors	Index	Ranking
Inspection delay	89.14	1
Alteration of drawings and specification during execution	87	2
Late/unclear instruction	85.35	3
Supervision absenteeism	84.6	4
Incompetent supervisors	84.15	5
Rework	73.84	6
Insufficient supervision of sub-contractors	71.75	7

Source: Research data (2022).

Table 2 illustrated the ranking of the factors under supervision as a group factor by concreters in North central Nigeria. On the ranking scale, inspection delay was ranked first with importance index of 89.14%. This result was supported by Enshassi et al, (2007) who studied factors affecting labour productivity in building project in the Gaza Strip and rank inspection delay 8<sup>th</sup> among 45 factors with importance index of 77.63%, and 2<sup>nd</sup> among the factors under supervision group. It is also ranked 15<sup>th</sup> among 32 factors by Alyew et al, (2019). Alteration of drawings and specifications during execution is ranked second in supervision factor group by the

concreters and also ranked 1<sup>st</sup> by Enshassi et al, (2007) among four factors in supervision factor group. Late/unclear instruction in supervision factor group is ranked 3<sup>rd</sup> with importance index of 85.35%. Other factors under supervision such as supervision absenteeism, incompetent supervisors, and insufficient supervision of sub-contractors were ranked by concreters as 84.15%, 83.84%, and 81.75% importance index respectively. On the whole, the result of the ranking of supervision factors by block layers and concreters in North Central Nigeria shows a high impact on labour productivity by all the

factors under supervision in the two masonry trades considered.

**Measurement of Impact of Supervision on Labour Productivity**

In order to measure the impact of supervision factors on labour productivity of the selected craftsmen in block laying and concreting activities in North –Central Nigeria, a multiple regression model was used. The multiple regression model provides the means of testing the predictive power or ability of independent variables. Nedgwa, (2017) determined the influence of training, method of hiring labour, source of building materials, and type of labour on performance of building project in Nairobi using regression model:

$$Z_i = BO + B_1 L_1 + B_2 L_2 + B_3 L_3 + B_4 L_4 + EO$$

Where  $Z_1$  = Building project performance.

$L_1$  = Type of labour;  $L_2$  = Source of building material;  $L_3$  = Method of hiring labour;

$L_4$  = Level of training of construction officers.

BO = Constant (inter-sept).

In this study the multiple regression used is defined by:

$$I_m = P_{ar} - P_{bl} + PL_1 X_1 + PL_2 X_2 PL_3 X_3 + \dots + P L_7 X_7.$$

Where  $P_{ar}$  = Average daily productivity

$I_m$  = Impact of supervision factors

$P_{bl}$  = Baseline productivity

$P L_1 + P L_2 + P L_3$  = Loss of productivity

$X_1 X_2 X_3 + \dots$  = Supervision factors.

$P_{ar} - P_{bl}$  = constant (inter-sept)

**Impact of Supervision factors on Block Layers Productivity**

For block work activities, the regression model used is summarized as:

$$I_m (\text{block}) = 0.806 + 0.174 X_1 + 0.347 X_2 + 0.187 X_3 + 0.246 X_4 + 0.058 X_5 + 0.117 X_6 + 0.267X_7.$$

**Table 3.** Multiple Regression Analysis of Supervision Factors on productivity of Block layers

Supervision Factors	Unstandardized Coefficient B	Std error	Standardized Coefficient Beta	t	sig
Constant	0.806	3.216		2.32	0
Alteration of drawings and specifications during execution	0.745	0.73	0.584	2.143	0.001
Incompetent supervisors	0.637	1.08	0.452	1.687	0.004
Late/unclear instruction	0.61	1.193	0.468	1.781	0.003
Rework	0.596	1.085	0.396	1.422	0.005
Supervision absenteeism	0.588	1.88	0.452	1.687	0.005
Inspection delay	0.58	1.434	0.476	1.11	0
Insufficient supervision of sub-contractors	0.562	1.12	0.395	0.665	0.005

Source: Research data (2022).

