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EDITORIAL

After a double-blind peer review procedure had been conducted and after the received manuscripts had been improved, the Issue 1 Volume 24 Year 2022 of the *Economic Horizons* scientific journal contains a total of five scientific and one review paper and the Announcement of the Scientific Conference, apart from the Editorial.

Starting from both traditional and combined traditional forms of the organization of an enterprise, the author *Vallari Chanda* indicates the fact that, together with the emergence of distance work, global organizations and associative work, temporary organizations began to gain primacy. Bearing in mind the mentioned change, the author points to the fact that management should better respect those phenomena so as to be able to correctly manage them and utilize them as well. Aiming to understand the manners in which temporary organizations that are partly woven into multiple parent organizations are being faced with the unique identity issues, the author proposes a conceptual model as a way which allows us to resolve the dilemmas concerning multifold identities.

Differently from the theoretical model of the perfect competition market which, in the conditions of the complete information of market participants, leads to an efficient resource allocation, the coauthors *Nada Trivic* and *Bojana Todic* have conducted a research study in which they highlight the fact that, in reality, market participants are most frequently asymmetrically informed. Indicating the consequences of their being informed in such an asymmetrical manner and the possibilities of the elimination or mitigation of the same, the coauthors have especially investigated the labor market and applied the methods of theoretical analysis, abstraction, comparison, concretization, generalization and critical valuation to present the mathematical formalization of such markets, especially the labor market formalization, by modelling the manners in which workers' salaries are calculated and the employer's target functions as the possibilities of overcoming the principal-agent problem.

In doing research into the relationship between the financial and macroeconomic factors and market risk measures in the consumer durables sector of the Indian economy, the coauthors *Khushboo Gupta*, *Venkata Ramana Thanikella*, *Omkar Singh Deol* and *Kanishka Gupta* used systematic, nonsystematic and total risks as the indicators. By applying the panel data dynamic regression technique used to rate the companies indexed on the Indian Bombay Stock Exchange, they demonstrate the fact that risk may prevailingly be assigned to the nonsystematic segment. The study's results are useful both to business managers and to investors, enabling them to better understand risks and the factors leading to their occurrence, which enables a more reliable determination of the cost of capital and the value of a firm.

Pursuant to the attitude that the enhancement of production and sale does influence the competitive advantage of an enterprise, the coauthors *Snezana Nestic*, *Aleksandar Aleksic*, *Jaime Gil Lafuente* and *Nikolina Ljepava* highlight the fact that, in companies with pronouncedly diversified production, different products differently influence income generation. Due to that fact, they consider that, in the management of business operations, greater attention should be

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paid to the products of the utmost importance for the given company. In accordance with this attitude, the coauthors propose a product selection model for the selection of the products that are characterized by the strongest influence on income generation. The coauthors' attitude implies that, due to its exactness, the model is an effective assessment tool which should be used in the management of business operations and sale in a manufacturing enterprise.

Starting from the attitude that auditing work is one of the possible determinants of unrealistically high auditor's fees, the coauthors *Henry Emife Monye-Emina* and *Edirin Jeroh* analyze the financial reports made by Nigeria's banks listed on the stock exchange. The study finds that there is a negative correlation between the reports based upon the International Financial Reporting Standards, the client's complexity and size, on the one hand, and unrealistically high auditor's fees, on the other, whereas joint audit has recorded a positive correlation with unrealistically high auditor's fees. The researchers' attitude implies that unrealistic auditor's fees are primarily motivated by additional or inexplicable auditing work, due to which fact it is recommended that professional accountancy bodies should review, agree upon and establish the upper limit for the fees for rendered professional services.

Given the fact that, when making a decision to buy a washing machine, consumers usually base such decisions on the factors of the price, the product quality, the value perceived and the related constructs, the coauthors *Oghenenyerhovwo Rita Inoni* and *Chiyem Okorie* indicate the need to also include the effects of consumers' emotions apart from the foregoing ones. Pursuant to the said, they do research in the influence of brand quality, consumers' emotions and social-economic factors on consumers' decisions. The results obtained in their study show that brand quality, consumers' emotions and social-economic variables such as the household size, the education level and the income level stand for significant determinants of consumers' decision made on the occasion of purchasing washing machines. Based on this attitude, they indicate the need for electrical household appliance manufacturers to bear in mind the fact that their products' design and functionality arouse positive emotions in consumers, which further stimulate their attachment and loyalty to the brand.

This Issue of the Journal contains *Gordana Radosavljevic* s announcement of the international scientific conference entitled the *Contemporary Issues in Economics, Business and Management - EBM 2022*, which is going to be organized by the Faculty of Economics of the University of Kragujevac and held in the City of Kragujevac on the 4th and 5th November 2022.

On behalf of the Journal's Editorial Board and on my own behalf I would hereby like to thank, first of all, to the authors of the contributions published in this Issue of the Journal. Simultaneously, our special gratitude goes to the reviewers, whose constructive and critical comments and suggestions they addressed to the authors of the submitted contributions have contributed to increasing the level of the quality of the published papers.

Editor-in-Chief
Vlastimir Lekovic

Vlastimir Lekovic is a full professor at the Faculty of Economics of the University of Kragujevac in retirement. He earned his Ph.D. from the Faculty of Economics of the University of Kragujevac in the scientific field of general economics and economic development. He teaches the teaching disciplines of institutional economics (in the master's studies) and the scientific research methodology and the market regulation policy (in the doctoral studies). The key fields of his scientific-research interest are the economic system, the economic policy and institutional economics.

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WHERE DO WE BELONG: AN EXPLORATION OF INDIVIDUALS' IDENTITY ISSUES WITHIN TEMPORARY ORGANIZATIONS

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Temporary organizations take on numerous forms and can be found within and across traditional organizational forms. With the rise of remote work, born-global organizations and collaborative work, temporary organizations are becoming more prevalent. They are playing critical roles in a host of situations and organizational leaders need to better understand the phenomena so as to be able to navigate and utilize them correctly. In this paper, a conceptual model intended to understand how temporary organizations partially embedded in multiple parent organizations are being faced with unique identity issues is proposed. The individuals involved with such boundary spanning temporary organizations have identity issues due to their multiple identities being at odds with each other. Using the theories of temporary organizational forms and the social identity, the given conceptual framework shows that the dilemmas related to multiple identities can be resolved by: buffering and ordering identities, self-selecting into temporary organizational forms, and acknowledging such multiple identities and allowing them to simultaneously be salient. Additionally, the consequences of a lack of resolution are explored, including reduced group cohesion, lower performance and the unethical behavior on the part of the pro-parent organization.

