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DONATION-BASED CROWDFUNDING FOR COMMUNITY DEVELOPMENT PROJECTS IN THAILAND

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² Rangsit University Advisor, Thailand

JEL G400

Abstract

This study explores the factors that affect intention to donate via crowdfunding digital platforms, and donors’ decisions to participate in online donation crowdfunding. The convenience sample comprised 638 participants who had donated to any organisation. Data were gathered via online questionnaires and analysed through multivariate analysis of variance (MANOVA) to test the hypotheses. The findings indicated that demographic factors such as educational background, occupation and communication tools were associated with online donation fundraising for community development. The variance analysed in terms of donation histories and attitudes towards donating revealed that the relationship to online funding for community development had a significance level of 0.05. However, 80.3% of participants were uninterested in donating to community development projects. These results may indicate the most reliable connections, facilitating the creation of guidelines to set proper plans and strategies for online community donations.

Key words:
Crowdfunding, Donations, Community project.

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1. Introduction

Crowdfunding is the practice of funding a project by a large number of people. Funders will set a funding goal and then promote and share their campaign with a crowd. Whoever is interested in supporting it can do so through fundraising (Asiola Limited, 2017, Kuppuswamy & Bayus, 2013). Franke and Klausberger (2008) have found that people tend to participate in funding projects that they perceive as being fair.
Lambert and Schwienbacher (2010) have indicated that the majority of crowdfunding projects do not have a direct relationship with project decision making. If investors are unable to participate in any of the project’s processes, rewards and reasonable deals must be offered. In other words, the negative effects that exist during passive investment can be compensated by rewards and being a controller.

MIT Technology Review identified online crowdfunding as an emerging technology of 2012 (Greenwald, 2012). Indeed, it reflects a new pattern of using the Internet as a funding portal, and extends opportunities to invest in businesses to people with less capital. Moreover, crowdfunding processes are not complicated (Suwanthath, 2013). The most important step is to create excellent and interesting ideas. Crowdfunding can then be initiated through registration with a crowdfunding website such as Kickstarter, Indiegogo, or Pledge Music (Kemgumnird, 2014). Platforms vary in terms of industry and objective. Once initiators have registered on a crowdfunding website, they must submit the project’s details (including its aims and scope of cooperation) in order to share information with those potentially interested in investing. Today, crowdfunding projects can be promoted via social media such as Facebook and video platforms like YouTube in order to increase recognition. These online platforms can also be used by funders to develop project details such as funds management, project goals, timeframe and details regarding compensation (Djamchid, 2015). On viewing the campaign, the audience may opt to donate directly via crowdfunding platforms. There are also numerous forms of compensation available for supporters, such as a ‘thank you’ email. These methods differ from traditional fundraising, for instance by banks.

A Mastercard survey regarding donations in Thailand has revealed that 70.5% of Thais donate for merit-making. Due to the convenience provided by recent technological advances, online donations are increasing; yet, concerns regarding the safety of online transactions may affect donation amounts. Nevertheless, tracking the transactions of donations via registered charity websites is generally easier than tracking transactions of cash donations (Thai Rath Online, 2016).

Apinunnmahakul (2015) has examined the factors that affect Thais’ donations and the possibility of individuals donating money, items and time. His findings demonstrate that decision making in monetary donations has no relation to item donations, while donated money and stuff or volunteer are the products that donors must consider simultaneously. Social capitals, especially formal and informal social and religious networks, positively affect donation decision making.
1.1. Objectives

1. To study the factors that affect crowdfunding for a community development project.
2. To study acceptance of user behaviour on an online crowdfunding platform.

1.2. Conceptual Framework

Independent variables include personal factors, gender, age, education level, monthly income, occupation, community tools and attitudes towards donations, while dependent variables comprise donation decision making and the amount donated to community projects.

1.3. Definitions

Decision making in regard to donating for community development constitutes the practice of funding a community project by a large number of people, each of whom donates small amounts of money, typically via a crowdfunding platform. This pattern of fundraising is well-suited to the contemporary world due to its convenience (Office of the Electronic Transactions Commission, 2016). This study includes two variables: the amount of donated money and the decision to donate (or not) to community development projects.

Donation platform software can readily record the activities of and information regarding donors and communication. New functions and modules have been improved in recent years, resulting in cutting-edge innovations that can be connected with a financial technology system or FinTech (Numnoon, 2015).

1.4. Scope of the study

1. Population: a group of 638 donors who have never donated money to charity, selected via convenience sampling.
2. Timeline: three months, from December 2018 to February 2019.
3. Content: this study aims to study the factors that affect crowdfunding for a community’s project development.

1.5. Hypotheses

1. Personal factors (including gender, age, education level, monthly income, occupation and communication tools) are relevant to decision making regarding donating for community development.
2. Crowdfunding attitudes influence decision making regarding donating for community development.
2. Methodology

This is a quantitative study using convenience selection sampling. The data were collected from 638 sets of online questionnaires. Before completing the surveys (questionnaire link: https://bit.ly/2TDh2no), all participants were required to explore the websites of two Corporate Social Responsibility: CRS projects (Doi Fah Ngam Smart Community Project and Phu Kae Smart Community Project) containing details and video clips in order to understand these projects’ overviews (website link: https://goo.gl/VNyVKD). Next, the data were analysed via two methods of analysis: descriptive analysis and inferential statistics analysis. The former was used to analyse demographic factors in mean and percentage values, while the latter was used to analyse the hypotheses through multivariate analysis of variance (MANOVA).

3. Results

For MANOVA to be used, dependent variables must be either interval scale or numerical measurement and present a relationship with one another. In this study, the dependent variables include the exact amount of money given to charity and decision making regarding whether or not to donate money for community development projects.

3.1. Descriptive analysis for demographic factors analysis

Table 1

<table>
<thead>
<tr>
<th>Factors affecting donations for community projects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personal information</strong></td>
</tr>
<tr>
<td>Factors</td>
</tr>
<tr>
<td>Sex</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>20-29</td>
</tr>
<tr>
<td>50+</td>
</tr>
<tr>
<td>Education level</td>
</tr>
<tr>
<td>Lower than bachelor’s degree</td>
</tr>
<tr>
<td>Bachelor’s degree or equivalent</td>
</tr>
<tr>
<td>Monthly income</td>
</tr>
<tr>
<td>20,001–30,000 Baht</td>
</tr>
<tr>
<td>Over 40,001 Baht</td>
</tr>
<tr>
<td>Occupation</td>
</tr>
<tr>
<td>Company employee</td>
</tr>
<tr>
<td>Merchant/freelance</td>
</tr>
<tr>
<td>Communication tools</td>
</tr>
<tr>
<td>Facebook and LINE</td>
</tr>
<tr>
<td>Facebook</td>
</tr>
<tr>
<td>History of donating</td>
</tr>
<tr>
<td>Annual number of donations</td>
</tr>
<tr>
<td>Average amount of money per donation</td>
</tr>
</tbody>
</table>
Table 1 presents the factors that influence donations to community development projects. We note that 80.3% of participants did not donate online for community projects. Females are nearly twice as likely as males to donate (63.8% vs. 36.2%, respectively), while the proportion of 20- to 29-year-old participants is over 20 times greater than those aged 50 or over. The majority of respondents are company employees (46.6%) and 66.3% of people have a bachelor’s degree or equivalent. The percentage of participants who earn 20,001–30,000 Baht is 39.2%. In terms of history of donating, most respondents donate one to three times per year, give less than 100 Baht and donate for religious purposes (44.2%, 51.4% and 28.5%, respectively).

3.2. Assumptions test for appropriate MANOVA use

The amount of money donated is related to decision making to donate or not (dummy variables: to donate to charity = 1, not to donate to charity = 0) at a significance level of 0.05, and the relationship’s direction is positive. According to Wanitdumrongssak (2012) reference range, the correlation coefficient of 0.843 represents a large association, and so the dependent variables of amount of money donated and decision making presents a strong correlation with the MANOVA use criteria.
Table 3

Data distribution

<table>
<thead>
<tr>
<th>Descriptive statistics</th>
<th>Statistic</th>
<th>Std Error</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>11.7382</td>
<td>1.11182</td>
<td></td>
</tr>
<tr>
<td>95% confidence interval for mean</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower bound</td>
<td>9.5550</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper bound</td>
<td>13.9215</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variance</td>
<td>788.658</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Std deviation</td>
<td>28.08306</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skewness</td>
<td>2.658</td>
<td>.097</td>
<td>2.658/.097 = 27.402</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>7.010</td>
<td>.193</td>
<td>7.010/.193 = 36.321</td>
</tr>
</tbody>
</table>

The statistic/standard error being between +/-1.96 indicates a normal distribution. This formula of statistic/standard error demonstrates:

Skewness: 2.658/.097 = 27.402, above 1.96
Kurtosis: 7.010/.193 = 36.321

The results are beyond the range of +/-1.96, hence these data exhibit a positively skewed distribution with a high kurtosis value, as shown in Figure 1.

![Histogram](image)

**Fig. 1. Histogram**

Given that the distribution is positively skewed, the natural logarithm (LN) is used to adjust the data values via the formula \( \text{Log}_e = \text{LN} \) (amount of money donated). The results are presented in Table 4.
Table 4

Data distribution having been adjusted by natural logarithm (LN)

<table>
<thead>
<tr>
<th>Descriptive statistics</th>
<th>Statistic</th>
<th>Std Error</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>.1026</td>
<td>.00864</td>
<td></td>
</tr>
<tr>
<td>95% Confidence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interval for mean</td>
<td>Lower</td>
<td>.0857</td>
<td></td>
</tr>
<tr>
<td></td>
<td>bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Upper</td>
<td>.1196</td>
<td></td>
</tr>
<tr>
<td></td>
<td>bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>Variance</td>
<td>.048</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Std</td>
<td>deviation</td>
<td>.21813</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Skewness</td>
<td>1.842</td>
<td>.097</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.842/.097=18.990</td>
</tr>
<tr>
<td></td>
<td>Kurtosis</td>
<td>1.800</td>
<td>.193</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.800/.193=9.326</td>
</tr>
</tbody>
</table>

With LN (amount of money donated), the skewness and kurtosis fall: the former from 27.402 to 18.990 (statistic/std error = 1.842/.097) and the latter from 36.321 to 9.326 (statistic/std error = 1.800/.193). Thus, having adjusted the non-normally distributed (positively skewed) data, reductions in skewness and kurtosis can be observed, and hence the new set of data may be used for more effective analysis.

3.3. Hypothesis test using MANOVA

Table 5

Variance test of education level and occupation

<table>
<thead>
<tr>
<th>Box’s M</th>
<th>117.801</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>1.986</td>
</tr>
<tr>
<td>df1</td>
<td>51</td>
</tr>
<tr>
<td>df2</td>
<td>4030.314</td>
</tr>
<tr>
<td>Sig.</td>
<td>.000</td>
</tr>
</tbody>
</table>

There is a statistically significant difference at 0.05 in the between-groups variation of independent variables tested by Box’s test of equality of covariance matrices. This is not in line with assumptions, or alternatively assumptions have been violated. Therefore, the test is robust, or the power of the test decreases. As a result, Wilks’ lambda, a commonly used test in MANOVA, must be amended to Pillai’s trace, which is more robust when assumptions are violated. However, test statistic values are usually similar.
Table 6

Difference in mean of demographic variables by multivariate tests

<table>
<thead>
<tr>
<th>Effect</th>
<th>Value</th>
<th>F</th>
<th>Hypothesis df</th>
<th>Error df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pillai’s trace</td>
<td>.134</td>
<td>38.405 (^{b})</td>
<td>2.000</td>
<td>496.000</td>
<td>.000</td>
</tr>
<tr>
<td>Wilks’ lambda</td>
<td>.866</td>
<td>38.405 (^{b})</td>
<td>2.000</td>
<td>496.000</td>
<td>.000</td>
</tr>
<tr>
<td>Hotelling’s trace</td>
<td>.155</td>
<td>38.405 (^{b})</td>
<td>2.000</td>
<td>496.000</td>
<td>.000</td>
</tr>
<tr>
<td>Roy’s Largest Root</td>
<td>.155</td>
<td>38.405 (^{b})</td>
<td>2.000</td>
<td>496.000</td>
<td>.000</td>
</tr>
<tr>
<td>Education level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pillai’s trace</td>
<td>.037</td>
<td>4.622</td>
<td>4.000</td>
<td>994.000</td>
<td>.001</td>
</tr>
<tr>
<td>Wilks’ lambda</td>
<td>.964</td>
<td>4.653 (^{b})</td>
<td>4.000</td>
<td>992.000</td>
<td>.001</td>
</tr>
<tr>
<td>Hotelling’s trace</td>
<td>.038</td>
<td>4.683</td>
<td>4.000</td>
<td>990.000</td>
<td>.001</td>
</tr>
<tr>
<td>Roy’s largest root</td>
<td>.037</td>
<td>9.198 (^{c})</td>
<td>2.000</td>
<td>497.000</td>
<td>.000</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pillai’s trace</td>
<td>.050</td>
<td>3.157</td>
<td>8.000</td>
<td>994.000</td>
<td>.002</td>
</tr>
<tr>
<td>Wilks’ lambda</td>
<td>.951</td>
<td>3.161 (^{b})</td>
<td>8.000</td>
<td>992.000</td>
<td>.002</td>
</tr>
<tr>
<td>Hotelling’s trace</td>
<td>.051</td>
<td>3.165</td>
<td>8.000</td>
<td>990.000</td>
<td>.002</td>
</tr>
<tr>
<td>Roy’s largest root</td>
<td>.038</td>
<td>4.784 (^{c})</td>
<td>4.000</td>
<td>497.000</td>
<td>.001</td>
</tr>
</tbody>
</table>

The demographic variables are age, education level, monthly income and occupation. In Table 6, Pillai’s trace indicates that at the significance level of 0.05, only education level and occupation show a significant relationship with dependent variables. Furthermore, other tests including Wilks’ lambda, Hotelling’s trace and Roy’s largest root show the same trends at a significance level of 0.05.

Table 7

Variance test of communication tools

<table>
<thead>
<tr>
<th>Box’s M</th>
<th>190.510</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>10.437</td>
</tr>
<tr>
<td>df1</td>
<td>18</td>
</tr>
<tr>
<td>df2</td>
<td>271769.945</td>
</tr>
<tr>
<td>Sig.</td>
<td>.000</td>
</tr>
</tbody>
</table>

At the significance level of 0.05, the variance in the between-groups variation of independent variables tested by Box’s test of equality of covariance matrices\(^{a}\) shows a statistically significant difference, hence there are violations of assumptions. Thus, the test shows robustness or a decrease in test power. Therefore, Wilks’ lambda, a
commonly used test in MANOVA, needs to be replaced by Pillai’s trace, which is more robust when assumptions are violated. However, there are usually similar trends in test statistics.

Table 8

<table>
<thead>
<tr>
<th>Effect</th>
<th>Value</th>
<th>F</th>
<th>Hypothesis df</th>
<th>Error df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept Pillai’s trace</td>
<td>.176</td>
<td>58.429b</td>
<td>2.000</td>
<td>547.000</td>
<td>.000</td>
</tr>
<tr>
<td>Wilks’ lambda</td>
<td>.824</td>
<td>58.429b</td>
<td>2.000</td>
<td>547.000</td>
<td>.000</td>
</tr>
<tr>
<td>Hotelling’s trace</td>
<td>.214</td>
<td>58.429b</td>
<td>2.000</td>
<td>547.000</td>
<td>.000</td>
</tr>
<tr>
<td>Roy’s largest root</td>
<td>.214</td>
<td>58.429b</td>
<td>2.000</td>
<td>547.000</td>
<td>.000</td>
</tr>
</tbody>
</table>

Pillai’s trace indicates that the demographic variable of communication tools shows a significant relationship with dependent variables at 0.05. In addition, Wilks’ lambda, Hotelling’s trace and Roy’s largest root show the same trends at a significance level of 0.05.

