

Mediating effect of cost of safety on performance of bread bakers: Evidence from Kogi State, Nigeria

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Abstract

The study investigated the mediating effect of cost of safety on the performance of bread bakers: Evidence from Kogi State Nigeria. The purpose was to examine the extent to which safety costs mediate or explain the underlying mechanism of the relationship between workers' safety and their performance. Data for the study were obtained from responses to the questionnaire distributed to 260 workers in seven (7) bread baking enterprises in the state out of which 163 of them (questionnaires) were returned. The analysis of the data was done using bootstrapping and regression statistical tools. The results of bootstrapping showed that the Average Casual Mediation Effect (ACME) is Total Effect (TE) minus Direct Effect (DE) of X (safety) and M (mediator) on Y (performance) and the coefficient of M have the same value of 0.3744 significant at 1 percent level. The result indicates partial mediation, the aim of mediation analysis. Similarly, the regression result indicated that approximately 53 percent of changes in Y are explained by the combined effect of X and M which is partial accountability of the variables akin to partial mediation of bootstrapping result. The study recommends that business owners especially bakery owners in Kogi State should take issues of safety seriously by providing adequate safety equipment and training workers on safety precautions.

1. Introduction

The safety of workers is paramount to management organizations and the government of any nation. Safety programmes especially for workers operating in factories were first introduced in Nigeria during the colonial period. The essence of the programmes was to enable organizations to manage and control safety risks and hazards in work environments. The negative effects of these risks and hazards are of various magnitudes ranging from accidents, injury, diseases, illness, and death impacting negatively on employees' and business performance, environment, and economy.

The hazards stem from physical exposure of workers as a result of handling/operating tools and equipment, high level of ambient noise from machines, and high repetitive motions and vibrations (Vander grift, Gold, Hanlon & Punnett, 2012 cited in Oloveze, Chukwuoyims, Ogbonna & Anayo Chukwu, 2021)

In Nigeria successive governments in a bid to guarantee the safety of workers, initiated a lot of safety programmes backed up by various legislations. These legislations include the Labour Act of 1974 the factory Act of 1987 and the workman's compensation Act of 1987. Other Acts on the health and safety of workers in Nigeria are the Health and Safety Labour Act of 1990 and the Workman's Compensation Act, 2004 amended in 2011 [Employee's compensation Act (ECA), 2011]. These laws are meant to legally seek management's commitment to employers. Safety has a lot of cost implications (Odigbo & Ekeh, 2019). Thus Desmond (2019) opined that Investment in the Safety of workers from accidents fatal and non-fatal has huge cost Implications and is associated with employees' performance and attainment of overall objective(s) of organizations.

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It is in view of this performance that many organizations in advanced economies such as the USA, UK, and China spend millions of dollars on safety programmes in terms of safety equipment procurement, maintenance of such equipment, and training of workers on safety measures are in compliance with applicable laws on safety precautions and compensation procedure in these countries. Similarly, in sub-Saharan African countries, such as Ghana, Kenya, and South Africa, These are laws that support the establishment of an accident-free working environment for employees with swift punitive measures on default [Brooklyn, (2018)], unfortunately, however, in Nigeria, though laws on employee safety are in place they are scarcely compelled with due to lack of enforcement (Barrikan & Jens). It is quite common that Nigerian business owners (entrepreneurs) are known for showing little or no interest/concern for employees' safety as their primary focus is on the return of their investment (Botinwa & Akinlade, 2020). The case of this nonchalant attitude of entrepreneurs to workers' safety in Nigeria is prevalent in private organizations where little or no fund is committed to securing the safety of their employees. (Botinwa & Akinlade, 2020)

Therefore, the objective of the study is to examine the extent to which safety costs to the management of enterprises (mediator) mediate between or explain the underlying mechanism of the relationship between workers' safety and their performance/ service quality.