Keywords: identity, identity conflict, role conflict, temporary organizations, teams

JEL Classification: M19, M12, D23, L20

INTRODUCTION

While the temporary organization concept is not new (Bakker, 2010), the tendency seen in the extant literature has been to look at the various forms i.e. projects, networks, consortia, film crews, task forces and even 'cheetah teams' as disparate entities (Kenis, Janowicz-Panjaitan & Cambré, 2009). Recent studies have begun to study these similar entities together, allowing us to look at the overarching themes applicable to the various sub-categories within temporary organizations (Bakker, Boroş, Kenis & Oerlemans, 2013). Many businesses have found themselves increasingly organized in the

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form of smaller, temporary work systems rather than expansive, permanent organizational forms (March, 1995). In an increasingly pluralistic world, traditional organizational forms are no longer as common or as ideal as they used to be (Bres, Raufflet & Boghossian, 2018). A widespread increase in the use of new organizational design forms, such as temporary organizations, requires the reexamination of whether our research concepts and constructs are still applicable in the exact same way as they are in typical contexts (Grabher, 2002; Burke & Morley, 2016). If they do vary from their traditional application, the variations should be explored so as to better understand their applicability in temporary contexts given their increased utilization as an organizational form. Indeed, when individuals find themselves in unconventional organizational forms, there is the potential that their experience will differ from conventional organizations in both positive and negative ways. M. G. Pratt and P. O. Foreman (2000) recognize the fact that the identity is related to an individual's question of 'Who am I?' or 'Who are we?' When, however, individuals belong to multiple organizations and are unsure about which organizational identity is the most important to them, they wonder 'Where do we belong?' This paper seeks to conduct a greater in-depth exploration of the specific content of temporary organizations as they relate to the identity issues experienced by the members of the same. Thus, the research goals are to increase the understanding of how an identity conflict arises in certain temporary organizations and why the resolution of such an identity conflict is important for the achievement of the Partially Embedded Temporary Oganization (PETO) goals. A conceptual framework is proposed herein with the aim to examine the identity conflict experienced by the individuals working for Partially Embedded Temporary Oganizations (PETOs). While such resolution results in positive outcomes, a failure to resolve conflicting identities results in counterproductive outcomes, such as reduced group cohesion within a temporary organization, lower performance by group members, and the Unethical Behavior of the Pro-Parent organization (UPPB).

Thus, the seven research propositions to be confirmed through the conceptual framework can broadly be classified into the following two:

- The identity issues experienced in certain temporary organizations can be resolved in numerous ways, including self-selection, identity buffering and ordering, and the management of the identity salience (Propositions 1a, 1b, 2).
- A lack of the resolution of the identity issues experienced in certain temporary organizations will lead to negative outcomes, including reduced group cohesion, lower performance, and the unethical behavior of the pro-parent organization (Propositions 3a, 3b, 3c, 3d).

While projects remain one of the most common types of temporary organizations (Lundin & Midler, 1998), there are numerous other variants used as well. For instance, one temporary setting at the individual level is when many organizations hire a pool of employees from a contractor to meet their short-term needs (Subramony, 2011). Another form is when smaller, entrepreneurial ventures find themselves to be a part of a temporary alliance (Hu, McNamara & Piaskowska, 2017). Certain industries have lent themselves to the creation and utilization of temporary organizations, such as film and theatre productions, which have varying production crews, airlines as the flight crews change on a flight-to-flight basis, and construction projects involving different firms (Grabher, 2002). Now, however, there are temporary organizations found across a spectrum of industries, including software development, defense, emergency response, biotechnology, and consulting (Bakker, 2010). Such increased attention paid to temporary organizations can be traced to the nature of today's fast-paced global economy (Ekstedt, 2009) and the increased focus on time and temporality in organization science (Ancona, Goodman, Lawrence & Tushman, 2001).

Thus, a multitude of possible temporary organization forms can be examined under the existing typology that proposes six ideal types (Chandna, 2017). Temporary organizations can thus reside within the existing firms, be collaborative amongst multiple

preexisting firms, or they could be a separate entity as well. Most commonly, of course, temporary organizational forms are partially embedded in other organizational entities. For instance, when two companies create a temporary system to collaboratively work on a project, the individuals are accountable to each other, as well as to their parent organizations. This temporary organization type, a partially embedded form fashioned from two or more parent companies coming together with the aim to create a temporary organization for their mutual benefit presents a unique and novel context.

The members of such partially embedded temporary organizations are thus the members of the parent organization, rather than merely independent actors, and they often find themselves in the position where they have multiple identities vying to be more prominent (Ashforth & Mael, 1989; De Bernardis & Giustiniano, 2015). This type of a temporary organization which is partially embedded in two or more parent firms is referred to as a PETO through the remainder of this paper.

The theory relating to organizational identification posits that individuals will have a feeling of oneness or belongingness to their work organization (Ashforth & Mael, 1989), and stronger organizational identification will enhance positive work-related behaviors (O'Reilly & Chatman, 1996; Voss, Cable & Voss, 2006). However, due to the complexity of the workplace in the modern era, individuals find themselves torn between multiple identities and the pressure of one identity interferes with the performance of another (Van Sell, Brief & Schuler, 1981; Pratt & Corley, 2007). When individuals work for both the parent organization and a PETO, they will likely experience a certain amount of conflict. The approach adopted as the research process implies the exploration of the extant research studies, bring together the theory and develop a framework to describe why this conflict occurs, how it may be resolved, and the consequences of it not being resolved.

The subsequent sections are organized as follows: in the Literature Review, the extant theory is presented in order to show the research studies of temporary organizations, which is only followed by the exploration of the identity theory. Then, the proposed framework is laid out along with the mechanisms of the identity issue resolution, outcomes where unresolved (decreased job performance, reduced group cohesion, the unethical behavior of the pro-parent organization), and the moderating role of the perception of PETO. Then, the Conclusion section is presented.