Table 9

<table>
<thead>
<tr>
<th>Box’s M</th>
<th>124.447</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>2.490</td>
</tr>
<tr>
<td>df1</td>
<td>48</td>
</tr>
<tr>
<td>df2</td>
<td>46120.325</td>
</tr>
<tr>
<td>Sig.</td>
<td>.000</td>
</tr>
</tbody>
</table>

There are statistically significant differences in the between-groups variation of independent variables tested by Box’s test of equality of covariance matrices at 0.05. This is not in line with assumptions, or there are violations of assumptions. Therefore, the test is robust or the power of the test decreases. As a result, Wilks’ lambda, a commonly used test in MANOVA, needs to be changed to Pillai’s trace, which is more robust when assumptions are violated. However, test statistic values are usually similar.
The difference in mean by multivariate tests

<table>
<thead>
<tr>
<th>Effect</th>
<th>Value</th>
<th>F</th>
<th>Hypothesis df</th>
<th>Error df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pillai’s trace</td>
<td>.109</td>
<td>37.241</td>
<td>2.000</td>
<td>611.000</td>
<td>.000</td>
</tr>
<tr>
<td>Wilks’ lambda</td>
<td>.891</td>
<td>37.241</td>
<td>2.000</td>
<td>611.000</td>
<td>.000</td>
</tr>
<tr>
<td>Hotelling’s trace</td>
<td>.122</td>
<td>37.241</td>
<td>2.000</td>
<td>611.000</td>
<td>.000</td>
</tr>
<tr>
<td>Roy’s largest root</td>
<td>.122</td>
<td>37.241</td>
<td>2.000</td>
<td>611.000</td>
<td>.000</td>
</tr>
<tr>
<td>Attitudes towards crowdfunding</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pillai’s trace</td>
<td>.183</td>
<td>2.471</td>
<td>50.000</td>
<td>1224.000</td>
<td>.000</td>
</tr>
<tr>
<td>Wilks’ lambda</td>
<td>.822</td>
<td>2.512</td>
<td>50.000</td>
<td>1222.000</td>
<td>.000</td>
</tr>
<tr>
<td>Hotelling’s trace</td>
<td>.209</td>
<td>2.552</td>
<td>50.000</td>
<td>1220.000</td>
<td>.000</td>
</tr>
<tr>
<td>Roy’s largest root</td>
<td>.168</td>
<td>4.117</td>
<td>25.000</td>
<td>612.000</td>
<td>.000</td>
</tr>
</tbody>
</table>

Pillai’s trace indicates that attitudes toward crowdfunding present a significant relationship with dependent variables at 0.05. The same trend is evident in other tests, including Wilks’ lambda, Hotelling’s trace and Roy’s largest root, at a significance level of 0.05.

4. Conclusion and Discussions

The findings indicate that at a statistical significance level of 0.05, demographic factors including education (p = 0.001), occupation (p = 0.002) and communication tools (p = 0.000) are related to online donation crowdfunding for community development projects, and so these factors affect decision making in donation crowdfunding via digital platforms. According to Bin Mohd Noor et al. (2015), education level affected charitable donations in Malaysia, the United Kingdom, Brunei and Pakistan, but not Australia due to this country containing a large proportion of refugees who may lack a high level of education. The results of their study are congruent with our own, possibly because a high proportion of our participants had a bachelor’s degree or similar. The next factor influencing participants’ decisions to donate via a crowdfunding website was occupation. The majority of our respondents were company employees, who may be more willing to donate. Communication tools such as social networks also have an impact on online donation crowdfunding. Saxton and Wang (2011) have examined the impacts of social networks on giving, finding that the size of an organisation’s social network is closely related to the receipt of charitable contributions. Accordingly, respondents who use Facebook and LINE predominated in this study’s sample, and any information
regarding donations shared through these social networks may influence donors’ decision making. In addition, statistics from the Bangkok Post have revealed that there were 46 million registered Facebook users in 2017 and 32 million LINE users in 2018 in Thailand. Therefore, both social networks represent an essential part of daily life for most Thai people (Norcross, 2017, Leesa-Ngansuk, 2018).

Attitudes towards donation can be related to crowdfunding on digital platforms for community development (p = 0.000). Many donors may be concerned about the safety of online donation crowdfunding systems. Jenik, Lyman and Nava (2017) have stated that fraud (such as fake campaigns and cyberattacks) is the most obvious risk that donors may encounter. Fake campaigns may be relevant when a campaign is not run by a reliable institution registered in a public register and subject to some minimum requirements, such as disclosing financial statements. Individual-run campaigns can be created for any lawful purpose, including purely selfish reasons that are not initially disclosed to donors. Therefore, if the platform fails to guarantee sufficient transparency, donors may not be able to track whether their donations were used for the purpose intended. Moreover, donors may be affected by issues such as cyberattacks, technological failure, or the potential closure of the platform, and so there is a risk of losing data and funds.

It is noteworthy that only 19.7% of respondents were interested in donating for community development projects, whereas 80.3% did not donate money via crowdfunding websites. There are numerous reasons why so many people do not donate to community projects. First, the majority of our respondents were aged between 20 and 29, which may have affected the donation trends we yielded. Although Gen Y people appear to be sociable, as individuals they seem to focus more on sharing and solidarity than on charity, and so they tend to reject institutionalised forms of giving, especially via charities. Another reason is that donors might not expect the money to be used efficiently. Southin (2013) has referred to Statistics Canada to argue that 56% of men aged 75 and over do not give because they do not believe that their money will be used efficiently. This concern regarding the efficiency of the use of funds is relevant to crowdfunding.

5. Recommendations

Most respondents did not rely on crowdfunding via a digital platform, and so pictures or video clips regarding donations for community support should be provided in order to ensure clearer communication, ultimately leading to greater trust.

Governments should set clear policies for crowdfunding by creating strict regulations that are enforced in local administrative organizations where cronyism will not
They should also control and manage the money received from donations and increase penalties to reduce repeat offences. Given that donating is a voluntary action, the government cannot ignore it, and local participation will enlarge the nation development finally.

Future research should compare attitudes and behaviour regarding the giving of money for community development. The results may indicate the most reliable connections, facilitating the development of appropriate plans and strategies for online community donations.

References


CONFLICTS MANAGEMENT STRATEGIES: A TOOL FOR INDUSTRIAL HARMONY

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JEL J3, J5, J7

Abstract

The non-existence of conflict may suggest tyranny, stagnation and uniformity; while its presence can be symptomatic of democracy, growth, self-actualization and diversity. Sequel to this assertion, this study therefore examines conflict management strategies as a tool for industrial harmony. The specific objective of this research is to investigate different strategies that can be explored by organizations in achieving industrial harmony. A sample size of 296 respondents was adopted from the working population of one thousand, one hundred and forty eight (1,148) employees. The data were generated through the use of structured questionnaire. Both descriptive and inferential statistics were used to analyze the data. Findings from the study revealed that collective bargaining strategy has a moderately significant relationship with industrial harmony (r=0.418, P<0.05). Also, confrontation strategy (r=0.127, P>0.05) and avoidance strategy (r=0.131, P>0.05) has no significant relationship with industrial harmony. The study concluded that for industrial harmony to be achieved, organizations need to consider collective bargaining strategy as a tool, as well as other integrative conflict management strategies such as; accommodation, reconciliation, and negotiation. It was recommended that organizations should adopt a participatory style of management rather than an autocratic style. Also, avenue for dialogue, taking part in decision making process, workshop and seminars that centered on organizational conflict management should be organized for the staff, in order to achieve the stated goals of the business.

Key words: Conflict management, Collective bargaining, Industrial harmony, Smoothing and Negotiation.

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1. Introduction

There is a notion as to what a conflict symbolizes and it is interpreted as wicked, avoidable, destructive, irrational and injurious. However, when it is perceived in a system, it should be avoided and managers should do everything for its elimination. The issue of conflict has become a major challenge to management because of its ubiquity and pervasive nature. Conflicts mostly arise as a result of employees competing for scarce resources. Ford (2007), opined that conflict remains an inevitable situation in everyday life either between individuals, groups, societies or organizations at large. It is logical therefore to say that, the manner in which conflict is controlled determines whether it is going to be beneficial or damaging in nature. There is no gainsaying to the fact that the ethnic, social and organizational conflicts have affected Nigeria as a nation, be it in the past or at present. Some of this conflict includes; the labor unions such as Nigeria Labor Congress (NLC), Trade Union Congress (TUC) versus Government, Muslim society against Christians groups, mostly in the Northern part of Nigeria. Other tribal groups conflict are the one in Taraba State (Tivs and Jukuns), Osun State (Modakeke and Ife), Anambra State (Aguleri and Umuleri) and Plateau State in Jos area (Hausa / Fulani ) to mention but a few. Which means that the study of conflict, be it at a macro or micro level, calls for special attention in Nigeria at this present moment with the related interventions and diplomatic resolutions.

In practice, conflict is said to be the presence of disagreement between different individuals with varied opinions, goals and values that affects the general interest of the organization at large. It is also a process whereby people within the system work against each other’s interest (Alebiosu & Akintayo, 2007). There are different perspectives to the issue of conflict in an organization. To some, it is perceived as a destructive state that has to be circumvented if possible at all cost. While others see it as a platform that compels administrators to be on their toes, and also, as an avenue for personal development and more often times people use it to their advantages. Fox (2001) postulated that conflict occurs when parties in an organization have a negative perception towards one another and they no longer trust themselves. Based on this contention, it can be presumed that conflict will always exist be it between groups, administrative members or among organizations in the same line of business. However, organizational conflicts from business point of view, has to do with a disagreement that occurs when the values, aims, and interests of different people or groups are not compatible with one another. Hence, the need to frustrate each other in order for the set goals not to be achieved. Lewis, French & Steane, (1997) observed
that organizational conflict is inevitable because it is a product of mismatch of people’s values and it arises from divergent behaviors. Therefore, the necessity for new strategies to workplace conflict management has become the central focus of public employment guiding principle (Gibbons, 2007).

Moving from perception to reality, management of conflict is not the same as resolution of conflict. Management of conflict in an organization entails providing a platform through which the aggrieved members in the system come together through a collective bargaining approach in order to reduce the dysfunctions of conflict so as to improve learning and efficiency in an organization (Rahim, 2002). Furthermore, labour management relations are a strong indicator of the industrial relations system. It is therefore vital to state that if there are any grievances or disputes between labour and management, this will not only have an adverse effect on the industrial relations system, but the whole system of the entire society at large.

Previous studies on the subject of organizational conflict have explained why conflict cannot be totally ruled out or eradicated in the work environment and possible ways to manage it. However, constant changes in the work system vis-à-vis demands of both employees and employers call for a periodic study of conflict situation and its management strategies in the contemporary workplace. Hence, this study examines conflict management strategies as a tool for achieving industrial harmony. The specific objective of this study is to investigate the different strategies that can be explored by different organizations in achieving industrial harmony.

1.1. Research Hypotheses

Sequel to the broad objective of this study, the following hypotheses thereby emerge.

i. $H_0$: Collective bargaining strategy has no significant relationship with industrial harmony.

ii. $H_0$: Confrontation strategy has no significant relationship with industrial harmony.

iii. $H_0$: Avoidance strategy has no significant relationship with industrial harmony.

2. Review of literature

2.1. Theoretical Framework

Most often times, people describe the word conflict as fighting, whereas, fighting is said to be one aspect of conflict within an organization. This study is therefore anchored on the behavior theory and contemporary theory respectively.
2.1.1. Behaviour theory

A study by Rahim (2002), identifies the common incidence of conflict either between management, workers or groups within the organization and comes to the conclusion that the term conflict is inevitable in a business environment. The study further argues that conflict is bad and can as well be prevented. The finest strategy for conflict is either to avoid or find a lasting solution to it when it occurs.

2.1.2. Contemporary Theory

According to Jury (2003), this theory is explained as the interaction that involves both the society and its environment. He perceives conflict as a required condition of the organizational life if the organization is to be reactive to change. This school of thought is of the opinion that conflict is both purposeful and receptive to change. Therefore, the study concludes that the best approach to handling organizational conflict is not to subdue or resolve it but provide a strategy, so as to reduce it dysfunctional consequences.

2.2. Conceptual Clarifications

2.2.1. Concept of Organizational Conflict

It is often said that in an environment which involves people working and interacting together, conflict becomes inevitable and in most cases, it becomes part of transacting business (Umar, 2000). A study by Chartered Institute of Personnel and Development (2008), among 660 Human Resource Practitioners, indicated that almost half (44%) out of the respondents described that clashes/conflicts are managed continually at the work place. Also, the report further stated that most managers spend up to 3-4 hours of their time in a week to resolve problems as well as managing conflicts. Obasan (2011), stated causes of conflicts in an organization as follows; (i) members of a team bringing critically different values to their work (ii) attitudinal differences with divergent goals (iii) frustration that arises as a result of needs not met that aggravates conflicts (v) different perspectives that result in different clarification of the same information, (vi) inadequate resources that bring about high rate of conflict, and (vi) team members having different perception towards one another.

In order to put the reasons for conflict in an organization in a proper perspective, Grace (2012) opined that conflict can arise as a result of either operational or personal factors. These different reasons were described below:

i. **Goal Differences:** these occur, when there is possibility of a conflict to increase substantially due to incompatible goals of different departments within an organization.
ii. **Personality Conflicts**: personality clashes in the workplace are unavoidable because no two people can act or behave exactly alike. Therefore, one employee can be introvert and the other an extrovert in nature. There will be a conflict when the duo refuses to understand each other’s inner nature.

iii. **Roles and Expectations**: these are job descriptions that are expected to be carried out by individuals in the organization. However, subordinate conflict can occur whereby each party, especially that in an employee role is not clear and has a diverse meaning of that role (Whitlam & Cameron, 2012).

iv. **Poor Communication**: when there is a gap in communication, it can bring about strife and misunderstanding among employees and management in the organization. When wrong information is passed across to members of staffs, this can lead to projects poorly executed and loss of revenue.

v. **Interdependence**: it is often said that an organization cannot work in isolation, hence, the need for cooperation and synergy among members of staff to achieve organizational stated goals and objectives. Therefore, as a regulation, interdependence exists when members in a team must show concern in the procedure of work and obtain results which hang on the performance of others.

vi. **Personal Problems**: a situation where if an employee is embattled with either marital or parental issues, outside the workplace, such an individual may take them to work. Consequently, he/she may pass the aggression on co-workers, and if they are ignorant about the cause, it may lead to conflict, whereby, affecting the performance and productivity level of the organization.