2. Literature Review

Conceptual Review

Cost of Safety (CoS): This refers to the cost of planned safety programmes for workers operating in an organization (Brooklyn, 2018). The programmes especially for factory workers are meant to protect them from injuries, diseases, illnesses, and accidents that could claim their lives. Otolu and Adesuga (2019) viewed CoS as an investment of management that shows their (management) commitment to the health and safety of their employees and the environment in which business operations take place. Some important considerations of management in the area of employee safety and a healthy working environment involving governmental funds (costs) include plant layout, fire prevention system, provision of safety equipment, and safety training for workers. Other safety provision programme of an organization according to Mitchel and Harrison (2018) includes the installation of alarms and warning system, adequate lighting in work areas, flooring of working areas that are easy to clean, and mounting of signboards at strategic business premises with clear written safety instructions. These provisions are necessary and critical to business operation as injuries sustained by workers in factory accidents could sometimes be fatal leading to permanent disability and even death of worker(s) difficult to replace even temporarily.

It is in view of the importance attached to workers' safety especially those working in a hazardous business environment that Clarsion and Moore (2019) classified an organization's investment in the area of provision of safety facilities into three namely (i). Provision of adequate safety equipment (ii) Training of Workers on safety precautions and handling of equipment and (iii). Maintenance of Safety equipment and working tools/machines.

Performance: Performance (P) in the case of an employee refers to how a worker (Staff) carries out his/her duty role, tasks, and behaves in the workplace (Hildal & Urzil, 2016). P is an important ingredient for an organization's success measured by Quality, Quantity, Effectiveness, and Efficiency of Output. The Q^2 fund, E^2 of Outcome generally referred to as P metrics helps both management and employees review methods and ways tasks are performed for the improvement of P employees to meet business as well as customers' needs (Fanner & Timlon, 2018). With the metrics, an individual P can be assessed in terms of his/her daily, weekly, or monthly efforts in sustaining patronage of goods and services delivered and the overall profitability of an enterprise. For a manufacturing enterprise, some of the commonly used P metrics according to Dulman and Arler (2018), Morgger (2019) and Brooks (2020) are the number of product defects, number of errors, and number of units made (Produced) and abstention rate.

Empirical Review

In literature, the relationship between the safety of employees and their performance has been established. For instance, Grace and Rosemary (2018) conducted a study on maintaining the health and safety of workers in the workplace. Employee and employer's role in ensuring a safe working environment. The aim was to ascertain the importance of a healthy working environment. Data for the study were obtained from teachers in Mboomi west district working in secondary schools. Findings from the responses on the need for safety in a working environment descriptively analyzed using charts revealed that firstly P is closely linked to safety and secondly, lack of training on environmental hazards affects performance. The findings indicate that safety with all the cost implications is a mediator that explains the underlying mechanism of the relationship between Safety (x) and performance P (y) of workers.

In Pakistan, Yumei, Maryam, Mutaz Tahur, and Imtiaz (2021) did a study on put safety first: Exploring the role of health and safety practices in improving the performance of SMEs. The purpose was to ascertain the role of health and safety practices in improving the performance of workers. Data obtained from a sample of employees in SMEs descriptively analyzed using mean, Standard deviation, and inferential statistics technique (Pearson correlation coefficient two-tailed and simple regression: Findings showed that health and safety practices have a significant effect on performance. The result is an indication of the association/ relationship between safety and performance of workers in a workplace.

Alex Shangman, Ka, Charles, and Tariq (2020) carried out a study on promoting employee safety in Chinese construction companies. The essence is to examine the role of organizations' leadership in promoting a safe climate for performance. The study adopted a quantitative research method. Results of responses obtained from 106 construction professionals analyzed descriptively indicated that exerting certain leadership strategies that encourage workers to comply with safety practices will improve performance. Encouraging safety in the workplace entails the provision of safety equipment and training of workers on safety practices.