LITERATURE REVIEW

Temporary organizations

Temporary organizations are different from their permanent counterparts (Sydow, Lindkvist & DeFillippi, 2004). The definitions of temporary organizations tend to differ depending on the context, the subject matter, and the conceptual lens being applied to studying them, thus leading to a lack of consensus on a precise definition. However, its salient feature of time and temporariness are always highlighted. P. Kenis *et al* (2009) have defined them as 'a group of two or more non-temporary organizations collaborating toward the accomplishment of a joint task with the duration of the collaboration explicitly and ex ante fixed either by a specific date or by the attainment of a pre-defined task or condition.' R. M. Bakker (2010) states that temporary organizations are defined by the elements of time, the task, the team, and the context. Looking at these recent well-regarded works on temporary organizations in conjunction, this paper considers the members of temporary organizations to be either individuals or organizations.

The term 'temporary organization' is thus a hypernym for networks, collaborations, consolations, groups, teams, virtual networks and the like, resulting in the six types of temporary organizations classified based upon (Chandna, 2017):

- their degree of embeddedness in the parent firm, and
- the type of their output, i.e. either an innovative or routine output.

Taking a closer look at the 'team' aspect of temporary organizations, they can be seen as referring to the interdependent sets of people working together within a temporary organization (Goodman & Goodman, 1976). It is the human dimension of temporary organizations and relates to the issues of skills, involved interdependencies and human resources (Lundin & Soderholm, 1995). Thus, a group of individuals involved in temporary organizations and their identity issues are the matter of concern, and rightly so, as the team is one of the most important elements of temporary organizations, usually regarded as second only to the time dimension or at times even on a par with it (Bakker, 2010).

PETOs incorporate the boundary-spanning dimension for their purpose as they are the temporary organizations that are partially embedded in two or more parent organizations and essentially work beyond their organizational boundaries and result in a temporary organization that is still a part of the multiple parent organizations that helped create it. Yet, they retain a separate social entity. The members of these temporary organizations will thus face unique challenges in reconciling their identity conflicts, as they will simultaneously belong to both their parent organization and the partially embedded temporary organization (PETO), which accounts for quite a novel context to explore.

Organizational identification

In the years following its initial introduction to the organizational behavior literature, identification has become more and more fine-grained and has deepened our knowledge of different aspects of it (Pratt, 1998). Organizational identification has especially helped explain many types of employee behavior and has also helped understand organizational outcomes, such as performance and green innovation (Van Knippenberg, 2000; Song & Yu, 2018). The feeling of being one with a group or the perception of belongingness to some 'human aggregate' is the defining feature of social identification (Ashforth & Mael, 1989).

People define themselves in terms of their relationships with their organizations, which has thus led to the extension of the social identification concept to the workplace (Elsbach, 1999). The individuals who are part of organizations to some degree define themselves in terms of what the organization represents and there is a perception of unity with a specific organization (Ashforth & Mael, 1989; Erkutlu & Chafra, 2015). Considering the fact that to a great extent our lives are spent in our being committed to our work, it is not unusual that our sense of identity is closely intertwined with our work organizations and professions (Burke, 1996; De Bernardis & Giustiniano, 2015). Organizational identification is one of the most important rationales standing behind the explanation of how individuals feel about their organization, and it is the one important way that individuals may derive their sense of self (Pratt, 2000). Organizations themselves are desirous of increasing their employees' organizational identification so that individuals may be driven to achieve those goals and objectives, still embracing their values (Barker, 1998; Zollo, Laudano, Boccardi & Ciappei, 2019). While the organization wants the individual to identify with it, there are multiple and simultaneous identities valid for every individual, which however are not always compatible with one another (Tompkins & Cheney, 1983).

The identity conflict in temporary organizations

Temporary organizations provide a fertile ground for the identity conflict to take root. The individuals belonging to a PETO begin to experience social identification with their cohort as a mere act of being assigned to a group is enough to generate in-group favoritism and in-group cohesion (Tajfel, 1982; Billig & Tajfel, 1973; Sapic, 2017). The psychological group concept (Turner, Hogg, Oakes, Reicher & Wetherell, 1987) posits that, quite separately from actual interactions or relationships, individuals still feel connected to the groups where they share the same social identification. This is true even in online settings, where the members sharing the same digital platform experience a sense of a virtual community (Chandna & Salimath, 2020).

While their identity within the PETO is developing and becoming stronger, individuals may experience

the identity or role conflict due to their membership in their parent organization as well as in the PETO. Identities may clash and conflict even with an individual's personal identity (Cheek & Briggs, 1982). For the purposes of this paper, however, only two organizational identities, namely the PETO identity and the parent organization identity, are explored. As members of social structures, individuals engage themselves in numerous interactions with a large number of other individuals, groups, and social structures, and thus have multiple forms of self and contain a multiplicity of identities (Ross, 2007; Brenner, Serpe & Stryker, 2014).

To understand how multiple identities are manifested in an organizational setting and how they are drawn upon by individuals, the nested identity, cross-cutting identity and the identity salience concepts are briefly explored. When speaking about the organizational identity, there is actually a hierarchy of the identities that comes into play in the form of higher-order identities, which essentially refer to divisions or organizations, within the framework of which there are lower-order identities, such as jobs, teams and so on (Albert, Ashforth, Barker, Dukerich, Elsbach, Glynn, Harquail, Kramer & Parks, 1998). While the nested identity concept is well-established in the literature, when and how these multiple identities are expressed is understood to a smaller extent (Meisenbach & Kramer, 2014). Within the parent organization, there is a tendency to more strongly identify and perceive more in common with the subgroups one belongs to, which is primarily so due to the similarity to the subgroups (Kramer, 1991). In the case of PETO and the parent organization duality of identities, it is the parent organization that the individual has more in common with, which leads to the identity conflict different from those experienced by the actors within a single permanent organization. Additionally, these identities are brought to the forefront by being involved in a social group that is 'cross-cutting' in nature (Ashforth & Johnson, 2001). Employees find themselves in a dilemma, as they must choose between prioritizing one identity over another, which leads to a potential identity conflict (Scott & Macaulay, 2020).