Table 3 shows the result of regression analysis of supervision factors on productivity

of Block layers. The unstandardized coefficient show how much a dependent variable varies with an independent variable when all other independent variables are held

constant. From the table, the unstandardized coefficient (B) for alteration of drawings and specification during execution was 0.745. This implies that for every change made in drawings and specification during execution of project caused a negative change in productivity (productivity loss) to a tune of 0.745. This result was concurred by the findings of Alyew et al (2019) who study factors affecting labour productivity on construction project in Wolaita, Ethiopia and ranked change in drawing and specification 4<sup>th</sup> among the 10 top most critical factors with relative importance index (RII) of 0.791. Thomas et al, (1999) reported that change order in drawing and specification from client caused about 30% loss of efficiency. Practically, when there is a change in drawings and specification during execution on site, additional time for adjustment of manpower and other resources to meet up with the change will be required.

The multiple regression analysis proved that incompetent supervisors has the 2<sup>nd</sup> higher impact on labour productivity of block layers with unstandardized coefficient value of 0.637. This result was supported by Makulsawatudom et al, (2004) who ranked incompetent supervisors as 3<sup>rd</sup> among the 10 most critical factors affecting construction labour productivity in Thailand. Late/unclear instruction also has high impact on labour productivity of the block layer with unstandardized coefficient value of 0.610. This implied that any late or unclear

instruction issued to the block layers caused 0.610 productivity loss. Alemu, (2004) reported that instruction delay in masonry construction cause 50mins productive time loss. Rework is another factor that has significant impact on labour productivity. The regression result shows the unstandardized coefficient of rework to be 0.596 which is a high value. This finding was supported by Enshassi et al, (2007) who ranked negative impact of rework on labour productivity to be 0.75 importance index and overall ranking of 11<sup>th</sup> position among 45 factors.

The result of the analysis also show that supervision absenteeism and inspection delay have significant impact on labour productivity of the block layers. The unstandardized coefficient of supervision absenteeism and supervision delay are .0588 and 0.580 respectively. Soekiman et al, (2011) ranked supervision absenteeism 7<sup>th</sup> among 10 most significant factors affecting labour productivity in Indonesia while Alyew et al, (2019) ranked inspection delay 15<sup>th</sup> among 32 factors with importance index of 0.460. Insufficient supervision of sub- contractors equally has significant impact on the labour productivity of the block layers with unstandardized coefficient of 0.562. All the seven factors in supervision group have significant impact on labour productivities of block layers. In order to determine whether the overall regression model is of good fit for the data, analysis of variance (ANOVA) was performed. Table 4 shows the details.

**Table 4:** One-way Analysis of Variance (ANOVA) for Block Work Activities and Factors under supervision group

Source of Variation	DF	SS	MS	F	P
Factors	6	4439669	742612	302165	0.000
Error =	347	87224	237		
Total	353	4627893			

S = 5.72 R-Sq = 96.09% R-Sq.(ad) = 95.85%  
Source: Research data (2022)

The result shows that the independent variables statistically and significantly predict the dependent variable ( $f=302165$ ,  $p = 0.000$ ), showing that the regression model is good fit of the data. This implies that there is a significant impact of supervision factors on the labour productivity of block layers in North-Central Nigeria.

### Impact of Supervision Factors on Productivity of Concreters

The impact of supervision factors on concrete activities was measured using a regression model as summarized below.

$$I_m (\text{concrete}) = 0.689 + 0.653 X_1 + 0.571 X_2 + 0.536 X_3 + 0.518 X_4 + 0.489 X_5 + 0.457 X_6 + 0.395 X_7$$

**Table 5:** Multiple Regression Analysis of Supervision Factors on productivity on Concrete Activity

Supervision Factors	Unstandardized Coefficient B	Std error	Standardized Coefficient Beta	t	sig
Constant	0.689	2.716		4.975	0
Inspection delay	0.653	1.114	0.412	3.11	0
Supervision absenteeism	0.571	1.314	0.277	2.687	0.005
Alteration of drawings and specifications during execution.	0.536	1.383	0.344	3.143	0.001
Incompetent supervisors	0.518	1.406	0.346	2.687	0.004
Rework	0.491	1.314	0.276	0.268	0.005
Late/unclear instruction	0.489	1.424	0.326	2.781	0.005
Insufficient supervision of sub-contractors	0.395	0.52	0.235	2.665	0.005

Source: Research data (2022).