The association between safety and performance of workers has ever been established for instance in Japan, Chung and Yonsi (2016) in the study examined the relationship between safety practices and the performance of employees in construction companies. Results of descriptive analysis of responses from 235 employees in six construction firms revealed a positive relationship between the quality, quantity, and safety, compliance with safety measuring, and performance of employees. The finding implies that safety in the workplace is a sine qua non (sacrosanct) to the performance of employees especially those workers in factories prone to various risks forms of accidents and injuries.

In the USA, Ranold and Elliot (2019) analyzed the effect of safety and productivity in fifty (50) manufacturing firms in Florida for the period 2006 to 2017). Ex-post factor, descriptive and analytical research approaches were adopted for the study. The results indicated that a positive and significant relationship exists between the safety and productivity of workers. Consistent with Ranold & Elliot (2019) Hallistron and Porttan (2020) examined the effect of safety and health practices on employee performance in twenty (20) manufacturing firms in Chicago from 2000 to 2017 and found that the safe practice of employees has a significant effect on their productivity and responsible for increased output of firms.

Further Studies in Sub-Saharan Africa provided further evidence on the positive effects of safety on workers' productivity. For instance in Cameroon, Kenneth and Doule (2019) in a study of the effect of employee health and safety practice on the performance of the shipping industry found out that employees in the industry are prone to safety and health hazards having a negative impact on their productivity. The finding implies that safety is a critical factor that dictates the level of productivity of employees.

In Nigeria, Paggi and Onaru (2020) did a study on the safety practice and performance of employees. Data for the study were obtained from responses of ninety-six (96) workers from ten (10) selected manufacturing companies in Lagos. Results of descriptive analysis of data indicated a positive relationship between safety practices and the performance of employees. It was further revealed that inadequate provision of safety facilities has exposed workers to numerous hazards with a negative effect on performance. The finding implies that safety is a factor in the performance of employees, especially those working in manufacturing outfits. Similarly, in a study on health and safety in a working environment in Nigeria, Niyi and Damola (2020) examined the provision of safety equipment and the productivity of employees. Data for the study were obtained from eight (8) companies, four (4) each from Lagos and Ogun States. Results of stepwise regression analysis showed that a relationship exists between the dependent variable (employees productivity) and the provision of adequate precautionary equipment. The findings consistent with that of Keneth Doule (2019) and Paggi & Onaru (2020) imply that the availability of safety equipment to workers is a necessity for the performance and attainment of objective(s) of business organizations.

3. Theoretical Framework

The study is anchored on Heinrich's theory of accident/incident propounded in 1936 (Stokoff, 2014; Ranold & Elliot, 2019). The theory also called the "domino" theory of accident, was developed based on the study made by the Committee on Safety and Production of the American Engineering Council (CS & PAEC) from where the theorist found out the sequence/order of accident occurrence in factories. The chronological order according to Heinrich is (i) Ancestry and Social environment (ii) Fault of persons (iii) Unsafe act and/or mechanical or physical hazards (iv) Accident and (v) Injury. According to the theory, one factor is dependent on another and one follows because of another thereby consulting a sequence.

The main axioms/assumptions of the theory according to Ermos and Assar (2016), Hildals & Urzil (2016), Dowell and Balmark (2017), and Dulman and Arler (2018) are that (i) Accident and injury are invariably

permitted by the unsafe act of and/or mechanical or physical hazards (ii) Occurrence of accidents and injuries are largely preventable (iii) Management has the best opportunity and ability to initiate the work of prevention and therefore should assume responsibility and (iv) Management duty of accident and injury prevention are exercised through supervisors or factory foremen. The supervisory capacity of the foremen to control work performance influences successful accident prevention. The axioms/assumptions of theory widely referred to as the first set of principles or guidelines on employee safety are still relevant in modern-day industrial relations that guarantee harmony between factory workers and management (Kenneth & Doule, 2019; Halliston & Portlan, 2020).

The relevance of the theory to the study stems from its emphasis on accident causation and prevention, management control, function and responsibility, cost of an accident, safety, the productivity of workers etcetera of which workers and managers of the enterprises of this study need to take note of.