A multitude of the identities that individuals experience may vary in their salience, a certain identity being more salient at one point and a different identity having the potential to supersede the remaining identities at another (Akerlof & Kranton, 2005). Identity salience is analogous to a lens through which individuals perceive their world (Turner *et al*, 1987; Maitner, Mackie, Claypool & Crisp, 2010). In the case of the individuals belonging to a PETO, they would have two identities often vying for salience - the one pertaining to being a member of the temporary organization and the other pertaining to being an employee of the parent organization.

Thus, there are many concepts in the extant literature that help shed light on the multifaceted identity-related issues arising out of organizational membership, concurrently being a part of other social relationships and entities (Meisenback & Kramer, 2014).

PROPOSED FRAMEWORK

The identity conflict for individuals in a PETO can be seen between the duality of the identities pertaining to the parent organization and the temporary organization. A conflict is the 'perceived incompatibility between one goal, value, or need and another goal, value or need' (Reichers, 1985, 509). Thus, the conflict between identities that is faced by individuals in the context of boundary-spanning organizations is no different, because the individuals who are the members of PETOs perceive an incompatibility between their parent organizations' goals, values and needs and those of PETOs' (Ashforth & Mael, 1989). This incompatibility may not actually exist - it is sufficient that the individual perceives it to exist.

Figure 1 depicts the proposed framework, illustrating how the identity conflict could be either resolved or unresolved, and the outcomes of both situations followed by the development of propositions.

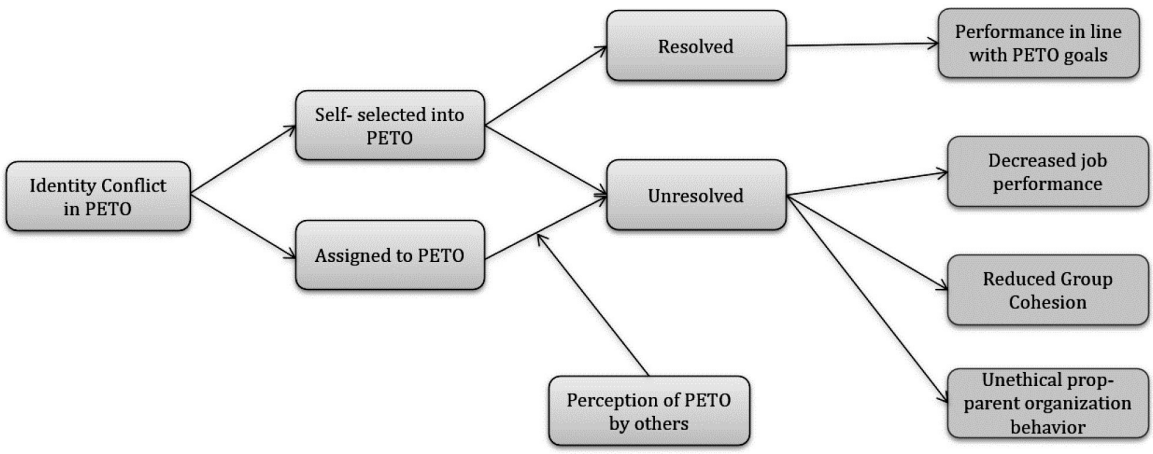

Figure 1 The illustration of the PETO identity conflict conceptual framework

Source: Author

Resolving the identity conflict

B. E. Ashforth and S. A. Mael (1989) state that integrating identities to completely resolve all role conflict is not always a viable option as it may cognitively be taxing and/or comprise the utility of the identities in their particular settings. It is possible for the assigned individuals, however, to resolve this identity conflict by ordering and buffering the identities (Ashforth & Johnson, 2001). Ordering is where individuals order their identities and then select the most important identity from their own point of view and define themselves in terms of that identity. Buffering is used to rationalize the conflict and buffer it by concentrating on the identity that is more appealing due to organizational demands.

In the case of individuals in a PETO, those who have self-selected into the PETO would find this conflict easier to resolve (Stryker & Burke, 2000). For these individuals, the element of choice is present, and they would be more cognizant of the changes entailed in making this choice. Individuals in PETOs are, first and foremost, still members of their parent organizations. Speaking from the point of view of the PETO, their identity is therefore the one nested within the framework of their greater organizational identity (Mueller & Lawler, 1999; Lawler, Thye & Yoon, 2021). In this case, the parent organization is a higher-order identity and will encompass the PETO identity as a lower-order identity (Kramer, 1991).

According to the identity salience theories, the PETO identity being a more concrete identity will have greater situational relevance and prominence and, therefore, will be more salient (Ashforth & Johnson, 2001). This allows the individual to have two options to resolve the PETO-parent organization identity conflict:

- they can focus on this hierarchy within a dyad of identities and defer to a more salient identity in the preponderance of situations, which will be the PETO identity (Monin & Durand, 2003; Thoits, 2012), and
- they can sequentially deal with these two identities (Ashforth & Mael, 1989).

In this case, they would first comply with the PETO identity requirements as it is partially embedded in the parent organization and has goals that ultimately serve the parent organization. Thus, the individual

would first focus on the lower-order identity and comply with the higher-order identity's requirements (Bartels, Pruyn, De Jong & Joustra, 2007).

The interaction, task interdependence, goal congruity and commitment to the same results will help enhance the strength of the lower order, the PETO identity (Sherman, Hamilton & Lewis, 1999). Additionally, assimilation is considered to be default in social judgments (Mussweiler, 2003). Thus, if individuals in the PETO notice many similarities between the PETO and the parent organization, the perceived conflict between the two social groups will be reduced and the assimilation with the PETO would follow (Spears & Manstead, 1990).