Table 5 shows multiple regression analysis of supervision factors on productivity of concreters. From the table the unstandardized coefficient for inspection delay was 0.653. This means that inspection delay on site cause a negative impact (productivity loss) of 0.653 in this study. Enshassi et al, (2007) rank inspection delay 2<sup>nd</sup> among supervision factor group and ranked 8 among 45 factors affecting labour productivity in the Gaza Strip. Inspection delay has high impact on labour productivity in masonry construction in Nigeria, UK and Indonesia (Olomolaiye et al, 1996; Guhathakurta et al, 1993). This result is

justified, particularly in Nigeria where inspection has to be carried out on the arrangement of reinforcement bars, formwork and the mix ratio and approved by the supervisory team before casting can commence on site for floor slabs, beams and columns. Prolonged delay in carrying out inspection will contribute to delay in work activities and consequently extension of time in work activities. Supervision absenteeism is another supervision factor that has high negative impact on concrete activities in North Central Nigeria. The multiple regression analysis in table 5 shows that the unstandardized coefficient (B) for supervision absenteeism was 0.571 indicating that

complete absent of supervision on concrete work in the study area lead to an average productivity loss of 0.571. This can also lead to poor quality work which give birth to early maintenance work. This finding was supported by Enshassi et al, (20007) who ranked supervision absenteeism 15<sup>th</sup> among 45 factors affecting construction labour productivity in Gaza Strip.

Alteration of drawings and specifications during execution has significant impact on labour productivity of concreters in the North-Central Nigeria. The result of multiple

### CONCLUSION

Productivity factors under supervision group was identified, analysed, and the impact on labour productivity in block laying and concreting activities was measured on building construction projects in North-Central Nigeria. A total of 7 factors were identified and ranked. The analysis of these factors based on relative importance index shows that all the factors identified have significant negative effect on labour productivity of Block layers and Concreters in North-Central Nigeria.

A regression model was developed to quantify the impact of various supervision factors on construction labour productivity in block laying and concreting activities in the study area. Losses of productivities in the two masonry trades considered (block laying and concreting) were evident from the model. Thus the analysis of the regression model reveals the negative impact of supervision factors on labour productivity in block laying and concreting activities. Furthermore, the quantification of the impact of these factors indicated that all the factors identified under supervision group in this study have significant negative impacts (productivity loss) on labour productivity ranging from 0.745 to 0.395 losses in labour productivity across the

regression shows that alteration of drawings and specifications during execution in concrete activity causes a negative change in productivity to a tune of 0.536. This result was supported by Alyew et al (2019) who studied factors affecting labour productivity in Wolaita Ethiopia and ranked the effect of alteration of drawings and specifications 4<sup>th</sup> among 32 factors identified. All the factors identified have significant negative impacts on labour productivity of the concreters with the exception of insufficient supervision of sub-contractors.

various factors and this corroborates the finding of the previous study.

Though factors affecting labour productivity have been identified, measured and monitored on construction projects across the world. However, majority of the contracting firms in North-Central Nigeria and Nigeria as whole have not initiated productivity studies on their construction sites to identify, measure and monitor productivity Factors affecting labour productivity of the construction workers, hence productivity losses go unnoticed. It is therefore recommended that the contracting firms in North-Central Nigeria should initiate productivity studies on their various construction sites. It is also recommended that the contracting firms should as much as possible discourage change order in drawings and specifications during execution on site. The management should recruit qualified and competent supervisors to avoid late/unclear instructions and rework which may lead to time and cost overrun. Finally, it is recommended that the supervisory team should carry out their inspection as and when due to avoid delay in progressing to next stage of the project.