4. Methodology

The section describes the procedure adopted in data collection. The study covered workers in the bread baking industry in Kogi State where data on safety equipment available, the number of safety training programmes received by employees, and the effects on their performance were obtained.

Out of a population of 463 workers in seven (7) bread barking enterprises in the state namely: Omaye bakery, ADL bakery, Mummy bakery, Eddy bakery, Peter & Co bakery, Kogi bakery, and MXD bakery, 260 of them (workers) were randomly selected. Questionnaires earlier designed to reflect five (5) point Likert scale were distributed to the respondents out of which 163 (questionnaires) were returned representing approximately 63 percent response rate.

Validities and Reliability of the Instrument

Validity and reliability of the questionnaire construct were done using Cronbach's Alpha with Item of the construct on the variables (M, X, and Y) having Cronbach's Alpha Co efficient value greater than 0.6. The minimum value of Cronbach's Alpha acceptable for internal Consistency and reliability of measuring instrument is 0.6 (Nully 1994 cited in Dapo & Tola, 2016).

Table 1. Measurement of variables

Variable	Measurement	Source
M = Mediator	Cost Mediating variables are measured by the number of safety equipment, training on safety, and frequency of maintenance of the equipment	Stokoff (2014), Ermon & Assar (2016) Orplan & Bahle (2017)
X = Safety	Measured by the absence of occurrence of accidents, illness, injury, and death of employees.	Blohher (2015), Gillard & Nehan (2018)
Y = Performance	Measured by output quality and quantity, number of defects, and efficiency of output	Locdoll (2015) Dowell & Balmark (2017) Morrcel (2018)

Source: Author’s computation, 2022.

Model Specification

The model used in the study was adopted from the work of Churchil (2015) and Doyel (2017) and Maxwell (2018) included variables such as provision and maintenance of safety equipment and training of workers on safety precautions as factors that mediate/explain the underlying mechanism of the relationship between safety (X) and performance(Y) of workers especially those working in hazardous environment such as in manufacturing/production outfit. The cost of production of these facilities is a function of the frequency/magnitude at which they are available to workers (Mitchel & Harrison, 2018).

The regression analysis involving the three variables: $X \rightarrow Y$, $X \rightarrow M$ and $X + M \rightarrow Y$ decomposed into econometric equation according to Baron and Kenny (1986) and Shrout and Bolger (2002) are as follows:

$$Y = b_0 + b_1 X + e \text{ -----equation 1 (X} \rightarrow Y)$$

$$M = b_0 + b_2 X + e \text{ -----equation 2 (X} \rightarrow M)$$

$$Y = b_0 + b_4 X + b_3 M + e \text{ -----equation 3 (X + M} \rightarrow Y)$$

Where:

Y = Performance of employee.

M= Cost of provision of safety equipment, training, and maintenance

X= All the indices of the safety of an employee (absence of accident, injury, sickness, and illness).

5. Findings and Discussions

Table 2. Analysis of X predictor of Y ($X \rightarrow Y$)

Item	Estimate	Std. Error	t-value	Pr(>/t)
Constant	3.1024	0.7279	4.3281	0.000
X	0.4159	0.1168	3.7442	0.0073
b_1	0.4160			
$R^2 = 0.43$				
F- Statistics 59.13				

Author's computation using R-Statistical Package

The effect of X on Y is 0.4159 and significant at a 1percent level of significance. Further, 43 percent of changes in Y are explained by X implying a relationship between X and Y.

Table 3. Analysis of the effect of X on M ($X \rightarrow M$)

Item	Estimate	Std. Error	t-value	Pr(>/t)
Constant	1.57450	0.61866	2.67225	0.0131
X	0.58907	0.09920	6.2349	0.0008
b_2	0.58907			
$R^2 = 0.382$				
F- Statistics =83.158				

Source: Computation using R- Statistical Package.