The final aspect related to multiple identities that may help resolve an identity role conflict is to acknowledge the fact that there are multiple identities working (De Bernardis & Giustiniano, 2015) and to allow them to be simultaneously salient as 'bringing multiple identities to bear on a situation may facilitate rich and circumspect actions' (Ashforth & Johnson, 2001, 45) in certain situations. This is relatively more difficult than allowing a single identity to be salient at a time due to a cognitive challenge (Marks & MacDermaid, 1996). Under certain conditions, however, this simultaneity may be possible (Higgins, 1996; Thoits & Virshup, 1997; Ashforth & Johnson, 2001):

- where identities are correlated, they become cognitively more accessible;
- where the context relevance is high, multiple identities may easily be cued;
- where the multiple identities are quite frequently simultaneously or sequentially invoked, cognitive association is formed between the two and simultaneity becomes easier due to the increased frequency of invoking multiple identities; and
- where the individual is cognitively more complex, the individual will be able to engage him/herself in simultaneity.

This leads to the first set of propositions:

Proposition 1a: An identity conflict is more rapidly resolved for the individuals who have exercised a choice to enter a PETO.

Proposition 1b: An identity conflict remains unresolved for the individuals who have been assigned to a PETO.

Identity conflict outcomes

The individuals who resolve the identity conflict will find themselves able to perform at the optimal performance level as if there were no identity conflict and, thus, they will work in line with the PETO's values, norms, and rules to achieve its goals. In some cases, however, the identity conflict will not be resolved thereby leading to reduced group cohesion, lower performance, and unethical pro-parent-organization practices. This difficulty in resolving the identity conflict may worsen by the presence of 'interference' in the form of the negative perception of the PETO by others within the parent organization, leading to further feelings of dissonance.

The desired outcomes from forming a PETO greatly vary from the need for creative ideas, a new product design, the resolution of common industry problems or even the resolution of meta-issues (Bres *et al*, 2018). Failure to resolve the identity conflict that springs out of the PETO-parent organization's dual identities, however, could lead to disruptive outcomes, such as reduced group cohesion within the temporary organization, lower performance by the members, and the unethical behavior of the pro-parent-organization, as discussed hereinafter. That is,

Proposition 2: Where the identity conflict is resolved, individual performances are in line with the PETO's goals

Decreased job performance: Organized groups become more lucrative and viable when their members behave in a manner that helps the group work more efficiently (Tyler & Blader, 2000; Davis, Fodor, Pfahl & Stoner, 2014) and it is this core principle lying at the heart of organizational identification which, amongst other behaviors of interest, explains enhanced work performance by individuals. Organizational identification is present when there is congruence between an individual's goals and the organization's goals. Being a form of psychological

attachment, this identification manifests itself in the form of organizational commitment (Reichers, 1985). If another organization is introduced into this relationship whereby individuals are no longer able to align their goals with their 'organization' clearly, then under such circumstances the individuals are likely to be predisposed towards their primary organization first and foremost (Reichers, 1985), which in this case is the parent organization. In such a scenario, the individual's commitment to PETO will suffer. This could be accompanied by a drop in the performance levels (Meyer, Allen & Smith, 1993; Meyer, Stanley, Herscovitch & Topolnytsky, 2002). Thus, the disconnection that occurs when individuals feel reduced commitment due to their inability in identifying with PETO would result in a decline in job performance i.e.

Proposition 3a: Where the identity conflict remains unresolved, individuals exhibit decreased job performance in PETO.

Reduced Group Cohesion: One of the core tenets of organizational identification is that in-group favoritism is exhibited by members while there is a relatively unfavorable attitude towards out-group members (Tajfel & Turner, 1986). Perceptions of dissimilarity may have an impact on positive organizational outcomes, such as organizational citizenship behaviors (Chou, Chang & Han, 2014). Thus, where the parent organization's identity is far stronger, it would lead individuals to regard it as the in-group members, whereas regarding PETO members, it would lead them to regard it as out-group members. This would be accompanied by a tendency to show favoritism towards in-group members (Allen, Schetzsle, Mallin & Pullins, 2014). Individuals may begin to process information regarding the in-group and the out-group in such a manner so as to focus on dissimilarities between the parent organization and PETO, leading them to regard the out-group as being in conflict with the in-group (Blanton, 2001). This misalignment might lead to a reduction in group cohesion, which is a critical factor influencing performance, which usually leads to positive behaviors within the group setting, although negative outcomes are also possible if cohesion is unusually high (Davis *et al*, 2014; Nikolic, 2018). Largely positive outcomes from group cohesion, however, make it a desirable outcome, the one to be strived for. Under the circumstances implying the PETO members being seen as belonging to the out-group, there will be a propensity for group cohesion to decline within PETO due to inferred group differences. Thus,

Proposition 3b: Where the identity conflict remains unresolved, PETO group cohesion is reduced.

Unethical pro-parent organization behavior

Where an individual is unable to establish the salience of his/her lower-order identity over that of his/her higher-order identity, and where the strength of such a higher-order identity does remain far stronger, such a salient parent organizational identity may encourage individuals to pursue organizational goals ahead of what they view as PETO's narrow, lower-order goals and follow the parent organization's values and norms over PETO's (Kramer, 1991). In a traditional organization, the strengthening of a higher-order organizational identity is important. While working in PETO, however, it is this very higher-order organizational identity that poses unique problems, because it acts as an 'unhealthy attachment' in this context. It is under these circumstances that the onset of unethical behavior in favor of the parent organization may be seen. E. E. Umphress, J. B. Bingham and M. S. Mitchell (2010) have advanced the concept of pro-organizational unethical behavior, which is essentially the unethical behavior engaged in by an employee of his/her own volition, but the intended beneficiary of this behavior is not the individual who engages him-/herself in it. It is rather the organization they work for. According to this definition of unethical pro-organization behavior (UPB), behavior needs to be both unethical and pro-organizational. Given the fact that there are two organizations involved in this conceptual framework, PETO and the parent organization, it is, however, the parent organization that an individual identifies with more strongly as the in-group, and thus the behavior in question will be unethical pro-parent organization behavior (Dou, Chen, Lu, Li &

Wang, 2019). Individuals may seek to benefit their parent organization at the cost of PETO and they may also resort to the behaviors that are considered as unethical, but not personally beneficial; they would rather be such that they may benefit the parent organization, or they may be perceived as being in the best interest of the parent organization. Thus,

Proposition 3c: Where the identity conflict remains unresolved, individuals exhibit unethical pro-parent organization behavior.