### 2.2.2. Conflict Management Strategy concept

There is a lot of misconception on the part of people about taking conflict resolution for conflict management. Therefore, it is imperative to distinguish these two components. Conflict resolution is an essential part of conflict management. Anderson (1990) and Burton (1998) argue that conflict management has a wide application. Moreover, the study of Burton (1998) explains conflict management as that key process that provides an avenue for the aggrieved members of the organization to properly manage the source of the dispute before it is escalated. Meanwhile, conflict resolution on the other hand specifically deals with removing the root cause of the conflict. In the same vein, management of conflicts refers to the tactics of containing dispute, together with finding a lasting solution to resolving it.
According to Jones and Geaorge (2003), conflict resolution and conflict stimulation are two techniques under Conflict management. It is noteworthy to state that in a situation whereby a clash becomes dysfunctional in the organization, conflict resolution technique becomes imperative in order to offer a way out to it. Equally, when conflict in organization is low, conflict simulation technique is required to be applied. Therefore, the use of these two techniques is necessary for managers to take a firm decision in order to ensure industrial harmony (Bradford & Burk, 2005). As earlier postulated, conflict is an unavoidable phenomenon which occurs at every sphere of human endeavor, however, if properly handled, findings revealed that it can serve as a channel to expose problems among different parties, as well as compelling the parties involved in dispute matters to have a lasting solution which is acceptable to all.

However, the following are some strategies of managing conflict in an organization. These are;

i. **Collective Bargaining**: this strategy is used as a legal instrument where issues relating to contracts of employment between workers and management are being settled (Fajana & Shadare, 2012). It is a process of providing a platform for all aggrieved members that are involved in a dispute matter, equal opportunity to express their mind irrespective of cadre or position in the system without fear or favor. Therefore, it is not only for managers to permit everyone to speak; it is also required that their agreements should be given an equal weight when mediating a conflict.

ii. **Avoidance**: this is another strategy adopted by some organizations in resolving conflict within the system. It is also known as conflict avoidance strategy. It is often said that, any organization that adopts this method will be sitting on a keg of gun-powder and also postponing the evil day.

iii. **Compromise**: in this strategy, the parties involved are willing to settle the conflict matter amicably without seeing anyone as a winner or vanquished.

iv. **Accommodation**: this involves the tactics adopted to neutralize the root cause of the conflict and to ensure that all distressed members are pacified as to be on the same page. Also, the strategy is appropriate when there is need for a stop-gap to be put in place or when the members have a mutually significant goal.

v. **Smoothing**: In this smoothing approach of conflict management style, much emphasis is laid on human relationships. It has to do with individuals ignoring their personal interest and work towards ensuring the majority have their way in order to enjoy industrial harmony.
vi. **Containment:** under this strategy, conflicts are permitted to come up, but they are well managed by seeing to issues that required to be discussed and providing possible way out of the quagmire. There is also room for all parties to negotiate the outcome of the resolution.

vii. **Confrontation:** this strategy has to do with survival of the fittest. There are different opposing views to issues and is more of win-lose approach.

viii. **Positive Perspective:** conflict can be an asset to any corporation provided it is well managed. It most assists the firms to learn from its shortcomings, errors, lacuna and identify areas of needed improvement. Equally, the coming together of people can lead to solution for resolving both internal and external issues.

Therefore, other approaches for management of conflict are for line managers to develop a platform that provides constant engagement with their subordinates, necessary training on dispute management and making them have a sense of belonging within the system.

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**Fig. 1. Researcher Conceptual Model**
2.2.3. Concept of Industrial Harmony

The term industrial harmony can as well be described as industrial democracy (Fejoh, 2015). One aspect of labor relations issues that is most delicate and complex to handle is achieving industrial harmony in the modern industrial society. This concept has to do with decentralizing decision making process within the organization. Industrial harmony also involves the participation of the major actors in labor relations matters i.e. (employer and employee) when it comes to issues relating to conditions of service for all staff (Puttapalli and Vuram, 2012).

According to Otobo, (2005); Osad and Osas, (2013), industrial harmony is explained as a friendly and cooperative agreement on working relationship between employers and employees for their mutual benefit. Also, it involves management and employees working harmoniously in order to achieve the stated organizational goals and objectives. In a related study by Odia and Omofonmwan (2007), the latter opined that industrial harmony can further be explained from four broad viewpoints which are; cooperation, collective bargaining, employment policy, consultations and communication respectively.

Otobo (2005) confirms that industrial harmony plays a significant role in the life of any business venture because it encompasses joint consultation, co-determination, co-operation and co-ownership. Therefore, it brings about an employee having a sense of belonging in the running of affairs of the organization and taking responsibility which can as well lead to a peaceful working environment (Chinedu, Vincent and Enaini, 2018).

2.3. Empirical Review

Conflict is obviously connected with power and it mostly arises when the stated objective and goals of any business enterprise is circumvented. Previous scholars on the issue of conflict are of the view that, the root source of conflicts is deeply entrenched in our biology. Schellernberg (1999) describes such approach as individual characteristics theory that focuses on the individual and his acts, rather than the context of the act. However, Fajana (2002) develops in his study two major sources where conflict can emerge in an organization. These are external and internal sources respectively. The external sources of conflict occur because of its peculiarity, meaning that it is always from outside the organization. It has to do with a situation when a third party intervention to industrial dispute is required and which most of the time is one sided or biased. Meanwhile, the internal sources of conflicts are referred to as those elements which are in-built within the structure of an organization. Some
key features when it comes to internal sources of conflict were identified which are; opposing interests, divergent interests, poor-relationship e.t.c (Fajana, 2002).

Another perspective to sources of conflict in an organization is a study by Katz (1990) who categorizes conflict sources into three groups. They are; structural conflict- which has to do with conflict arising when a department depends on another department in order to function effectively. Role conflict- this is a conflict which emanated as a result of special sets of agreed conduct, while resources conflicts are those coming from different concern groups which are contending or fighting for administrative resources (David 2012).

Robbins (2005) further identifies another set of organizational conflicts sources and indicates that when the root source of conflict is acknowledged or known, it will bring about proper conflict management within the system. Some of the sources are; communicational conflict, which comes up as a result of misunderstanding. Structural conflicts emerge due to business roles and individual conflicts are all about individual differences. Similarly, Suliman & Abdulla (2005) conducted yet another study and identified conflict sources which include; politics and priority characterization, personality and allocation of resource, unresolved prior conflicts, procedures in administration, communication and leadership problem. Another study by Duke (1999) further identifies other major sources of conflict to corroborate earlier submissions. These are interpersonal disagreements which occur when an individual is stressed up; the problems of role conflict; and power struggles that makes people join forces together to achieve personal selfish interest. This study therefore intends to expand the frontiers of knowledge by investigating conflict management strategies and its implications towards achieving industrial harmony.

2.4. Conflict and its effect on Organization

Rachin (2002) in his study, stated that conflict should not be perceived in a negative form; its outcome, be it constructive or destructive, largely depends on how it is being addressed by those in position of authority. Conflict can come in a different form within the organization. It can be between superior versus subordinate, heads of department etc. Groups can also be involved when it comes to issue of conflict based on performance as well as unknown management rivalries. It is a general assumption that there is always a negative consequence of conflict for the organization and individual. The effects can be in the form of Physiological responses (headache, hypertension and heartburn), Behavioral responses (alcoholism, aggressiveness, work sabotage and decreased communication) and Psychological responses (work anxiety, frustration and job dissatisfaction). However, one can conclude that conflict does not
only hinder the performance of individuals, but can also lead to emotional disorders, which invariably affects the individuals’ health in the long run.

3. Methodology

This study used a descriptive research design. The research targeted a working population of one thousand, one hundred and forty eight (1,148) employees of Unilever Nigeria Plc. A simple random sampling technique was adopted in selecting a sample size of two hundred and ninety six (296). A structured questionnaire was adopted as a research instrument for the study. However, from the 296 questionnaires administered, only 210 were filled and returned appropriately. The questionnaire was divided into 2 major sections. The first part of the questionnaire sought for the demographic reports of the respondents, while the second part comprised 20 items-questions to be answered in Likert scale format ranging from strongly agree to strongly disagree with numerical value 5-1, which was used to measure pertinent constructs of (collective bargaining, confrontation, avoidance strategy and industrial harmony) independent and dependent variables for the study. The data collected were analyzed using descriptive statistics (frequency counts, mean and standard deviation) and inferential statistics of (Pearson correlation coefficient) in order to test the formulated hypothesis.

4. Result and findings

<table>
<thead>
<tr>
<th>Table 1</th>
</tr>
</thead>
</table>

Mean and standard deviation of factors of conflict management strategies and industrial harmony

<table>
<thead>
<tr>
<th>Collective Bargaining Strategy</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>My organization often adopts strategy of collective bargaining to resolve dispute.</td>
<td>210</td>
<td>3.52</td>
<td>1.40</td>
</tr>
<tr>
<td>There is always a mutual agreement in settling matters arising from conflict in my organization.</td>
<td>210</td>
<td>3.50</td>
<td>1.26</td>
</tr>
<tr>
<td>The adoption of this strategy shows signs of weakness from the management.</td>
<td>210</td>
<td>2.96</td>
<td>0.99</td>
</tr>
<tr>
<td>No conflict can be resolved using collective bargaining strategy.</td>
<td>210</td>
<td>2.66</td>
<td>1.19</td>
</tr>
<tr>
<td>Collective bargaining is a legal requirement to resolve matters relating to contract of employment.</td>
<td>210</td>
<td>4.16</td>
<td>0.93</td>
</tr>
</tbody>
</table>
A. M. Adekunle, O. S. Abimbola, E. J. Ehimen  
Conflicts Management Strategies: A Tool for Industrial Harmony

<table>
<thead>
<tr>
<th><strong>Strategy</strong></th>
<th>210</th>
<th>2.09</th>
<th>0.93</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Confrontation Strategy</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confrontation strategy is the best approach of resolving dispute matters in any organization.</td>
<td>210</td>
<td>1.82</td>
<td>0.76</td>
</tr>
<tr>
<td>The adoption of this strategy can always lead to industrial harmony.</td>
<td>210</td>
<td>2.03</td>
<td>0.58</td>
</tr>
<tr>
<td>This strategy is all about survival of the fittest.</td>
<td>210</td>
<td>3.79</td>
<td>1.29</td>
</tr>
<tr>
<td>Confrontation strategy always affects organizational performance.</td>
<td>210</td>
<td>3.97</td>
<td>1.11</td>
</tr>
<tr>
<td>No business can move forward using this type of strategy to settle disputes among aggrieved parties.</td>
<td>210</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Avoidance Strategy</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The best way to ensure industrial harmony is to adopt avoidance strategy for conflict management.</td>
<td>210</td>
<td>1.89</td>
<td>1.81</td>
</tr>
<tr>
<td>The strategy is a short term approach of managing conflict in a company.</td>
<td>210</td>
<td>3.88</td>
<td>1.21</td>
</tr>
<tr>
<td>My organization often adopts this strategy to suppress the wishes of the union.</td>
<td>210</td>
<td>3.93</td>
<td>1.30</td>
</tr>
<tr>
<td>The strategy mostly leads to more conflict in my organization.</td>
<td>210</td>
<td>3.91</td>
<td>1.11</td>
</tr>
<tr>
<td>Avoidance strategy is a poor way of managing conflict in any organization.</td>
<td>210</td>
<td>3.79</td>
<td>1.32</td>
</tr>
<tr>
<td><strong>Industrial Harmony</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To achieve industrial harmony all employees must be treated with mutual respect.</td>
<td>210</td>
<td>3.49</td>
<td>1.42</td>
</tr>
<tr>
<td>The best approach for conflict management is to adopt collective bargaining strategy.</td>
<td>210</td>
<td>2.35</td>
<td>1.24</td>
</tr>
<tr>
<td>Personal interest must be ignored and uphold general interest in resolving conflict.</td>
<td>210</td>
<td>3.88</td>
<td>1.21</td>
</tr>
<tr>
<td>Conflict is a good tool for achieving industrial harmony.</td>
<td>210</td>
<td>2.54</td>
<td>1.35</td>
</tr>
<tr>
<td>I am satisfied with level of conflict management strategy adopted in my organization.</td>
<td>210</td>
<td>4.00</td>
<td>1.07</td>
</tr>
<tr>
<td><strong>AVERAGE</strong></td>
<td>3.31</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Source: Authors Computation, (2018).*

The information in table 1 shows the descriptive statistics of conflicts management strategies and industrial harmony alongside with the mean and standard deviation value. On the average, the mean value on the statement of evaluation is (3.31).
4.1. Test of Hypotheses

**Table 2**

Pearson Moment Correlation Results of the tested Hypotheses Correlations

<table>
<thead>
<tr>
<th></th>
<th>Industrial Harmony</th>
<th>Collective Bargaining Strategy</th>
<th>Confrontation Strategy</th>
<th>Avoidance Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Harmony</td>
<td>Pearson Correlation</td>
<td>.418**</td>
<td>.127**</td>
<td>.131**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.569</td>
<td>.487</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>210</td>
<td>210</td>
<td>210</td>
</tr>
<tr>
<td>Collective Bargaining Strategy</td>
<td>Pearson Correlation</td>
<td>.418**</td>
<td>1</td>
<td>.103**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.143</td>
<td>.168</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>210</td>
<td>210</td>
<td>210</td>
</tr>
<tr>
<td>Confrontation Strategy</td>
<td>Pearson Correlation</td>
<td>.127**</td>
<td>.103**</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.569</td>
<td>.143</td>
<td>.138</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>210</td>
<td>210</td>
<td>210</td>
</tr>
<tr>
<td>Avoidance Strategy</td>
<td>Pearson Correlation</td>
<td>.131**</td>
<td>.133</td>
<td>.125**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.487</td>
<td>.168</td>
<td>.138</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>210</td>
<td>210</td>
<td>210</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.05 level (2-tailed).**

**Interpretation**

Table 2 revealed the Pearson product moment correlation for the three (3) variables used for the study to test the relationship between the independent variable (collective bargaining, confrontation and avoidance strategies) and dependent variable (industrial harmony).

Hypothesis 1: Collective bargaining strategy has no significant relationship with industrial harmony. From the result above it is evident that the correlation of collective bargaining strategy with industrial harmony is 0.418 and the significant level of 0.05. Also, P-Value of 0.000, which is less than 0.05. On this premise, the null hypothesis is hereby rejected and it is concluded that collective bargaining strategy has a moderate significant relationship with industrial harmony (r=0.418, P<0.05). It implies that collective bargaining as a strategy plays a key role in
resolving dispute matter among aggrieved members in any organization. The result is in line with the study of (Fajana & Shadare, 2012), which states that the strategy provides the aggrieved members the platform to express their minds without any form of intimidation.

Hypothesis 2: Confrontation strategy has no significant relationship with industrial harmony. The result from table 2, also indicates the correlation of confrontation strategy vis-à-vis industrial harmony as 0.127 and the significant level of 0.05. Also, the table shows that the P-value is 0.569 which is greater than 0.05. Therefore, we reject the alternate hypothesis and accept the null hypothesis which states that confrontation strategy has no significant relationship with industrial harmony (r=0.127, P>0.05). This implies that an organization that adopts the strategy of confrontation as a method of resolving conflict will achieve little or no result.

Hypothesis 3: Avoidance strategy has no significant relationship with industrial harmony. Table 2 result also revealed the correlation of avoidance strategy with industrial harmony as 0.131 and the significant level of 0.05. Also, the table indicate the P-value as 0.487 which is greater than 0.05. Therefore, we reject the alternate hypothesis and accept the null hypothesis which state that avoidance strategy has no significant relationship with industrial harmony (r=0.131, P>0.05). The result emanating from the analysis above shows that avoidance as a strategy cannot achieve any positive result if choosen as a tool for industrial harmony.

5. Conclusion

The way and manner through which conflict is been resolved in an organization will determine the level of coherence within the system. Hence, this study examined conflict management strategies; a tool for industrial harmony. However, findings from this research revealed that the human nature and conflict are synonymous and it is equally important to study because the causes of conflicts can be constructive or destructive to a business. Moreover, the study lay emphasis on the fact that conflict arises from different sources such as external i.e. conflict from outside the organization and internal conflicts which are inherent within the framework of an organization. Also, three variables which are collective bargaining, confrontation and avoidance were used as a determinant of conflict management strategies for the study.