The table shows the effect of X on M at a 1 percent level of significance with approximately 38 percent likely changes in M explained by X.

Table 4. Analysis of the effect of X and M on Y ($X+M \rightarrow Y$)

Item	Estimate	Std. Error	t-value	Pr(>/t)
Constant	1.9995	0.6358	3.3022	0.0031
X(b_4)	0.0416	0.1151	0.3791	0.7546
M(b_3)	0.06673	0.1055	6.6371	0.001
$R^2 = 0.526$				
F- Statistics= 182.78				

Source: Computation using R- Statistical package

The table shows the value of X at 0.0416 and that of M at 0.6673 with $P < 0.001$. These results indicate the disappearance of the effect of X on Y (the value of M greater than that of X) implying full mediation of M between X and Y. Full mediation effect rarely exists in business practice (Brooklyn, 2018).

Table 5. Mediation: Direct and Indirect effects of X and M on Y – Summary Result.

Item	Estimate	C1 (Lower)	C1 (Upper)	P- Value
ACME	0.3744	0.2263	0.5556	0.000
ADE	0.0416	0.1849	0.2728	0.000
Total Effect	0.4160	0.1641	0.6084	0.000
Prop: Mediated	0.9450	0.5517	1.9761	0.000

Source: Computation using bootstrapping package

The Total Effect (TE) in summary as indicated in table 4 is 0.4160, the same figure of b_1 in Table 1 ($X \rightarrow Y$) that is an effect of X on Y without M (mediator). The Average Direct Effect (ADE) is 0.0416 is b_4 indicated in table 3 which the Direct Effect (DE) of X on Y after taking into consideration a mediation (indirect) effect of M on Y. Therefore the Average Causal Mediation Effect (ACME) is the Total Effect (TE) minus the Direct Effect (DE) ($b_1 - b_4$) that is $0.4160 - 0.0416 = 0.3744$ which is the product of the coefficient of X, the same value with the Coefficient of M which is $b_2 \times b_3$ that is $0.58907 \times 0.6356 = 0.3744$ indicating partial mediation of M (mediator) at 1 percent level of significance which is the main aim of mediation analysis.

6. Conclusion and Recommendation

For many years the topic of occupational safety has been attracting the attention of players in the labour market. This has brought about the initiation of safety laws and programmes by the government and managers of enterprises across the globe. In Nigeria just like other countries, laws to secure the safety of workers are in place, unfortunately, many business owners in the country pay little or no attention to complying with the laws as they (entrepreneurs) show little or no concern about the safety of their employees. The emphasis of the safety law is on the need for employers of labour to provide adequate safety equipment and train workers on safety precautions especially employees operating in a hazardous environment. Therefore the study examined the mediating effects of the provision of safety equipment, training of workers on safety precautions, and maintenance of the equipment) in guaranteeing the safety and performance of bread bakers in Kogi State. Data for the study were obtained from the responses of 163 workers in seven (7) bread baking enterprises in the state.

Analysis of the data was done using bootstrapping and R-Statistical package techniques to determine the indirect effects of X and M on Y and the significance of the impact of variables on Y. The results of bootstrapping analysis showed that ACME (TE –DE) or $b_1 - b_4$ and the co-efficient of M (mediator) or $b_2 \times b_3$ have the same value of 0.3744 significant at a 1 percent level. This indicates partial mediation of M which is the main aim of mediation analysis given that full mediation rarely occurs. Similarly, the results of the regression analysis with an R^2 value of 0.526 (Table 3) indicate that approximately 53 percent of changes in Y (performance) of employees are explained by the combined effect of X and M while the rest 47 percent of changes in Y are accounted for other factors other than X and M. This is partial accountability of X and M on the likely changes in Y akin to partial mediation. The study recommends that business owners particularly bread bakery owners in Kogi State should take the issue of the safety of workers seriously by providing adequate safety equipment and training their employees on safety precautions in the workplace for the positive effect the facilities can have on performance.

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