The moderating role of perception of PETO: The other coworkers who solely belong to the parent organization may not perceive PETO in a favorable light due to the legitimacy issues or perhaps for other reasons (Hornsey, Spears, Cremers & Hogg, 2003). Where individuals feel social isolation due to being a part of the group which has a lower social status or due to discrimination by the parent group members as the PETO members are regarded as being in the out-group (Fischer, Greitemeyer, Omay & Frey, 2007), the individuals in the PETO will find their performance hindered and they will experience other dysfunctional work outcomes (Steele & Aronson, 1995; Steele, 1997). Thus, how other parent organization's members perceive PETO interferes with the identity of the PETO members as well. Identity interference has been associated with numerous negative psychological outcomes (Settles, 2004), poorer job performance (Netemeyer, Boles & McMurrian, 1996), higher perceived stress (Settles, Sellers & Dams Jr, 2002) or overtaxed cognitive resources (Fried, Ben-David, Tiegs, Avital & Yeverechyahu, 1998) included. Thus,

Proposition 3d: The negative outcomes of unresolved identity conflicts are moderated by the perception of non-PETO members such that where other organizational members have a negative perception of PETO, such negative outcomes will be stronger.

CONCLUSION

In the case of the temporary organizations partially embedded in one parent organization or a larger number of parent organizations, it is inevitable that individuals would experience a certain identity conflict as there are two organizations - the one being the parent organization, and the other being a temporary organization - tugging on the individual. If their goals, values, norms, and rules are identical, no issue at all will arise. As there are multiple (at least two) parent organizations involved, however, it is to be expected that the goals, while related, will probably not be identical to the parent organization's goals. In fact, it is possible that they will be contrasting goals (e.g. within its own boundaries, the parent organization pursues exploitation goals, but it has decided to be involved with PETO so as to pursue exploration goals). It is this dissonance between these goals, values, norms, and rules that causes the identity conflict and is the reason why individuals find themselves wondering where they belong.

By proposing this conceptual model, the issues arising due to the unresolved identity conflict are explored and their potential problematic outcomes are highlighted. This framework shows how those employees who self-select into PETOs will resolve their identity issues and work in line with what is expected of them. As our framework shows, however, assigning employees without their express interest may lead to multiple identity issues. Thus, performance, group cohesion, and ethical behavior are all diminished. Furthermore, the negative perception of their colleagues at work may further exert a negative influence on the identity issues.

The work-related outcome the most relevant to any employee study is job performance and understanding potential pitfalls in the way of attaining the high levels of job performance and helps managers avoid them in order to create an atmosphere conducive to productivity. With the rising use of temporary organizations, it is necessary to be attentive to their potential problems, not so as to be deterred in their use, but to be cautious. For instance, if an interorganizational virtual enterprise network comprised of individuals from different parent firms produce unimpressive productivity outcomes instead of dissolving a potentially useful relationship, managers should investigate if the individuals are

suffering from any identity conflict. If so, help resolve it by highlighting the salience of the lower order identity i.e. the PETO identity.

One of the predominant reasons for engaging in interorganizational enterprises such as PETOs is to derive the benefits of collaborative work from varied individuals or sources. The identity conflict mitigates this very important benefit of collaborative work by causing reduced group cohesion. This is noteworthy because if the primary motivation behind the formation of PETO was to avail of the benefits of group collaboration, then being unable to avail of this would seriously impair the potential gains from the PETO. However, this should not deter organizations from engaging in such relationships. They rather need to be more attentive to the issues of the identity conflict in such scenarios and act rapidly to resolve it instead. While these are the more practical contributions made by this paper that could help managers, the theoretical implications of this paper are discussed below.

Organizational identification and the identity conflict have been studied in multiple settings and in varied contexts for various types of employees. However, how actors of such PETOs experience organizational identity issues and resolve the same has not extensively been explored in the extant literature. Together with the increased ubiquity of temporary organizations, this is an important area of study. Identification issues within a temporary setting are exacerbated due to the temporal element and studying this important dimension of time may contribute to our understanding of its role in more traditional organization forms as well.

An additional contribution made by this paper reflects in the fact that the concept of unethical pro-organizational behavior is adapted so as to be applicable to temporary organizations. Where unethical behaviors benefit the parent organization to the detriment of PETO and its members, and not for the benefit of an individual him-/herself, the individual will have engaged in unethical pro-parent organization behavior (UPPB). This adaptation brings up some interesting possibilities for future research as this topic could be studied in more detail using networks and projects, which are the PETOs commonly used in the business arena.

In conclusion, it is important to remember the fact that the identity does not remain stable over time, nor must it necessarily do so for any sort of long-term benefits. It is transient and situation-specific (Mayhew, 2007) and as PETO comes to an end as inevitably it must, the individual can revert back to the stage where the parent organizational identity was their most important identity.

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MODELS OF WAGES AND INCENTIVES CONTRACTS IN THE CONDITIONS OF INFORMATION ASYMMETRY ON THE LABOR MARKET

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The theoretical model of a perfectly competitive market leads to the efficient allocation of resources, and one of the assumptions of that model is complete information of market participants. In reality, however, market participants are usually asymmetrically informed. The goal of this analysis is to point out the fact that asymmetric information is almost ubiquitous, and also to point out the consequences of asymmetric information and the possibility of their elimination or mitigation. In addition, the research aim also reflects in achieving a theoretical confirmation of the presence of such asymmetric information and its consequences on the labor market as well, and in an attempt to mathematically formalize such markets, especially the labor market, by modeling the method of calculating wages and the employer's objective function as an opportunity to overcome the principal-agent problem. The precisely defined research goals determined the structure of the paper, as well as the methodological tools. In order to test and prove the defined research hypotheses in this study and to realize the defined research goals of the study, the methods of theoretical analysis, abstraction, comparison, concretization, generalization, and critical evaluation are used.

Keywords: asymmetric information, adverse selection, inefficiency, moral hazard, signaling

JEL Classification: D82, C18

INTRODUCTION

The situation in which one party in an economic transaction has more information on a product or service than the other party does is called asymmetric information. The party possessing more information has an advantage and can make a more objective decision. As an assumption, all market participants in a competitive market have perfect information on the prices and quality of goods. Is this the case with the markets of medical or dental services, insurance, or the used car market? Hence, information is not equally available to all parties to a contract. Information is

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asymmetric. What is the impact of such asymmetric information on how a market works?