Subsequently, the result shows that collective bargaining as a strategy will achieve a better result in resolving conflict in an organization as against adopting confrontation and avoidance strategy respectively. The study concluded that for industrial harmony to be achieved in the organization, it is necessary to explore all other available methods of conflict resolution such as accommodation, compromise,
etc. A properly managed organizational conflict is expected to bring about institutional benefit, increase productivity, competitive advantage and above all effective attainments as well as achieving the set goals and objectives for the business.

6. Recommendations

Arising from the study, the following under listed points are herewith recommended:

i. There is need for management to develop different strategies that can promote industrial democracy within the organization.

ii. Room should be given to the participatory style of management rather than the autocratic style which is rigid in nature.

iii. There is need for effective and proper communication procedures to be put in place in order to resolve conflict.

iv. Management should provide an avenue for different unions in the organization to be part of the decision making process- by so doing they will have a sense of belonging in the business.

v. It is also going to be of benefit if there is adequate interaction and dialogue in conflict resolution.

vi. Management should also organize trainings, workshops, seminars that centered on conflict management periodically for all members of staff in the organization.

References


A. M. Adekunle, O. S. Abimbola, E. J. Ehimen
Conflicts Management Strategies: A Tool for Industrial Harmony


INFLUENCE OF DIVIDEND POLICY ON STOCK PRICE VOLATILITY OF NON-FINANCIAL FIRMS LISTED NIGERIAN STOCK EXCHANGE

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JEL G35

Abstract

Stock Price Volatility with Dividend Policy pose relevant factors to an investor’s choice in stock investment. The focus of the study was intelligent view on the long-run and short-run causal significance of dividend management on stock price volatility. Panel Auto Regressive Distribution Lag was conducted on listed non-financial firms in Nigeria. The result showed that Stock Price Volatility in the long-run based on a threshold of 1% level of significance is significant as movement of Dividend Payout Ratio, Dividend Yield, Earnings Volatility and Firm Size causes about 0.15%, 0.76%, and 0.008% increase and about 3% decrease respectively on change in stock price on the long run while in the short-run, all the variables except Earnings Volatility have insignificant effect. The study recommended that low dividend payout ratios at a stable rate serve as a good signal out to all investors for expectation of returns which in turn increases firm value and stabilize stock price.

Key words:

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1. Introduction

According to Section 380 of Company and Allied Matters Act, Cap. C20, Laws of the Federation of Nigeria, (2004), as long as firms meet up the debt demand dividends can then be paid out of the profits arising from the use of the firm’s assets, revenue reserves or net realized profits on the assets sold. However, Section 381 stated
that if the firm failed to meet up its liabilities as they due, no dividend should be declared or paid. The decision to make dividends payment or not is called Dividend Policy and it falls under one of the three main decisions made by the company’s management which are called dividend decision, the other two being financing decision and investment decision.

Jo and Pan (2009) opined that dividends payment in line with corporate governance practices serves as a signal to investors. It is good news when there is an increased dividend and vice versa when it is otherwise. (Ordu, Enekwe & Anyanwaokoro, 2014). Dividend payment has its way of attracting investors to the company which in turn increases the company’s value which then result to an improvement on share price of the company. According to Lintner (1956), firms take caution in matter that relate to reduction of dividends as investors could interpret such decision as a sign of poor performance and cause share prices to fall. Hence the decision to increase or decrease dividends payment has a signaling effect to it which may affect firms and cause share prices to rise or fall. The degree to which share prices rise or fall is called share price volatility.

The share price volatility which as described above is not only a consequent effect, it also has a causal effect. The volatility of stock prices is an indicator to the investor on the risks he is exposed in investing in shares. By default, investors are wary of investment risks and it can be concluded that high price volatility represents high risk in investment while low price volatility represents low risk in investment, which could be an incentive or deterrent to invest in such shares. As a result, it is necessity for firms’ managing director to understand the weight their dividend decisions carry as the consequences could affect the firms’ value and could encourage or discourage investment.

However, whether or not Dividend Policy is of relevance to firms’ value and share prices that has been the debate among scholars. Most recognized scholars of Miller & Modigliani (1961) were of the opinion that Dividend management is of no relevance to a firm’s value which depend on the future cash flow subject to the investment policy. This irrelevance theory seems to suggest that firms should focus more on their investment decisions if they are to attract investors. On the other hand, the relevance theory proposes that Dividend Policy does in fact affects firms’ value. The main proponents of this theory are Gordon and Lintner who argued that investors prefer present dividends to future dividends due to risks associated with future earning (Hashemijoo, Ardekani&Younesi, 2012). Although there have been many studies which have either validated or refuted these arguments, most researches focused their study on developed nations and their environment, and have findings
that represent such environments. However, very little have been done to capture the realities of the Nigerian environment.

Also it is believed that stock volatility signals to the current and prospective investors concerning the risks involved if investors buy firms’ shares. High volatility is said to translate to high risk while low volatility is said to translate to low risk. This means that stocks with low price volatility are more predictable in their price change (Lindeman, 2016). However, despite its causal effect on investment decision, it is actually a consequent effect from the firms’ point of view being one of the effects of the Dividend Policy of firms. So, this research study examined the dividend factors, earnings and size factors as they affect change in the stock price of selected listed firms on the NSE to determine the relationships that exist between them, attested to whether or not Dividend Policy is relevant to stock price changes, both in the long-run and short-run effects, and made recommendations.

2. Literature Review

There are many mixed reactions on the subject as discussed by many scholars in the field of finance while some indicated positive relationships which were either significant or not, others showed negative relationships which were either significant or insignificant.

Khan et al (2017) investigated 42 firms with different sampled sectors: textile, sugar and chemical sector of Pakistan for the period of six year (2006-2011) applying pool cross sectional regression analysis. Their study documented positive and significant relationship between change in stock price and the firm’s dividend policy which found positive significant regression coefficient with volatility in price and Dividend Yield. Also, there was a positive significant coefficient of movement of stock price and firm size. His study also presented a significant positive relationship of debt on the price volatility, recommending that the high leveraged firms, have price volatility.

Ali & Waheed (2017) in their study covered the period of 2007-2016 with sample of ten (10) firms on the Pakistan Stock Exchange to establish the association between movement of stock price and Dividend Policy (proxied by Dividend Yield, dividend payout, firm’s size, firm’s growth, earning volatility and leverage). Regressions analysis was employed under the method of least squares model. It was found that all variables have significant change on the share price, and was implied that firms that pay regular dividend to its shareholders are more stable in their stock price.

Shah & Noreen (2016) on the Karachi Stock Exchange studied a sample of fifty (50) non-financial firms from the period of 2005-2012 with the use of multiple
regressions analyses through panel data assisted firms’ Firm Size, long-term debt, earning volatility, asset growth and earnings per share as control variables. Though the study was robust but there is a negative relationship existing between stock price volatility and dividend policy variables despite positive significance of some control variables (Earnings Volatility, Asset Growth, and Earning per Share). The remaining two control variables (Firm Size and Long-term Debt) showed negatively related to it.

Lindeman (2016) in his study investigated 99 companies listed on the Helsinki Stock Exchange out of 107 observations in all. The period covered was 2010-2014. The methodology put in place was Pearson Correlation Coefficient with the assistance of SPSS software. It was a pity situation as there is a negative correlation between Dividend Policy measures (Dividend Yield & Dividend Payout Ratio) and share price volatility of the selected firms while there was a positive correlation between variables used to capture the dividend policy.

Otieno (2016) employing purposive sampling studied 38 firms listed on the Nairobi Stock Exchange which have been consistently trading from 1994-2015. Data was analyzed using panel data analysis. The relationship between the variables was determined through Regression analysis but some pre-tests were carried out which are tests for multicollinearity, heteroskedasticity test, panel unit root test assisted with Hausman specification test. The study revealed that Dividend Policy (dividend, yield and payout ratio) depicted negative insignificant relationship to the change in Stock Price while only firm size has positive significant.

Ullah, Saqib and Usman (2015) studied a sample of 5 firms from the Textile industry in Pakistan for the period 2003-2008. Pool Multiple regression model was employed to investigate the relationship where Firm Size, Earnings Volatility and growth were selected as control variables. The result showed that Dividend Payout Ratio was significantly affecting the stock price. Other variables indicated in the study had mixed reaction and were found relatively significant.

Abruar-ul-haq, Akram&Ullah (2015) carried out their study with the application of stratified random sampling to select 11 non-financial firms from the floor of Karachi Stock Exchange-100 index from years 2001 and 2014. The study made use of pre estimation (descriptive statistics) and estimation techniques of correlation and regression models on the panel data that revealed dividend policy has no relevance on the stock price volatility as in the case of MM theory.

Hooi, Albaity and Ibrahimy (2015) study the whole Malaysian stock market with 319 firm son the Kuala Lumpur Stock Exchange which cover the years from the 2003 to 2013. The study made used of dividend yield and dividend payout to capture the dividend policy that had negative relationship along with the movement of stock
price of those firms under review. The study also find out that earnings, asset growth and long term do not contribute to price volatility compared to the study of Khan et al (2017) recommending that the high leveraged firms, have price volatility.

Lashgari & Ahmadi (2014) studied a sample of 51 firms listed on the Tehran Stock Exchange and covered the period 2007-2012. They made use of panel multivariable regression model assisted with some pre-tests using Unit root test to test for stationary test while important test like Chow test and Hausman test were also carried out on all the variables. The result recommended the use of fixed effect models for the interpretation at 5% level of significance. Using Dividend Payout Ratio to capture the dividend policy, which has negative effect on the movement of stock price while only asset growth rate has a significantly positive effect on Stock Price Volatility. Other variables: leverage, earning volatility and firm size on Stock Price Volatility have no effect.

Kenyoru, Kundu & Kibiwott (2013) in their study using listed firms from Nairobi Securities Exchange for a period of ten (10) years from 1999 – 2008 as the scope used and the estimation technique was based on pool multiple regression analysis. Change in dividend policy was found to be major determinant on the share price volatility. The Dividend Yield negatively affects share price volatility. It brought about the conclusion that the higher the dividend payout ratio the wrong signal to the share price volatility, and with the same application to the Dividend Yield.

Ramadan (2013) investigated all 77 industrial firms on the Amman Stock Exchange from the period 2000 through 2011. A cross-sectional time series was used for the study assisted with descriptive analysis, correlation analysis and multiple least square regression method. The results indicated significant negative influence dividend policy to the tune absolute parallel line with stock price which revealed that both move in opposite direction. Hashemijoo, Ardekan & Younesi (2012) similar with Ramadan (2013) study investigated 84 firms out of 142 consumer goods manufacturing firms from the Kuala Lumpur Stock Market Exchange ranged from 2005 to 2010. The results didn’t differ from the opposite direction of variables used to capture the dividend policy and the change in stock price except the fact that Dividend Yield and size have higher impact on share price volatility than other predictor variables.

Nazir, Abdullah & Nawaz (2012) conducted a study on the Karachi Stock Exchange, Pakistan which investigated a sample of 75 firms for the period 2006-2010 using fixed effect regression analysis. From the study negative relationship was also established between Dividend Yield and stock price volatility vis a vis dividend payout. This is an indicator to the investors that Dividend Policy play prominent role as well as a tool in setting share prices for firms in emerging economy like Pakistan.
Habib, Kiani & Khan (2012) investigated a sample of non-financial firms on the Karachi Stock Exchange of 100 index. A Cross-sectional data was also used for the study that resulted to the negative relation of Dividend Payout Ratio to the change in stock price. The size couple with the debt are negatively and positively related with the share price volatility respectively. Hussainey, Mgbame & Chijoke-Mgbame (2010) investigated a number of sample firms on the London Stock Exchange. The analyses used were multiple regression analyses. This was done for a period of 10 years (1998 - 2007) with a positive relationship between dividend yield and stock price changes and a negative relationship between Dividend Payout Ratio and stock price changes. In addition, their results show that firm’s growth rate, debt level, size and earnings explained stock price changes.

3. Methodology

The data sourced for this study was secondary data which was sourced from publications of the non-financial sectors listed on Nigerian Stock Exchange (NSE) coupled with audited annual reports. This descriptive research design makes it possible to establish the cause-effect relationship between variables involved. The variables used are Dividend Payout Ratio (DPR), Dividend Yield (DY) and Earnings Volatility (EV) and the Price of shares using Panel Regression equation disclosed:

\[ PV_{it} = \beta_0 + \beta_1 DPR_{it} + \beta_2 DY_{it} + \beta_3 EV_{it} + \varepsilon_{it} \ldots \]  

(1)

There is multicollinearity problem among the independent variables as it appear in Drury, 2008 as cited in Hussainey et al, 2010 which call for the need of firm size as control variable changing the panel regression equation to be:

\[ PV_{it} = \beta_0 + \beta_1 DPR_{it} + \beta_2 DY_{it} + \beta_3 EV_{it} + \beta_4 SZ_{it} + \varepsilon_{it} \ldots \]  

(2)

Where PV = Price volatility, \( \beta_0 \) = constant, \( \beta_1 - \beta_4 \) = Regression coefficients, DPR = Dividend payout ratio, DY = Dividend yield, EV = Earnings volatility, SZ = Firm size, \( \varepsilon \) = Error margin, i = Firms, t = Years.

Measurement of the Variables

Stock Price Volatility was measured using the standard deviation of monthly returns of share prices within each year. On the other hand, the independent variable was measured using Dividend Payout Ratio, Dividend Yield and Earnings Volatility, taking into consideration the control variable, Firm Size. These variables were calculated as indicated in the table below:
### Measurement of the Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Type</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stock Price Volatility</td>
<td>Dependent</td>
<td>$2 \sqrt{\frac{\sum_{t=1}^{12} (R - \bar{R})^2}{12}}$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>where $R = \text{natural log of } \frac{p_t}{p_{t-1}}$, $p_t = \text{price in current month}$, and $p_{t-1}$ = price in previous month</td>
</tr>
<tr>
<td>Dividend Payout Ratio</td>
<td>Independent</td>
<td>Dividend per share X 100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Earnings per share</td>
</tr>
<tr>
<td>Dividend Yield</td>
<td>Independent</td>
<td>$\frac{\text{Dividend per share}}{\text{Market price per share}} \times 100$</td>
</tr>
<tr>
<td>Earnings Volatility</td>
<td>Independent</td>
<td>$\left( \frac{E_t}{E_{t-1}} \right) - 1$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>where $E_t$ = Profit before tax to Turnover ratio in current month, and $E_{t-1}$ = Profit before tax to Turnover ratio in previous month</td>
</tr>
<tr>
<td>Firm Size</td>
<td>Control</td>
<td>$\ln(T_t)$</td>
</tr>
</tbody>
</table>

*Source: Researcher’s Compilation.*

### Data Estimation Technique and Estimation

Panel data was analyzed using Panel Autoregressive Distributive Lag (PARDL) to show the long-run and short-run effects that subsist by the identified independent variable on the dependent variable. However some pre-tests were conducted, among which is the Unit Root Test to test the stability of each variable under consideration. Variables are used in the study in the order of integration determined by the unit root test designed for the regression model. If the variable is stationary at level after performing unit root test, then it is I (0); otherwise it is I (d) where d represents the number of times the series is differentiated before it becomes stationary. The differences are the 1st difference and the 2nd difference.