### REFERENCES

Afsharian, M; Mivghasemi, S.M; ebadzadeh, K; Iran, K (2013) A study of factors

- affecting productivity: *Advances in Environmental Biology* 7(11), p. 3350-3355.
- Alemu, T. (2006). sMeasurement oflabour productivity in construction project. Unpublished M.Sc thesis, Adis Ababa University.
- Alnaitiwe, H. M., Mwakali, J. A., & Hassan, B. (2007). Factors affecting the productivity of building craftsmen: Study of Uganda. *Journal of Civil Engineering and Management*, 3,169-176.
- Alyew,a ; Bassa, M ; Reta, A ; and Tora, M (2019) A study on factors affecting labour productivity on construction projects in Wolaita Zone Ethiopia. *International Journal of Engineering Research and Technology* 8(12), p.817-822.
- Aki, P; Harriand, H; Maila, H 92011) Productivity and performance Management: Managerial practices in construction Industry. *International Journal of Performance Measurement* 1: 39-58.
- Amae, D.K.K (2020) Determinants of labour productivity of site operatives in Ghana: Site managers perception. *Project management Scientific journal* 4(8), p. 61-80.
- Benviolent, C; and Tinvavi, M (2014) Factors affecting Labour Productivity on Building Projects in Zimbabwe. *International journal of Architecture, Engineering and Construction* 3(1), p. 56-565.
- Enshassi, A., Mohammed, S., Mayer, P., & Abed, K. (2007). Benchmarking Masonry Labour Productivity. *International Journal of Productivity and Performance Management*, 4, 358-368.
- Guhathakurta, S; and Yates, J (1993) International labour productivity. *Cost Engineering Journal* 35(1), p. 15-25.
- Homer,R.M.W; Talhouni,B.T; and Thomas, H.R (1989) Productivity results of major labour productivity monitoring programme. *Proceedjngs of the 3rd Yugoslavian Symposium. Construction Management cavtat.* P.18-28.
- Jarkas, E., & Bitar, C. (2012). Factors affecting labour productivity in Kuwait. *Journal of Construction Engineering and Management*, 138(7), 811-820.
- Khaled,M.E ; and Remond, F.A (2014) Factors Influencing Construction Labour Productivity in Egypt. *Journal of Management in Engineering* 30(2). P 1-9.
- Lim, E.C; and Alum, J (1995) Construction Productivity: Issues encountered by contractors in Singapore. *International Journal of Project Management* 13(10), p.51-58.
- Makulsawatudom, A., & Emsely, M. (2004). Critical factors influencing construction productivity in Thailand. *Journal of KMITNB*, 14(3), 1-6.
- Muhammed, N.Z; Sani, A; Muhammad, A; Balubaid, S; Ituma, E. E; and Sulieman, J.H (2015) Evaluation of factors affecting labour productivity in construction industry: A case study. *Junal Teknologi* 77 (12), p.87-91.
- Ndegwa,F,K (2017) Labour productivity and performance of Building projects in Nairobi county, Kenya. Unpublished Msc Thesis submitted to School of Business study Kenyatta University.
- Olomolaiye, P. O., Kaming, P., Holt, G., & Hany, F. (1996). Factors influencing craftsmen productivity in Indonesia. *International Journal of Project Management*, 1, 21-30.



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- Robles, A; Stifi, J.L ; Ponz-Tienda, S.G (2014) Labour Productivity in construction Industry : Factors Influencing Spanish construction Labour. *International Journal of Civil, Architecture, Structural and Construction Engineering* 8(10), p.999-1008.
- Serdar, D; and Jasper, M (2011) On- site labour productivity New Zealand Construction Industry: Key Constraints and improvement Measures. *Australian Journal of Construction Economics and Building* 11(3), p.18-33.
- Shree-Raja Gopal, G. T., & Urali, K. (2015). A critical review on factors influencing labour productivity in construction. *Journal of Mechanical and Ciil Engeering*, 5, 47-51.
- Sockiman, A., Pribadi, K. S., Soemardi, B. N., & Wivahadikusmah, R. D. (2011). Factors Relating to labour productivity affecting the project schedule performance in Indolesia. *Procedian Engineering*, 14(2), 815-873.
- Thomas, H. R., Riley, D. R., & Sanvido, V. E. (1999). Loss of productivity due to delivery method and weather. *Journal of Construction Engineering and Management*, 21, 31-46.
- Yi, W; and Chan, A.P,C (2013) Critical Review of labour productivity Research in construction. *Journal of Management in Engineering* 30(2), p.214-225.