The subject matter of the analysis carried out in this paper is the markets with asymmetric information. The results presented in this paper are result from many years of the author's engagement in researching this topic. Taking into account the generally known theoretical views of markets with asymmetric information, one of the goals set in this paper is the analysis of asymmetric information on the labor market, bearing in mind the specifics of this market. The primary goal of this part of the analysis is the theoretical confirmation of the presence of the consequences of asymmetric information on the labor market as well. The first research hypothesis arises from this goal:

H1: All negative consequences of asymmetric information are present on the labor market and on other markets, too, with certain specifics.

In addition to the theoretical analysis of the markets with asymmetric information, specifically the labor market with asymmetric information, another goal of this analysis is to try to mathematically formalize such markets. The ultimate goal is to formalize the labor market by modeling the method of calculating workers' wages and the employer's objective function as an opportunity to overcome the principal-agent problem. The second research hypothesis derives from the goal and is defined in the following manner:

H2: Different and precisely defined functional relations in the calculation of workers' wages can reduce the negative effects of the principal-agent problem on the labor market.

The set goals and hypotheses determine the methodological tools used in this research study, as well as the structure of this paper. The precise mathematical formulation of the functional interdependencies presupposes the precise theoretical findings of the problem of asymmetric information and market inefficiency as logical consequences. The understanding and analysis of the labor market with asymmetric information is therefore necessarily preceded by an analysis of the problems, causes, and consequences of asymmetric information on the market in general.

It is essential to identify market defects, so that they could be either removed or continuously reduced. In this sense, the theory of asymmetric information can be perceived as the most significant new means of economic analysis.

ASYMMETRIC INFORMATION OF MARKET PARTICIPANTS

The foundations of asymmetric information theory were laid by the American economist G. A. Akerlof (1970), whereas M. Spence (1971) and J. Stiglitz (1975) gave an immense contribution to its foundation and further elaboration.

In the conditions of information asymmetry, the less informed side may face unfavorable consequences of its position, and certain models of such markets may serve a less informed side to diminish those consequences. At the same time, a more equal distribution of information may be useful even for the better-informed participant. Namely, equalizing the levels of information is sometimes in the interest of a better-informed participant, because only by conveying the information to a potential partner is it possible to establish economic relations that would otherwise be left out in the case of them not being informed. However, a better-informed party may direct its activities towards using the advantages of its position and achieving as great economic effects as possible. The problems of insufficient information of customers are becoming more apparent nowadays, with the emergence of technically complex products and services that require high qualification.

The examples of asymmetric information are numerous and typical of nearly all areas of life.

The production and turnover of products - A producer may introduce changes that reduce production costs, but also lower the quality of a product without lowering the sale price. Such changes cannot easily and timely be noticed by customers. This suits

neither the producers of a high-quality product nor customers. Many producers are faced with this problem - some consciously take hidden actions in order to gain benefits, while others make special efforts (and incur costs) to convince their customers that no hidden action is their business policy.

Moral hazard and insurance - Insurance is an institutional response to the circumstances in which there is a risk (Rothschild & Stiglitz, 1976). A person buys insurance from an insurance company and thus protects the value of his/her property from fire. When the insurance indemnity that the insured person expects is greater than the value of the insured property, his/her interest in prevention and risk mitigation may be lost. The owner of the insured property primarily reduces his/her caution to avoid the insured event. Such behavior already contributes to an increase in risk. Finally, he/she may become motivated to cause a "harmful" event him-/herself and claim a compensation afterwards. From the social aspect, insurance becomes harmful, because instead of contributing to a better protection of property, it may result in more property destruction.

The production and turnover of medicines - In the process from the production of medicines to their consumption, several actors are involved, each having an important role: the producer of the medicine, the physician (they who prescribe the medicine), the pharmacist (they who issue the medicine), the patient (they who use the medicine), and the insurance fund (the party paying for the medicine). Therefore, there are numerous possibilities for the appearance of the phenomena related to asymmetric information. The possibilities for a moral hazard to occur on the medicine market are multiple (Adeyele, Ogungbenle & Isimoya, 2019). In this chain, the patient is in a special position. The initiative of the other participants implies production or turnover, but the patient is the consumer of medicines. The others bear a material and moral liability. Apart from financial consequences, however, the patient exposes his/her own life and health to risk. However, the patient's behavior may even take the form of moral hazard. If a third party (the insurance fund) pays for the medicines, the patient may needlessly increase demand and cause damage. This sensitive market is faced with various forms of moral hazard, among which the occurrence of counterfeit medicines is the severest one. There are numerous examples of the occurrence of counterfeit medicines on the market. Placing counterfeit medicines on the market is sometimes a lucrative business with little chance of being detected and punished.

Health care and the principal-agent problem - The physician's behavior may take a form of moral hazard (Adeyele *et al*, 2019). The information asymmetry between the patient (the principal) and the physician (the agent) is huge, which implies that understanding this concrete problem is essential for understanding economic problems present in the healthcare system. The patient is forced to leave to the physician (the agent) to make a decision on diagnostic tests, the therapy, hospitalization, control examinations, etc. that are going to be applied. The only option the patient has is to believe the physician. The physician may (if motivated) induce demand for his/her services. When the treatment is paid by a third party (a fund), and when the physician is paid on the basis of the number of the services provided, he/she is motivated to invite the patient (the insufficiently informed party) to an increased number of examinations, keep them longer in the hospital, offer them diagnostic methods and treatments that are not necessary, and so on. Thus, the physician increases his/her income, causes no dissatisfaction with the patient, but contributes to incurring increased costs of healthcare protection. Monitoring medicine prescription is complicated and expensive, so hidden actions taken by physicians are possible to evidence. Therefore, a series of difficulties appear when trying to distribute healthcare services to users via the market mechanism. Finally, it may be concluded that asymmetric information generates immense problems in financing healthcare protection, and no satisfactory healthcare funding model has been made yet.

THE KEY CONSEQUENCES OF THE ASYMMETRIC INFORMATION OF PARTICIPANTS

The main consequences of asymmetrically distributed information are (Auster & Gottardi, 2019):

- adverse selection,
- moral hazard, and
- principal-agent problem.