However, for the panel ARDL to be used it must not exceed the first difference and the test type to be used is the Levin, Lin & Chu Unit Root Test, using the
Schwarz Info Criterion across all three test equations (Intercept, Trend and Intercept, and None) and it must be stationary in at least one of these three at any of the three levels of significance (1%, 5% and 10%). The need for running unit root tests in the PARDL procedure is probably to ensure that none of the variables is integrated of order 2 or above.

4. Result and Discussion

Descriptive Statistics

The Descriptive statistics reveal the qualities of the panel data under consideration for estimation. These details enhanced the use of appropriate methodology for estimation. The table below summarizes the descriptive statistics:

| Source: Researcher’s Computation. |

From the panel data however, each cross-sections was duly observed and two salient outcomes were drawn out. First, the researcher checked for firms that have DPR of above 49% in each cross-sections within the eleven years’ span under study. It was found out that for A.G. Leventis Nigeria Plc., the DPR was above the stated threshold in 5 out of 11 times. For Aluminum Extrusion Industries Plc., it was found to be 0 out of 11 times, same with Beta Glass Plc. For Glaxo Smithkline Consumer Nigeria Plc., it was found to be 4 out of 11 times.
In Julius Berger Nigeria Plc., it was found to be 8 out of 11 times, same as University Press Plc. For Presco Plc., it was found to be 3 out of 11 times. For Unilever Nigeria Plc., it was found to be 7 out of 11 times, same as 11 Plc.

Second, the researcher checked for what the average DPR was in each cross-section with the study’s period scope. It was observed that A.G. Leventis Nigeria Plc. had an average DPR of 44%, Aluminum Extrusion Industries Plc. had an average DPR of 16%, Beta Glass Plc. had an average DPR of 11%, Glaxo Smithkline Consumer Nigeria Plc. had an average DPR of 46%, Julius Berger Nigeria Plc. had an average DPR of 80%, 11 Plc. had an average DPR of 56%, Presco Plc. had an average DPR of 37%, Unilever Nigeria Plc. had an average DPR of 76%, University Press Plc. had an average DPR of 62%.

Unit root test result

The variables were subjected to a unit root test. This already spelt out in the third chapter is to test for the stability of the each variable. This is to ensure that none of the variables are in the integrated order of two and above as the ARDL model cannot accommodate such variables. The test type used is the Levin, Lin & Chu Unit Root Test and the result is presented in the table below:

*Table 3*

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>MODEL A</th>
<th>I(d)</th>
<th>MODEL B</th>
<th>I(d)</th>
<th>MODEL C</th>
<th>I(d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PV</td>
<td>-5.67926</td>
<td>I(0)</td>
<td>-5.34336</td>
<td>I(0)</td>
<td>-3.42149</td>
<td>I(0)</td>
</tr>
<tr>
<td></td>
<td>(0.0000)</td>
<td></td>
<td>(0.0000)</td>
<td></td>
<td>(0.0003)</td>
<td></td>
</tr>
<tr>
<td>DPR</td>
<td>-5.24305</td>
<td>I(0)</td>
<td>-9.44290</td>
<td>I(0)</td>
<td>-2.28800</td>
<td>I(0)</td>
</tr>
<tr>
<td></td>
<td>(0.0000)</td>
<td></td>
<td>(0.0000)</td>
<td></td>
<td>(0.0111)</td>
<td></td>
</tr>
<tr>
<td>DY</td>
<td>-3.26287</td>
<td>I(0)</td>
<td>-2.14054</td>
<td>I(0)</td>
<td>-1.28817</td>
<td>I(0)</td>
</tr>
<tr>
<td></td>
<td>(0.0006)</td>
<td></td>
<td>(0.0162)</td>
<td></td>
<td>(0.0988)</td>
<td></td>
</tr>
<tr>
<td>SZ</td>
<td>-2.95753</td>
<td>I(0)</td>
<td>-3.67302</td>
<td>I(0)</td>
<td>6.03960</td>
<td>I(1)</td>
</tr>
<tr>
<td></td>
<td>(0.0016)</td>
<td></td>
<td>(0.0001)</td>
<td></td>
<td>(1.0000)</td>
<td></td>
</tr>
<tr>
<td>EV</td>
<td>-5.26771</td>
<td>I(0)</td>
<td>-5.84263</td>
<td>I(0)</td>
<td>-8.49179</td>
<td>I(0)</td>
</tr>
<tr>
<td></td>
<td>(0.0000)</td>
<td></td>
<td>(0.0000)</td>
<td></td>
<td>(0.0000)</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Researcher’s Computation (2018).*

From the result above, it is proved that the variables are I (0) variables in model A and model B, that is, stationary at level, while model C has an exemption to Firm Size which is an I (1) variable of which combination is what is practical. The result shows that none of the variables under all three model is an I (2) variable, hence fit for ARDL analysis.
The correlation analysis was conducted to show the possible association between the variables. The results are presented in Table 4 below.

**Table 4**

<table>
<thead>
<tr>
<th></th>
<th>PV</th>
<th>DPR</th>
<th>DY</th>
<th>EV</th>
<th>SZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>PV</td>
<td>1</td>
<td>0.158491</td>
<td>0.084170</td>
<td>-0.045307</td>
<td>0.032493</td>
</tr>
<tr>
<td>DPR</td>
<td>0.158491</td>
<td>1</td>
<td>0.222293</td>
<td>-0.065943</td>
<td>0.264229</td>
</tr>
<tr>
<td>DY</td>
<td>0.084170</td>
<td>0.222293</td>
<td>1</td>
<td>-0.215594</td>
<td>0.103088</td>
</tr>
<tr>
<td>EV</td>
<td>0.045307</td>
<td>-0.065943</td>
<td>-0.215594</td>
<td>1</td>
<td>-0.044726</td>
</tr>
<tr>
<td>SZ</td>
<td>0.032493</td>
<td>0.264229</td>
<td>0.103088</td>
<td>-0.044726</td>
<td>1</td>
</tr>
</tbody>
</table>

*Source: Researcher’s Computation.*

The results from the table above show a positive association between Dividend Payout Ratio and Stock Price Volatility. This means that an increase (decrease) in Dividend Payout Ratio will bring about approximately 16% increase (decrease) in Stock Price Volatility of the companies examined. Also a low but positive association is observed between Dividend Yield and Stock Price Volatility. This indicates that an increase (decrease) in Dividend Yield will bring about approximately 8% increase (decrease) in Stock Price Volatility of the companies examined.

Earnings Volatility, is observed to have a low but positive association with Stock Price Volatility. This association is represented by a value of about 5%, which means that an increase (decrease) in Earnings Volatility will bring about approximately 5% increase (decrease) in Stock Price Volatility. The control variable, Firm Size, is observed to have a low but positive association with Stock Price Volatility to the tune of about 3%, which means that an increase (decrease) in Firm Size will bring about approximately 3% increase (decrease) in Stock Price Volatility.

Coming to the associations between the independent variables, it was observed from the result that Dividend Payout Ratio and Dividend Yield have a positive association of approximately 22%. It was also observed to have a negative association with Earnings Volatility to the tune of about 7% from which it can be inferred that the higher the Earnings Volatility, the lower the Dividend Payout Ratio and vice versa, while it was observed to have a positive association with Firm Size to the tune of approximately 26%. The Dividend Yield shows a negative association with Earnings Volatility to a tune of about 22% and a positive association with Firm Size to the tune
of about 10%, while Earnings Volatility shows a negative association with Firm Size to a tune of about 4.5%.

Regression Analysis

Panel Auto Regressive Distributive Lag (ARDL) was used in the analysis of the panel data to examine the long-run relationship, the short-run relationship and the cross-section relationship of the independent and dependent variables. The model was first subjected to the Vector Auto Regressive test to estimate the number of lags to be used which was determined to be 1 lag based on the Schwarz criterion. The model was then estimated based on this lag which subjected the variables to a maximum lag of 1 which is best fit for annual data and considerably, the eleven (11) years used. The only fixed regressor was the constant term. The result is presented in the table below;

Table 5

<table>
<thead>
<tr>
<th>Panel ARDL Result</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variable: D(PV)</strong></td>
</tr>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td><strong>Long Run Equation</strong></td>
</tr>
<tr>
<td>DPR</td>
</tr>
<tr>
<td>DY</td>
</tr>
<tr>
<td>EV</td>
</tr>
<tr>
<td>SZ</td>
</tr>
<tr>
<td><strong>Short Run Equation</strong></td>
</tr>
<tr>
<td>COINTEQ01</td>
</tr>
<tr>
<td>D(DPR)</td>
</tr>
<tr>
<td>D(DY)</td>
</tr>
<tr>
<td>D(EV)</td>
</tr>
<tr>
<td>D(SZ)</td>
</tr>
<tr>
<td>C</td>
</tr>
</tbody>
</table>

*Source: Researcher’s Computation.*

From the table above, it is observed that both the independent and control variables significantly drive Stock Price Volatility in the long-run based on a threshold of 1% and 5% level of significance, However, it is also observed that while
Dividend Payout Ratio, Dividend Yield and Earnings Volatility positively affect Stock Price Volatility, Firm Size have negative impact on it.

Explicitly, an increase in each of Dividend Payout Ratio, Dividend Yield, Earnings Volatility and Firm Size causes about 0.157416 increase, 0.762185 increase, a 0.008088 increase and about 3% decrease respectively on Stock Price Volatility.

Meanwhile, in the short-run, all the variables except Earnings Volatility have insignificant effect on Stock Price Volatility, based on a threshold of 10% level of significance. The result indicated that an increase in each of Dividend Payout Ratio, Dividend Yield, Earnings Volatility and Firm Size causes a 0.042819 increase, 3.571326 increase, 0.024674 increase and about 8% increase respectively on Stock Price Volatility. The error correction coefficient COINTEQ01 which is negative and significant indicates cointegration, and that there is 67% annual rate of adjustment from short run into the long run equilibrium. This means that the short-run effect of the independent variables on Stock Price Volatility quickly adjust to the long-run effect at an annual rate of about 67% which is significantly fast.

**Dividend Payout Ratio and Stock Price Volatility**

Dividend Payout Ratios observed to have a positive and significant effect on stock price fluctuations in the long-run while, in the intermediate period, any change in Dividend Payout Ratio will not significantly affect stock price changes compared to a similar study Abrar-ul-haq et al (2015) where the Dividend Payout Ratio had a high positive effect on Stock Price Volatility but was insignificant. This is different from the usual expectation that the increase in Dividend Payout Ratio would reduce the stock price fluctuations significantly. Hence it can be induced that when the Dividend Payout Ratio is high and it increases, Stock Price Volatility is likely to rise.

**Dividend Yield and Stock Price Volatility**

Dividend Yield showed a positive relationship with stock price fluctuations which is also different from what is expected both in the long-run and short run. However, while the long-run results indicated a significant effect thereby rejecting the null hypothesis in the long-run period, the short-run result indicated an insignificant effect thereby validating the null hypothesis for the short-run period (Long-run: \( \beta = 0.762185 \), p-value= 0.0000; short-run: \( \beta = 3.571326 \) and p-value= 0.3822), meaning that the Dividend Yield increase causes an insignificant 3.571326 increase in stock price fluctuations in the short-run, and a significant 0.762185 increase in stock price fluctuations in the long-run. This positive effect could also be trailed back to the dividend per share argument raised earlier.


**Earnings Volatility and Stock Price Volatility**

For Earnings Volatility, it is also observed to be in line with theoretical expectations as the result indicates a positive and high significant effect of Earnings Volatility on stock price fluctuations in the long-run period. This translates to long-run period position ($\beta= 0.008088$ and p-value= $0.0000$), meaning that high changes in earnings significantly cause rapid changes in stock prices in the long-run period. Since a firm’s earning is one of its indicators of profitability, and that earnings are not always constant, the fluctuations in earnings’ stream from one period to the other will affect firms’ Dividend Policy. If the earnings are low for a particular period, the management may be constrained to reduce their dividends payment which may send the wrong signal to investors and consequently cause firms’ value to drop as firms with volatile earnings are considered to be risky. Evidence for this is earnings per share. It has been observed that as EPS increases, so does the share price. Hence volatile earnings would translate to volatile stock price that also apply to the intermediate period meaning that an increase in earnings fluctuations will cause a positive and significant increase in stock price fluctuations in the intermediate period by $0.024674$.

**Firm Size and Stock Price Volatility**

The result also showed that Firm Size in line with theoretical expectation that it has a negative and highly significant effect on stock price fluctuations in the long-run. It means that an increase in Firm Size will contribute to the significant decrease in Stock Price Volatility by about 3%. Consequently, the larger the firm, the lower the Stock Price Volatility, affirmed by Hashemijoo et al (2012) who in their study opined that due to more diversification by large-sized firms and limited access to public information to small firm, larger firms are expected to be less risky and have less share price volatility. Also Zakaria et al (2012), concluded that the bigger the size, the more significantly it could influence the volatility of the share price. Hence affirming the high negative relationship observed between Firm Size and Stock Price Volatility.

**5. Conclusion and Recommendation**

Volatility in stock price may reduce aggregate output temporarily as it delays business investment by raising uncertainty or by inducing expensive resource reallocation. It can be collectively concluded from the research findings that Dividend Policy as a matter of fact has a significant effect on Stock Price Volatility. This significant effect occurs mainly in the long-run period. However in the intermediate period, it can be concluded that Dividend Policy does not significantly
affect Stock Price Volatility. The study recommended that firms with low dividend payout ratios should increase their dividend payments and try as much to keep it stable. This will send a good signal out to current and potential investors that the firms are doing well and can always predict within what range their expected returns from their investment will fall. This in turn increases firm value and stabilize stock price change. The investors should consider sectors before their investments as some sectors behave better than others as in the case of Oil and Gas sector and Construction sector meaning that investors and traders of investment in Nigerian Stock Exchange are advised to take utmost interest in sectoral performance when policy prescriptions concerning dividend decision are looked into.

**References**


CORPORATE GOVERNANCE MECHANISM AND CAPITAL STRUCTURE DECISION IN NIGERIA

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JEL G30, 32, 34. Abstract

This study investigated the relationship between the corporate governance mechanism and capital structure of 42 Nigerian listed firms for financial years 2005-2016. The corporate governance mechanism was surrogated by three variables: corporate board size, independence and gender diversity, while leverage served as a proxy for capital structure. Using Fixed effects least squares technique as a method of estimation, the result revealed a positive and statistically significant relationship between board gender diversity and capital structure. The study did not find empirical evidence in support of corporate board size and independence having influence on capital structure decision of the sampled firms, as results produced statistically insignificant relationships. The study recommends that corporate shareholders and regulatory bodies should put in place robust policies that would encourage the participation of more women in the boardrooms of corporate organizations.

Key words: Board of directors, Capital structure, Corporate governance, Nigeria, Panel data.

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1. Introduction

Capital structure refers to the combination of equity and debt capital employed by a firm to finance its assets and operations. Decisions concerning capital structure are seen from prior studies to affect the profitability and long-run survival of an entity (Abor, 2005, Chakraborty, 2010, Onaolapo & Kajola, 2010, Haron, 2014 and Anju &
Since the seminal paper of Modigliani and Miller (MM) (1958) irrelevant hypothesis of capital structure, several theories on capital structure have evolved. One of the theories that challenged the efficacy of MM proposition is Agency Theory. Agency theory opines that as a result of the separation of ownership and control of an entity, there exists a conflict of interest between the owners (principal) and the managers (agents) of the business. As a result of their self-interest, the agents may decide to get involved in some activities which are profitable to them but are against the shareholders wealth maximization.

In order to mitigate the agency conflicts to a manageable level, owners of business organisations employ various strategies - internal and external, to checkmate excesses of managers. One such strategy is by putting in place a sound corporate governance mechanism in the company. Corporate governance mechanisms are wide but one that is very germane to any listed company is the board of directors. The board performs so many functions which are supported by Agency and Resource dependency theories (Kajananthan & Achchuthan, 2013). An entity’s board of directors monitors the activities of the management; formulates policies that would improve the economic fortune of the business and also takes decisions (such as financing mode/capital structure) that affect the progress and survival of the business.

The problem statement regarding the issue of corporate governance in most of the developing countries is due to weaknesses in regulation guiding the behaviour of various stakeholders in an organization. Due to this reason, the informed members of the organization, particularly the management, tend to use their privileged position to expropriate the resources of the organization (using the capital structure strategy) to better them as management at the expense of the owners of the business.

The present study tries to investigate whether having a sound corporate governance mechanism would enhance or weaken the capital structure policy adopted by a firm. Three features of the board of directors – board size, board independence and board gender diversity are adopted in this study vis-à-vis the capital structure (leverage) of the firm.

The motivation for this study is predicated on the paucity of empirical works in Nigeria and other developing countries. Several studies have been done in the developed countries but outcomes of these studies (although conflicting in many cases) cannot be adopted wholeheartedly in the developing countries because of social, cultural and economic dissimilarities between the developing and developed countries. Thus, with the use of data from the Nigerian business environment, the noticeable knowledge gap would, to certain extent, be bridged by the outcome of this work.

The remaining part of the paper is organized as follows; Section 2 beamed search light on the theoretical framework and in Section 3 the methodology and data
adopted was discussed. Results of econometric analysis and discussion of findings were provided in Section 4 while Section 5 concluded the study.

2. Theoretical Framework

The study is predicated on two theoretical foundations – Agency theory and Resource dependence theory. Agency theory was propounded by Berle and Means (1932) cited in Kajola, Abosede and Akindele (2014, p. 41) and was, however, reviewed by Jensen and Meckling (1976). It is premised on the unwarranted conflict of interest between the owners (shareholders/principal) and the firm’s management (agents) caused by the separation of ownership and control. By pursuing their self-interests, the attainment of the objective of shareholders wealth maximization is sacrificed. Haris and Raviv (1991) reveal that conflict of interests causes agency costs, which in turn determine the firm’s capital structure decision. In order to mitigate the agency problem, the owners of a business put in place some mechanisms, thereby incurring agency costs. One such mechanism is through the institution of various corporate governance mechanisms, which could be internal or external or a combination of the two.

The company’s board of directors is one the critical internal control mechanisms. Agency theory posits that a company’s board that is well composed will be difficult to manipulate by a few members of the board, hence better decisions that will improve the performance of the company will be made in their deliberations. Furthermore, agency theory supports board diversity in the form of representation of women on corporate boards. When women are on corporate boards, better decisions will be made concerning the financing mode of the company.

Resource dependence theory offers an explanation of the role of the board of directors as a resource to the firm. The major argument of this theory according to Pfef- fer and Salancik (1978) is that organisations attempt to exert control over their environment by bringing into the fold resources necessary to survive. A well-composed board is expected to attract indispensable resources which the organization needs to survive and flourish. Using this theoretical belief, Pearce and Zahra (1992) argued that when outside directors are appointed on board, they bring to the boardroom a fresh perspective on the management of the company. With their skills, exposure and contacts in the immediate environment, they attract the needed resources (including funds) to their companies.

Resource dependence theory also provides support for board diversification, particularly the representation of women on corporate boards. Having women in the boardroom will confer to company legitimacy with regard to several groups of stake-

In determining the causal effect of corporate governance mechanism on capital structure decision, several studies were conducted in some parts of the world. The most used proxies of corporate governance mechanism were board size, board independence and gender diversity.

Corporate board size denotes the total members on corporate boards and is responsible for making company’s strategic decisions, including the debt-equity mix. Several studies conducted on the effect of board size on capital structure have produced conflicting results. Wen, Rwegasira and Bilderbeck (2002) argue that large boards follow a policy of higher levels of gearing to enhance firm value especially when these are entrenched due to greater monitoring by regulatory authorities. Berger, Ofek and Yermack (1997) on the other hand submit that with larger boards managers are encouraged to apply lower gearing levels which ultimately enhance firm performance.


External or independent directors are seen to possess the power to diligently monitor managers and other board members. The outside directors ensure that funds from debt issues approved by the board are judiciously utilized by the management. Theoretically, a board which consists of a larger proportion of outside directors is expected to provide tighter conditions for acceptance of debt to fund assets and operations of the business by the management.

Wen, Rwegasira and Bilderbeek (2002) and Al-Najjar and Hussainey (2011) argue that due to rigorous monitoring by outside directors, managers tend to adopt a lower level of leverage for achieving superior results. Lipton and Lorsch (1992), however, opine that the presence of outside directors enhances the capability of the firm to get recognition from external stakeholders thereby enhancing the ability of the firm to raise funds, especially from the capital market. They therefore propose that the higher the level of representation of outside directors, the higher the gearing level.

Studies on the role of women on corporate boards are just evolving in finance and corporate governance literature especially in the developed countries. Some prior studies (Jensen and Meckling, 1976 and Fondas and Sassalos, 2000) suggest that the presence of women on the board of directors enhances independence of the board while some other studies (McKinsey & Company, 2007, Campbell and Minguez-Vera, 2008, Adam and Ferreira, 2009, Fan, 2012, Julizaerma and Sori, 2012 and Bart and McQueen, 2013) provide evidence that women on corporate boards improve the financial performance of companies they represent. Rovers (2013) opines that firms work effectively when board of directors contain women, while firms without a woman on their board don’t work well.

However, few studies have so far been conducted on the effect of women directors on financing mode decision. Jaradat (2015) investigates the relationship between corporate governance practices and capital structure of 129 Jordanian firms for the period 2009-2013. The result reveals a positive relationship between the representation of women on corporate boards and capital structure. Emoni, Muturi and Wandera (2016) using data from the listed companies in Kenya provide evidence of a positive relationship between women on corporate boards and capital structure. The study posits that having more women on the board enables the company to have more access to capital and also increases board independence and provides better ways of financing a firm since women tend to ask more questions than males do. In another study, Loukil and Yousfi (2015) submit that women on corporate boards do not support risk-taking preference in firms.

3. Methodology and Data

3.1. Research Design and Data Collection

This study is exploratory and analytical in nature. Secondary source approach was adopted in obtaining relevant data. Specifically, data were extracted from audited reports and accounts of the sampled companies from the Nigerian Stock Exchange Fact book for the financial years 2005-2016.
3.2. Population, Sample and Sampling Technique

The population of the study comprised all the listed non-financial companies in Nigeria (186 as at 31st December, 2018). A sample size of 42 companies was chosen from the population through the combination of judgmental and stratified sampling techniques. In all, the selected firms covered 15 business sub-sectors of the Nigerian economy as shown in Table 1.

Table 1

<table>
<thead>
<tr>
<th>S/N</th>
<th>Sub-sector</th>
<th>Number of Firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Agro/agro-allied</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Automobile and tyre</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Breweries</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Healthcare</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Industrial and domestic product</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Building materials</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Chemical and paints</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>Conglomerates</td>
<td>5</td>
</tr>
<tr>
<td>9</td>
<td>Construction</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>Printing and publishing</td>
<td>3</td>
</tr>
<tr>
<td>11</td>
<td>Food/beverages and tobacco</td>
<td>4</td>
</tr>
<tr>
<td>12</td>
<td>Packaging</td>
<td>3</td>
</tr>
<tr>
<td>13</td>
<td>Petroleum (marketing)</td>
<td>5</td>
</tr>
<tr>
<td>14</td>
<td>Textile</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>Commercial/service</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>42</strong></td>
</tr>
</tbody>
</table>


3.3. Data Analysis Instrument

Panel data regression analysis was adopted. Two estimation methods – Fixed effects and Random effects were initially considered. The study, unlike some prior studies (Rehman, Rehman and Raoof, 2010, Okiro, Aduda and Omoro, 2015, Jaradat, 2015 and Emoni, Muturi and Wandera, 2016), did not use simple pooled Ordinary Least Squares (OLS) as estimation technique due to the fact that companies of different sizes and sectors comprised the sample and the use of simple pooled OLS may not give correct inferences on the relationship between the study variables. In line with Jang and Park (2011), Kouser, et al., (2012) and Kajola, Agbanike and Adelowotan (2016), Fixed effects model (with least squares as estimation technique) and Random
effects model (GLS as a method of estimation) where lagged values are not included among the regressors were applied, in order to mitigate the occurrence of omitted variables, measurement error of explanatory variables or reverse causality among variables.

3.4. Variable Description and Development of Hypotheses

Based on the discussion in the literature review, the study has only one dependent variable (capital structure), and three variants of corporate governance mechanism (board size, board independence and board gender diversity). Two variables (profitability and firm size) are included to serve as control variables.

The hypotheses of the study are:

- \( H_{01} \): There is no significant relationship between capital structure and board size.
- \( H_{02} \): There is no significant relationship between capital structure and board independence.
- \( H_{03} \): There is no significant relationship between capital structure and the proportion of women on the board.

3.5. Model Specification

The model is framed in accordance with what is obtained in the prior reviewed literature (Abor, 2007, Rehman, Rehman and Raoof, 2010, Velnampy and Nimalathasan, 2013, Agyei and Owusu, 2014, Uwuigbe, 2014, Okiro, Aduda and Omoro, 2015 and Kyriazopoulos, 2017) and is as presented in equation 3.1:

\[
LEV_{it} = \beta_0 + \beta_1 BSZ_{it} + \beta_2 IND_{it} + \beta_3 WOM_{it} + \beta_4 PROF_{it} + \beta_5 FSZ_{it} + e_{it} \tag{3.1}
\]

Where,
- \( LEV \) = Total debt to total asset
- \( BSZ \) = Board Size
- \( IND \) = Independent or Outside directors
- \( WOM \) = Women on corporate boards
- \( PROF \) = Profitability
- \( FSZ \) = Firm size
- \( \beta_0 \) = Intercept of the equation
- \( \beta_1, \ldots, \beta_5 \) = Coefficients of independent and control variables
- \( e_{it} \) = stochastic error term

3.6. Measurement of Variables

The definition or measurement of variables used in the study is depicted in Table 2.
Table 2

<table>
<thead>
<tr>
<th>Name</th>
<th>Symbol</th>
<th>Definition/Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital structure</td>
<td>LEV</td>
<td>Total debt</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total assets</td>
</tr>
<tr>
<td>Board size</td>
<td>BSZ</td>
<td>Log of total number of directors on the board</td>
</tr>
<tr>
<td>Board independence</td>
<td>IND</td>
<td>Number of non-executive directors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total board membership</td>
</tr>
<tr>
<td>Board gender diversity</td>
<td>WOM</td>
<td>Number of women directors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total board membership</td>
</tr>
<tr>
<td>Profitability</td>
<td>PROF</td>
<td>Profit after tax</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total assets</td>
</tr>
<tr>
<td>Firm size</td>
<td>FSZ</td>
<td>Log of total assets</td>
</tr>
</tbody>
</table>


4. Results and Discussion

4.1. Descriptive Statistics

The summary of the descriptive statistics of the variables are provided in Table 3. The average leverage of the sampled firm is 0.2163. This suggests that the proportion of total debt to the total assets of the firms used in the study is about 22%, which is quite low. While the minimum leverage is 0% (depicting that some firms did not apply debt financing during the study period, but the maximum leverage ratio of 3.0908 indicates that a firm used debt capital as much as thrice the size of its total assets. The average independent (or outside) director on the boards is about 77%. The corporate board size of 0.9447 indicates that on the average 9 members (log inverse 0.9447) constituted the board during the period of study. The proportion of women on board is about 5.34% while in some cases there were firms without women on their boards (minimum 0.0000), while the maximum representation of women on board is 33.33% of board membership. The average profitability of the firms is 0.0503 indicating that for every N1 total asset, the profit element accounted for only 5 Kobo. Furthermore, Table 3 depicts that the average firm size (9.6919) is about N5 billion (that is log inverse 9.6919), approximately US $ 16.4 million.
Table 3

Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Standard deviation</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEV</td>
<td>0.2163</td>
<td>0.0000</td>
<td>3.0908</td>
<td>0.2532</td>
<td>4.4479</td>
<td>42.8400</td>
</tr>
<tr>
<td>IND</td>
<td>0.7742</td>
<td>0.0909</td>
<td>0.9333</td>
<td>0.1394</td>
<td>-1.1663</td>
<td>3.8377</td>
</tr>
<tr>
<td>BSZ</td>
<td>0.9447</td>
<td>0.4771</td>
<td>1.2041</td>
<td>0.1158</td>
<td>-0.7155</td>
<td>4.2664</td>
</tr>
<tr>
<td>WOM</td>
<td>0.0534</td>
<td>0.0000</td>
<td>0.3333</td>
<td>0.0734</td>
<td>1.1163</td>
<td>3.3918</td>
</tr>
<tr>
<td>PROF</td>
<td>0.0503</td>
<td>-3.0259</td>
<td>0.5080</td>
<td>0.1711</td>
<td>-11.8081</td>
<td>209.8345</td>
</tr>
<tr>
<td>FSZ</td>
<td>9.6919</td>
<td>7.9967</td>
<td>11.4990</td>
<td>0.7413</td>
<td>-0.1722</td>
<td>2.3344</td>
</tr>
</tbody>
</table>

*Source:* Authors’ computation.

4.2. Multicollinearity Test

The use of multiple regression is premised on the fundamental principle of absence of multicollinearity among the explanatory variables. Two methods were used to test for multicollinearity in the study. These are Vector Inflation Factor (VIF) and Tolerance Value (TV). A variable with VIF of greater than 10.0 or TV value closer to zero) indicates high multicollinearity between it and other explanatory variables (Asaeed, 2005, Wooldridge, 2009 and Gujarati & Porter, 2009).

The result of the multicollinearity test is presented in Table 4.

Table 4

Multicollinearity result

<table>
<thead>
<tr>
<th>Variable</th>
<th>VIF</th>
<th>TV</th>
</tr>
</thead>
<tbody>
<tr>
<td>IND</td>
<td>1.115</td>
<td>0.897</td>
</tr>
<tr>
<td>BSZ</td>
<td>1.403</td>
<td>0.713</td>
</tr>
<tr>
<td>WOM</td>
<td>1.195</td>
<td>0.837</td>
</tr>
<tr>
<td>PROF</td>
<td>1.020</td>
<td>0.980</td>
</tr>
<tr>
<td>FSZ</td>
<td>1.363</td>
<td>0.734</td>
</tr>
<tr>
<td>Average</td>
<td>1.219</td>
<td>0.832</td>
</tr>
</tbody>
</table>

*Source:* Authors’ computation.

As seen in Table 4, no variable has VIF of above 10 or TV of less than 0.1. The VIF values range between 1.020 and 1.403, with average value of 1.219 while TV ranges between 0.713 and 0.981; thereby confirming non-existence of multicollinearity among the study’s explanatory variables.
4.3. Correlation

The results presented in Table 5 indicated the correlation matrix of all the variables used.

**Table 5**

<table>
<thead>
<tr>
<th></th>
<th>LEV</th>
<th>BSZ</th>
<th>IND</th>
<th>WOM</th>
<th>PROF</th>
<th>FSZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEV</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BSZ</td>
<td>-0.014</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.374)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IND</td>
<td>0.007</td>
<td>0.103***</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.434)</td>
<td>(0.011)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WOM</td>
<td>0.550**</td>
<td>-0.285***</td>
<td>-0.296***</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.017)</td>
<td>(0.000)</td>
<td>(0.000)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROF</td>
<td>-0.518***</td>
<td>-0.020</td>
<td>-0.015</td>
<td>-0.047</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.327)</td>
<td>(0.370)</td>
<td>(0.146)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FSZ</td>
<td>0.008</td>
<td>0.489***</td>
<td>-0.042</td>
<td>-0.193***</td>
<td>0.102**</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>(0.431)</td>
<td>(0.000)</td>
<td>(0.171)</td>
<td>(0.000)</td>
<td>(0.011)</td>
<td></td>
</tr>
</tbody>
</table>

*, **, *** indicate 10%, 5% 1% significance level, respectively

**Source:** Authors’ computation.

From Table 5, there is an indirect association between leverage and corporate board size, but insignificant. Insignificant and direct association exists between leverage and independent director variable. The same result was produced for the association between leverage and firm size. The association between leverage and board gender diversity (women on corporate board) is positive and significant at 5% level. Following the suggestion of Pecking order theory of Myers (1984) the association between leverage and profitability is negative and significant at 1% level. However, a major drawback to the use of correlation as data analytical tool is that it only shows direction and not strength of relationship. In mitigating the flaw in the use of correlation, the study used regression analysis.

4.4. Regression

The study conducted multivariate regression exercises based on Fixed effects model (with least squares as a method of estimation) and Random effects model (with Generalised Least Squares, GLS as a method of estimation). Table 6 presents the regression results.
Table 6

Regression Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Fixed coefficient</th>
<th>Random coefficient</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>effects</td>
<td>t-stat</td>
<td>prob</td>
</tr>
<tr>
<td>Constant</td>
<td>-2.8417</td>
<td>-5.4995***</td>
<td>0.0000</td>
</tr>
<tr>
<td>IND</td>
<td>0.1254</td>
<td>1.5374</td>
<td>0.1249</td>
</tr>
<tr>
<td>BSZ</td>
<td>0.1580</td>
<td>1.4207</td>
<td>0.1561</td>
</tr>
<tr>
<td>WOM</td>
<td>0.5759</td>
<td>3.5251***</td>
<td>0.0005</td>
</tr>
<tr>
<td>PROF</td>
<td>-0.5254</td>
<td>-10.5265***</td>
<td>0.0000</td>
</tr>
<tr>
<td>FSZ</td>
<td>0.2897</td>
<td>5.5775***</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

\[ R^2 \] 0.6394 \hspace{1cm} 0.2415
\[ \text{Adj R}^2 \] 0.5933 \hspace{1cm} 0.2166
\[ \text{F-stat} \] 13.876*** \hspace{1cm} 9.6899***
\[ \text{Prob} \] 0.0000 \hspace{1cm} 0.0000
\[ \text{Durbin-Watson} \] 1.8020 \hspace{1cm} 0.9839
\[ \text{Observation} \] 504 \hspace{1cm} 504

*, **, *** indicate 10%, 5% 1% significance level, respectively

Source: Authors’ computation.

Results show some areas of semblance in the two models. The relationship between leverage and independent director is positive and statistically insignificant; leverage and board size is also positive and insignificant; and leverage and board gender diversity is positive and significant at 1% level. Hausman (1978) specification test was employed to help in determining which of the two estimates - Fixed or Random effects is better to make inferences.

4.5. Result of Hausman Test

Hausman specification test hypothesizes that Fixed and Random effects models’ estimates do not differ substantially. According to Wooldridge (2009), if the \textit{prob} value of the Chi-square is statistically significant (p < 0.05), the estimation based on the Fixed effects will be better off. The opposite favours the use of Random effects model.
From Table 7, the \( \text{prob} \) value of the Chi-square is 0.0025 and statistically significant at 1% \((p < 0.05)\), hence Hausman test suggests the use of the outcome of Fixed effects model for making valid inferences.

### 4.6. Discussion

Using results of Fixed effects model as provided in Table 6, the Durbin-Watson value of 1.8020 is within acceptable threshold of 1 and 3 (Asaeeed, 2005) and it indicates absence of serial autocorrelation among the study’s explanatory variables. The F-stat value of 13.876, which is significant at 1% level \((p < 0.05)\) shows the good fitness of the model.

Table 6 shows that there is a positive but insignificant relationship between leverage and corporate board size. It indicates that corporate board size has no significant influence on capital structure decision. The finding is consistent with studies of Rehman, Rehman and Raoof (2010), Al-Najjar and Hussain (2011), Velnampy and Mimalthasan (2013), Amir, Mehdhi and Mahmoud (2014), Javeed, Hassan and Azeem (2014), Budiman (2015), Corsi and Prencipe (2015), Hafez (2017) and Mwambuli (2018). However, it is contrary to the findings of Abor (2007), Hassan and Butt (2009), Uwuigbe (2014) and Kyriazopoulos (2017) that show negative relationship and that of Jaradat (2015) and Okiro, Aduda and Omoro (2015), which indicate positive relationship. The null hypothesis 1 is hereby failed to be rejected. Thus, there is no significant relationship between corporate board size and capital structure.

Table 6 reveals that the relationship between board independence and capital structure is positive but statistically insignificant. It indicates that outside members of the board do not significantly affect the discussion on the capital structure of the firms on whose boards they sit. Similar results were found by Kyerobo-Coiman and Biekep (2006), Hamid, et al., (2011) and Mwambuli (2018). It is however incongruent with the studies conducted by Akbari and Piri (2011), Uwuigbe (2014), Budiman (2015), Kajananthan (2016) and Purag and Abdullah (2016), which produced negative relationship and Abor (2007), Javeed, Hassan and Azeem (2014), Jaradat (2015) and
Kyriazopoulos (2017), that produced positive relationship between capital structure and board independence. The null hypothesis 2 is hereby failed to be rejected. Thus, there is no significant relationship between board independence and capital structure of firms.

Board gender diversity, as reported in Table 6, exhibits a positive and statistically significant relationship with capital structure. This is significant at 1% level. It clearly reflects that women on board significantly influence decision concerning capital structure of firms which they represent. Hence, by having more women on board, firms tend to work effectively (Rovers, 2013) and have more access to capital and better ways of financing (Emoni, Muturi and Wandera, 2016). The outcome of this study is also empirically supported by Jaradat (2015) and consistent with the submissions of Agency and Resource dependence theories. It is however against the findings of Faccio, Marchica and Musa (2012) and Loukil and Yousfi (2015) that produced negative relationship between the two variables. The null hypothesis 3 is rejected in favour of alternative hypothesis. Thus, there is a significant relationship between board gender diversity and capital structure.

Table 6 reported an indirect and statistically significant relationship between profitability and capital structure at 1% level. The finding is in accordance with Pecking order theory. The outcome is also empirically supported by the studies conducted by Leonard and Mwas (2014), Mwangi, Makau, and Kosimbe (2014), Haron (2014), Budiman (2015), Kajola (2015), Purag and Abdullah (2016), Kallamu (2016), Kyriazopoulos (2017) and Anju and Rashmi (2018). The relationship between firm size and capital structure is positive and statistically significant at 1% level and is supported by Maxwell and Kehinde (2012), Wahab and Ramli (2014), Mahdi, Behnaz, Mansoureh and Neda (2014), Onaolapo, Kajola and Nwidobie (2015), Purag and Abdullah (2016), Kyriazopoulos (2017) and Uzma, et al., (2018).

5. Conclusion and recommendations

The study examined the relationship between corporate governance mechanism (board size, board independence and board gender diversity) and capital structure (leverage) of 42 Nigerian listed non-financial firms for the financial years, 2005-2016. This represented 504 firm-year observations.

The major finding of the study is that there is a positive and statistically significant relationship between board gender diversity and capital structure. This implies that women directors perform a critical role on the various boards of companies when issues concerning financing mode are discussed. Another specific finding of the study is that there is no significant relationship between corporate board size and board
independence and capital structure. This suggests that board size and board independence are not relevant when capital structure issues are being discussed during board meetings.

Following the outcome of the study, it is hereby recommended that company’ shareholders (or owners) should nominate more female members on corporate boards as they tend to represent their (owners’) interest positively. Female directors take time to study issues critically before decisions on them are taken. The reputation and connection with other stakeholders of the company are improved when a board has at least a woman in the boardroom.

Furthermore, regulatory bodies such as the Financial Reporting Council of Nigeria and the Securities and Exchange Commission (SEC) can take a cue from some other countries on board gender diversity issue. The Spanish law for instance encouraged balanced representation (each sex having at least 40% of board membership) while in Norway a company can be permanently shut down as a last resort if significant representation of female directors is not on corporate board (Rovers, 2013). Hence, the recently released Nigerian Code of Corporate Governance of 2018 (which revised the earlier SEC Code of 2011) should be urgently reviewed to make it mandatory for companies to reserve a specified number (but not less than one-third of the board size) for female directors on corporate boards.

For future studies, increasing the sample size and study time frame may produce a more robust result. The effect of other corporate governance variants not covered by this study like managerial ownership and institutional ownership on capital structure decision can also be considered. This study can also be replicated in other developing countries having similar economic and social features with Nigeria, particularly in Asia, Latin America and Eastern Europe.

References


STUDY OF THE MINERAL COMPOSITION OF BROCCOLI AND BRUSSELS SPROUTS FOOD WASTE

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Abstract

At present, there is a need to develop and implement effective waste management strategies for fruit and vegetables and to find opportunities for their future utilization. Vegetables from the Brassicaceae family have important economic significance and are consumed in many countries worldwide. The purpose of this article is to investigate the mineral composition of the waste portions of broccoli and Brussels sprouts. The establishment of the mineral composition of these wastes would provide guidelines for their further utilization. It was found that in the non-edible parts of broccoli and Brussels sprouts the highest content is that of potassium – respectively 3880 mg/kg in Brussels sprouts and 3254 mg/kg in broccoli, sulfur (1695 mg/kg in wastes from broccoli, and 1187 mg/kg in wastes from Brussels sprouts) and phosphorus – 1216 mg/kg in broccoli wastes and 686 mg/kg in Brussels sprouts wastes. The following elements in the reduction of their contents are: calcium, magnesium, sodium, iron, copper, zinc, boron, manganese, aluminum.

Key words:
food waste; broccoli; Brussels sprouts; mineral composition.

Introduction

The wastes emitted in the production and processing of fruit and vegetables are increasingly being considered as a potential danger to human health and one of the reasons for the deterioration of the environment. This determines the need to develop and implement effective strategies for environmentally sound management of wastes from fruit and vegetables in order to identify opportunities for future utilization.
Typically, the term "fruit and vegetable wastes" means the non-edible parts of fruit and vegetables that are discarded when collected, processed, transported and rehashed; i.e. this waste is generated throughout the food supply chain (agricultural production, storage, post-storage processing, consumer phase) (Plazzotta et al., 2017). It has been found that in Europe fruit and vegetable wastes accounts for 8% of total food wastes (Banerjee et al., 2017). Corrado & Sala review the existing studies on the generation of food wastes on a global and European scale. They point out that the available data provide an overview of the generation of food wastes, but they are not sufficient to identify specific interventions and monitor their accumulation (Corrado and Sala, 2018). According to surveys conducted in EU countries, non-edible parts of fruit and vegetables account for 44% – 47% of food wastes generated by households. Recently, there have been an increasing number of publications on the quantification of food wastes across the supply chain on a global and regional scale. In order to investigate how the consumption of fresh fruit and vegetables contributes to the generation of domestic waste in the European Union, De Laurentiis and co-authors create a model for the evaluation of household wastes from fresh fruit and vegetables (De Laurentiis et al., 2018). Proper treatment of such waste biomass is essential to reduce environmental pollution (Di Donato et al., 2014). Of particular interest is the search for innovative, cost-effective and efficient techniques for the recycling of fruit and vegetable wastes (Wu et al., 2017).

Lam et al. state that fruit wastes are a renewable and sustainable resource that should not be treated as other solid wastes. Methods of composting, landfilling or incineration are not suitable for their destruction, as they can lead to environmental problems. Release of unpleasant odor during composting would result in deterioration of air quality; greenhouse gases (e.g. methane) emitted during landfilling contribute to global warming; the possible formation of toxic compounds (such as dioxin) upon incineration can lead to headaches, fatigue, insomnia (Lam et al., 2016).

Different management strategies can be successfully implemented to handle fruit and vegetable wastes. In recent years, the use of functional compounds has found great application which suggests that fruit and vegetable wastes can be regarded as a source of valuable ingredients (Plazzotta et al., 2017). Various studies on the composition of the fruit processing wastes indicate the presence of different bioactive compounds, which are the primary and secondary metabolites of plants (phenols, alkaloids, glycosides, essential oils, resins). Biologically active extracts can be used for their proven health effects (Banerjee et al., 2017). The use of food wastes as a raw material for bio-refineries is still at an early stage of development. Cristóbal and co-authors examine the techno-economic potential and profitability of four bio-refineries
that use tomato, potato, oranges and olive oil as raw material. The results show that waste materials have different potential. It is necessary to optimize the sustained availability and transport of wastes in order to prevent negative impact on the environment (Cristóbal et al., 2018).

A Gow review article focuses on the extraction of bioactive compounds from fruit and vegetable wastes and the possibility of using them as natural additives for the food industry (Gowe, 2015). Kandari & Gupta offer bioconversion of turnip, apple, papaya and banana wastes in order to obtain valuable ingredients (Kandari and Gupta, 2012). Wu and co-authors have developed an electrofluidic pre-treatment system for citrus wastes in order to improve the extraction of essential oil (Wu et al., 2017). A number of authors study fruit and vegetable wastes as a source for extracting polyphenol antioxidants (Peschel et al., 2006, Wijngaard et al., 2009, Savatović et al., 2010, Wijngaard et al., 2012, Kabir et al., 2015).

Singh & Immanuel offer antioxidants extraction from pomegranate and citrus peel and its addition to traditional Indian food products to prevent auto oxidation changes (Singh and Immanuel, 2014). Panda and co-authors discuss the microbiological treatment of fruit and vegetable wastes to produce enzymes and organic acids (Panda et al., 2016). Qureshi and co-authors examine peel of oranges, lemons, bananas, papaya and apple petioles as a source for the production of enzymes - pectinase and lipase (Qureshi et al., 2017). Nawirska & Uklańska investigate the fiber content in the wastes of processed apples, strawberries, aronia, black currant, red cabbage, carrots (Nawirska and Uklańska, 2008). Szymańska-Chargot and co-authors retrieve cellulose from waste pieces of apples, carrots, tomatoes and cucumbers (Szymańska-Chargot et al., 2017). Soquetta and co-authors investigate the physicochemical and microbiological properties as well as the biologically active components contained in the flour from non-edible parts of kiwi (Soquetta et al., 2016).

The search for opportunities to extract the valuable components contained in fruit and vegetable waste can be cited as a major challenge. Sagar and co-authors have reviewed the methods of extraction and possible use of biologically active substances (such as fiber, phenolic compounds, flavoring substances, enzymes, organic acids etc.) from fruit and vegetable waste (Sagar, et. al., 2018).

From the above it is clear that the use of waste products from the processing of fruit and vegetables as a source of various valuable compounds is a promising area of theoretical and practical significance. However, it is noteworthy that most studies have focused on the possibility of extracting substances with antioxidant activity, fiber and enzymes. There are few articles aimed at exploring the mineral composition of fruit and vegetable wastes. Asquer et al. investigate the content of mineral sub-
stances in broccoli wastes (Asquer et al., 2013). Vegetables of the Brassicaceae family have important economic significance. Various varieties of cabbage, cauliflower, Brussels sprouts, etc. are used for human food. Interest in the cultivation of Brussels sprouts and broccoli has increased in recent years. It is expected that in the coming years their production will continue to increase (Prohens and Nuez, 2008).

The aim of this paper is to study the mineral composition of the waste portions of broccoli and Brussels sprouts. The determination of the mineral composition of these wastes would provide guidelines for future research with a view to their utilization.

Matherials and methods

Sample collection

As test materials were used non-edible parts (the authors considered waste) from:

- broccoli – "Calabrese" variety;
- Brussels sprouts – "Erfurt" variety.

Broccoli and Brussels sprouts are purchased from retail outlets (local market). Sample vegetables are ripe, symmetrically developed, without mechanical damage and signs of microbiological deterioration. The test is performed on the inedible parts of the sample (stem heads of broccoli, faded and discoloured outer roofing sheets of Brussels sprouts, etc.). Triplicates of each sample run for the determination of mineral content.

Digestion of samples and determination of mineral content

The mineral content was studied in an accredited laboratory of SGS – Bulgaria EOOD, Varna laboratory. The measurement performed by mass spectrometer with a source of excitation inductively coupled plasma ICP-MS Perkin Elmer Nex ION 300X. Minerals were determined by ICP after digestion in a closed microwave oven decomposition system.

The following methodology is applied: on an analytical balance, in a quartz tube weigh to the nearest 1 mg test portion of about 0.5 g (in two replicates). Each of the test portions was wetted with 1 ml of deionized water and 4 ml of HNO₃ were added. Homogenized well by vortexing. The decomposition is performed by a Ultra Wave-Milestone Microwave Decomposition System.

A control sample containing all of the reagents used in the decomposition and preparation of the test samples and developing the same pathway was developed and analyzed with the samples.

The processing of the primary data obtained is performed by external calibration. The calibration graph is drawn at the beginning of each series of analysis.
The measurements are made only in the linear part of the calibration graph. The working calibration solutions were prepared on the day of use.

**Statistical analysis**

All variables were reported as mean value of three replicates. The differences between the mineral contents of the samples were tested by one-way analysis of variance (ANOVA) followed by the t-test to evaluate the relationship between the variables. The analysis was performed using the software Statistica 7.0 (Statsoft Inc., Tulsa, OK, USA) and differences among means at the 5% level (p < 0.05) were considered statistically significant.

**Results and discussion**

Table 1 presents the experimentally obtained results for the content (in mg/kg) of certain macro- and micro elements in the non-edible parts of broccoli and Brussels sprouts.

*Table 1*

<table>
<thead>
<tr>
<th>Content of macro- and microelements, mg/kg, a</th>
<th>Samples</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>non-edible parts of broccoli, b</td>
<td>non-edible parts of Brussels sprouts, b</td>
</tr>
<tr>
<td>Fe</td>
<td>25.5</td>
<td>22.2</td>
</tr>
<tr>
<td>Ca</td>
<td>547</td>
<td>964</td>
</tr>
<tr>
<td>Cu</td>
<td>7.22</td>
<td>6.53</td>
</tr>
<tr>
<td>K</td>
<td>3254</td>
<td>3880</td>
</tr>
<tr>
<td>Mg</td>
<td>403</td>
<td>271</td>
</tr>
<tr>
<td>Mn</td>
<td>3.23</td>
<td>1.97</td>
</tr>
<tr>
<td>Mo</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Na</td>
<td>244</td>
<td>338</td>
</tr>
<tr>
<td>Zn</td>
<td>9.89</td>
<td>4.92</td>
</tr>
<tr>
<td>P</td>
<td>1216</td>
<td>686</td>
</tr>
<tr>
<td>Se</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Cr</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>S</td>
<td>1695</td>
<td>1187</td>
</tr>
<tr>
<td>Al</td>
<td>0.85</td>
<td>0.54</td>
</tr>
<tr>
<td>B</td>
<td>3.97</td>
<td>3.38</td>
</tr>
</tbody>
</table>

a – data are reported on a fresh matter basis  
b – mean value, n=3
As can be seen from the results presented, in the non-edible parts of broccoli and Brussels sprouts, the highest content is potassium – respectively 3880 mg/kg for Brussels sprouts and 3254 mg/kg for broccoli. Ong investigates the content of mineral substances in edible parts of Brussels sprouts and broccoli (Ong, 2008). It is noteworthy that the results we obtained are almost identical with regard to Brussels sprouts (it establishes 3890 mg/kg). For broccoli, the result established for the edible parts is 3160 mg/kg, which is lower than our established value, but this may be due to differences in varietal composition or soil and climatic conditions of growing vegetables.

It is well known that potassium helps remove excess water from the body and actively participates in the detoxification process. On the other hand, Sattar and colleagues point out that potassium is an essential nutrient in the soil, with a decisive role in the physiological and metabolic processes of plants and provides resistance to biotic and abiotic stress (Sattar et al., 2019). The results thus obtained reveal the possibility that the wastes generated by the processing and the consumption of broccoli and Brussels sprouts can be used as a potassium fertilizer after suitable treatment.

Sulphur content is also high and the quantity measured in broccoli wastes (1695 mg/kg) is more than 1.4 times higher than that found in Brussels sprouts. According to Doleman and co-authors, cruciferous vegetables are among the most important sources of sulfur-containing amino acids and sulfur for the human body, as their consumption provides nearly 42% of the total amount of sulfur in the feed intake and is associated with a number of health benefits – reducing the risk of certain oncological diseases, cardio vascular disease, reduced risk of type-2 diabetes, protection from neurodegenerative disease (Doleman et al., 2017).

We have found that the phosphorus content in the wastes of Brussels sprouts is 686 mg/kg, the result is comparable with the data published by other authors for phosphorus content in the edible parts of the plant (Ong, 2008). The amount found in wastes from broccoli, is almost twice higher – 1216 mg/kg. A human should daily procure about 700 mg phosphorus intake. The values thus established indicate that the inedible parts of Brussels sprouts and particularly broccoli may be used as a valuable source of phosphorus and sulfur for enriching foods deficient in the above minerals.

The data on the sodium content are comparable to those obtained by Ong in the study of the edible parts of the respective vegetables – according to him, in the edible parts of broccoli there are 330 mg/kg of sodium and in Brussels sprouts – 250 mg/kg (Ong, 2008). Our study found out sodium content of 244 mg/kg of broccoli edible parts, and of Brussels sprout edible parts – 338 mg/kg, respectively.

Brussels sprouts wastes have higher calcium content (964 mg/kg), while for the broccoli the measured value is 547 mg/kg. However, it is noticeable that these results
are higher than the published data on calcium content in the edible parts of both vegetables (Ong, 2008). There may be unequal distribution of calcium in the different parts of plants, or differences due to the agricultural methods applied for growing vegetables.

The magnesium content was 271 mg/kg in the waste parts of Brussels sprouts and 48.7% more in the inedible parts of broccoli – 403 mg/kg. According to other authors the quantity of magnesium in the used edible parts of Brussels sprouts is 230 mg/kg, and in broccoli – 210 mg/kg (Ong, 2008), these amounts are lower than the ones established by us.

Iron is an essential element for all living organisms. In relation to its main role in the transmission of oxygen and as a cofactor in many enzymes, iron plays an important role in maintaining the immune system in the human body. Approximately equal iron content was found in the inedible parts of broccoli (25.5 mg/kg), and Brussels sprouts (22.2 mg/kg).

The important role that zinc has for the health and the wide range of biological functions it performs is well known. In this regard, the European Food Safety Authority (EFSA) presents an official position on health claims and the importance of zinc for human health. Its main role is associated with the fact that it is a component of over 200 enzymes that are related to the synthesis of proteins and DNA (Prasad, 2014). In the study conducted by us it was found that broccoli wastes contain twice as much zinc as those of Brussels sprouts – 9.89 mg/kg and 4.92 mg/kg respectively. In other studies, an amount of 40 mg/kg was reported in the edible parts of both vegetables (Ong, 2008). There is evidence that there is zinc deficiency among the population worldwide, as about 40% is affected (Prasad, 2014). Zinc deficiency is responsible for 4.4% of the mortality in Africa, Asia and Latin America (Liberato et al., 2015). The seriousness of the problem is the basis in many countries for developing and implementing programs to increase the intake of this essential element by enriching food products (Brown et al., 2010). The values we have established show that non-edible parts of Brussels sprouts, and especially broccoli non-edible parts, may be used as a valuable source for leaching of calcium, magnesium, iron and zinc, to enrich foodstuffs with established deficiency.

Copper, like zinc, is involved in the form of complex compounds in many metalloenzymes. About 30 – 60% of the copper in food is absorbed in the gastrointestinal tract. We detected 7.22 mg/kg of copper in the broccoli waste parts and a slightly lower amount (6.53 mg/kg) in the Brussels sprouts waste parts.

The content of boron (3.97 mg/kg), manganese (3.23 mg/kg) and aluminum (0.85 mg/kg) in the non-edible parts of broccoli is higher than that in Brussels
sprouts wastes. The study found that for some of the elements (molybdenum, selenium and chromium), the quantities available in Brussels sprouts and broccoli wastes are below the detectable minimum of the applied method <0.05 mg/kg, although according to the literature data, Brussels sprouts are among the best sources of molybdenum. According to Asquer et al., in broccoli wastes, the molybdenum content is 0.008 mg/kg, selenium <0.1 mg/kg and chromium 0.002 mg/kg (Asquer et al., 2013). Ong published data on the content of selenium in broccoli 2.5µg%, while in Brussels sprouts – 1.6µg% (Ong, 2008).

Compared to Brussels sprouts wastes the broccoli wastes are richer in sulfur, phosphorus, magnesium, iron, zinc, copper, boron, manganese, aluminum, while Brussels sprouts wastes are characterized by a higher content of potassium, calcium, sodium.

From the results obtained it is clear that nonedible parts of broccoli and Brussels sprouts contain valuable mineral substances in significant quantities. This could determine their further use to extract these components and incorporate them into food, soil enrichment, feed or cosmetic products.

The extraction of biologically active compounds from fruits and vegetables involves complex mechanisms and can be achieved by various methods as shown in the review paper by Soquetta et al. (Soquetta, et. al., 2018). Conventional techniques usually require large amounts of organic solvents, high energy consumption, and are time consuming, which has generated interest in new technologies that are referred to as green technologies. These can reduce or eliminate the use of toxic solvents, and thus preserve the natural environment and its resources. The replacement of conventional techniques with green technology methods is promising and expedient (Soquetta, et. al., 2018) and reveals a possibility for further research work in this area.

Conclusions

The increasing amount of wastes generated by household and industrial activities (including processing of fruit and vegetables) imposes the necessity of seeking ways to utilize them in order to reduce environmental pollution. From the study we can conclude that the broccoli and Brussels sprouts wastes are rich in valuable mineral substances. In the non-edible parts of broccoli and Brussels sprouts, the highest is the potassium content – respectively 3880 mg/kg for Brussels sprouts and 3254 mg/kg for broccoli; sulfur (1695 in broccoli wastes and 1187 mg/kg in Brussels sprouts wastes), and phosphorus – 1216 mg/kg in broccoli wastes and 686 mg/kg in Brussels sprouts wastes. This could determine their possible further use to extract these components and incorporate them into food, soil enrichment, feed or cosmetic products.
The content of calcium, magnesium, sodium, iron, copper, zinc, boron, manganese, aluminium was also found. For some of the elements (molybdenum, selenium and chromium), the available quantities in Brussels sprouts and broccoli wastes are below the detection limit of the applied method <0.05 mg/kg.

References


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- Each received article is to be initially assessed by the editorial board. The editors check on the compliance of the manuscript with the objectives and scope of the magazine and the rest of the set requirements.
- If the manuscript meets the requirements of the first stage, it is sent to two independent reviewers. The magazine applies the principle of double-blind review.
- After receiving the feedback reports from the two reviewers, the editorial board decides whether to accept or reject the manuscript. To do this there needs to be unanimous opinion from both reviewers. If their opinions are extremely opposite, the editor-in-chief can require another expert opinion from a third reviewer.
- A manuscript can be accepted without any remarks or with minimal correction. This does not require another check from a reviewer.
- A manuscript can be accepted with a recommendation for substantial correction. This requires for reviewers to confirm again the truthfulness and relevance of their corrections, after that the editor-in-chief makes the decision for publishing the article.
- The manuscript can be returned to its author for substantial rewriting and a second review process.
- In case the manuscript is rejected, its author cannot send it again.
Structure of the manuscript

Requirements about the structure of the manuscript:

✓ Title – clearly and precisely stated, relatively short.
✓ Abstract – it must resemble a summary and include the objectives of the research, methodology and results;
✓ Key words – precise and sufficient, not more than five.
✓ Introduction – it should state the objectives of the research and the relevance of the scientific problem; it should review the condition of the issue and review references; it should also give the theoretical framework of the research, lead to research questions and hypotheses.
✓ Methodology and data – the methods used should be correct and include also appropriate references on similar, already published methods. The data shown must come from reliable sources.
✓ Results and outcomes (conclusions) – the results should be presented clearly and elaborated correctly; they must show a better way of using the data. Conclusions must be significant, valid and supported by proofs.
✓ Bibliographic sources (references).

Formatting:

The papers suggested for publishing must meet the following technical requirements:

✓ Manuscripts typed in Word for Windows, font - Times New Roman, font size – 14 pt, line spacing – 1.5 lines.
✓ Size of tables and charts – not larger than A4. The numeration of tables and charts should be consecutive in the wording of the paper. The use of color charts, graphs and pictures are not accepted. All tables, figures, charts and images should be editable.
✓ Margins in cm: top – 2.5, bottom – 2.5, left – 2.5, right – 2.5.
✓ The title should be typed in caps, without abbreviations (font - Times New Roman, font size - 14 pt, line spacing - 1.5 lines, Bold – Center).
✓ At the right top corner above the title it is typed EconLit index in JEL (Journal of Economic Literature) classification system.
✓ After the title articles must include an abstract (10-12 lines) and up to 5 key words. The abstract and the key words should be written in Bulgarian and English (for articles in Bulgarian) and only in English for the articles submitted in English.
✓ Listing the used sources and citations is done in compliance with the Harvard short reference system (See examples of description and citation). The Quoted sources of a scientific research paper should be at least 20 and transliteration is obligatory. Footnotes are not recommended, except when necessary. If so-called “notes” need to be used, they should be indexed with Arabic numerals and are explained at the end of the article, before the references.

✓ The papers should be written without any handwriting and crossing out words, in good Bulgarian and, respectively, English.

After the article is received, it is edited language- and style-wise. As for the Language the editor makes insignificant corrections since it is supposed that the papers are written in good Bulgarian and English. The articles in English can be returned for another check by the author. Authors confirm the suggestions for changes in style or mark what they disagree with.

**Acceptable size of manuscripts:**

- for articles – from 16 to 20 pages;
- for micro articles, reviews and abstracts of dissertation papers - up to 10 pages.

Articles submitted for publishing must be original and not published before or in the process of reviewing and preparation for publishing in other publishing houses. Editors have the right to make insignificant editing corrections on the manuscript. After an article is accepted, authors must declare an agreement and give the publishing house the exceptional right for publishing. Authors can use the article or part of it in their future work without permission from the publishing house, but this would require citing the original article.