Negative selection

Negative selection occurs when products of a different quality are sold at the same price because buyers or sellers do not have sufficient information on the real value of the product at the moment of its purchase. As a result, too many low-quality products and too few high-quality products are sold. The used car market served G. A. Akerlof (1970) as an example to explain the phenomena which became prominent in information asymmetry. For the purpose of this analysis, this particular example will be presented in short and in a simplified manner, with the same basic conclusions.

In the literature on microeconomics, an example of the used car market is often given, where the cars of low quality are called the "lemon" (the slang word for "low" quality). It is assumed that there are four types of cars: new ones and used ones, as well as the cars of a high quality and the cars of a low quality. New cars may be of a high quality and of a low quality, the same working for used cars as well. When a consumer purchases a new car, he/she does not know whether it is going to be of a high or of a low quality. That is, the probability that he/she will buy a car of a high quality is P, and the probability of his/her buying a low-quality car is (1-p), with the assumption that q is the share of high-quality cars, and (1-q) the share of low-quality cars.

The situation is somewhat different on the used car market. Used cars are assumed to be equal regarding everything except for the quality (the same brand, model, year of production, etc.). If both buyers and sellers can distinguish these two types of cars, there are two markets (Figure 1). In part (a), the curve Sv is the supply curve, and Dv is the demand curve for the cars of a high quality. On Figure (b), Sn is the supply curve, and Dn is the demand curve for the low-quality cars. For any price, the curve Sv is on the left from Sn, since high quality cars are sold rarely, and their owners want to achieve a higher price. Also, the curve Dv is higher than the curve Dn, since customers are ready to pay more for cars of a better quality. If both buyers and sellers have exchanged information fairly, the market price of the high-quality cars will be 10,000 currency units, and that of the low-quality cars will amount to 5,000 currency units, 50,000 cars of each type being sold. Free trade will bring an increase in welfare to each participant and the exchange will be efficient.

Due to the asymmetric information between buyers and sellers, buyers will consider that a car is of a medium quality when buying, and the demand curve for medium-quality cars is DM. The curve DM is below the curve Dv, but above the curve DN, and the cars are sold at the same price which is lower than 10,000 and higher than 5,000 currency units. In this case, the sellers of low-quality cars receive more than the actual value of the car, and the sellers of high-quality cars receive less than the actual value of the car. Since they cannot sell at a higher price, some sellers of high-quality cars will withdraw their cars from the market. Therefore, fewer high-quality cars (25,000) and more low-quality cars (75,000) will be sold.

Buyers will realize that the largest number of the sold cars are of a low quality, and their demand shifts and is represented by the curve DNM, meaning that the quality of the cars is perceived as low and medium. Buyers further perceive cars as mostly low-quality, and the demand curve shifts further to the left until only low-quality cars start selling. Then the market price is too low for the sale of high-quality cars. Any car they buy will be of a low quality and the only relevant demand curve is the curve DN. In the literature, this phenomenon is called adverse or reverse selection, because a low-quality product

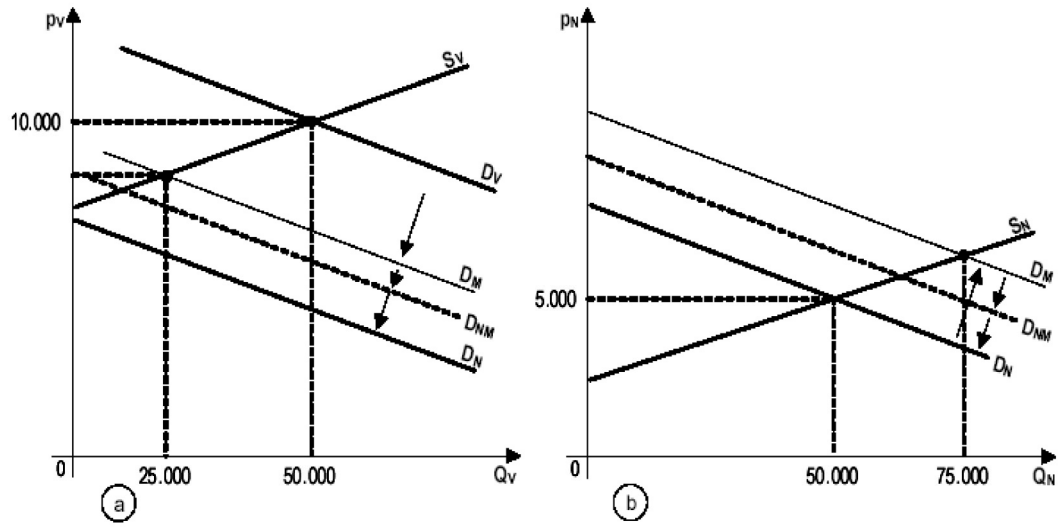

Figure 1 The used car market

Source: Trivić, 2009b, 113

remains on the market and drives a high-quality product out. Buyers cannot easily determine the quality of a product until they buy it. Therefore, prices are reduced, a high-quality product is driven out, and a low-quality product captures the market. Thus, a lack of the buyer's information leads to some mutually beneficial exchanges not occurring. This is due to the problem of adverse selection or market failure (inefficiency).

Adverse selection also occurs when products of different quality are sold at the same price, because buyers or sellers are not adequately informed to determine the actual value of the product at the moment of the purchase. As a result, too many low-quality products and too few high-quality products are sold on the market.

Moral hazard

Moral hazard can be defined as a hidden action of one party in a business or contract, because of which the other party, being unable to perceive or monitor these actions, suffers economic damage. However, there is usually nothing hazardous in the undertaken by the better-informed party. This is de facto rational economic behavior in the circumstances where the other party lacks an important piece of information.

Moral hazard becomes apparent when the hidden action of one party is present in an economic relation. That is, one party undertakes an action that does not favor the other party, cannot be easily noticed or controlled by the other party, due to which action the other party suffers unfavorable economic consequences. Moral hazard may occur in particular forms in various types of economic relations (insurance, the capital market, the product market, etc.). The easiest way to explain moral hazard is by taking insurance as an example (Dembe & Boden, 2000), a property owner insured against fire does not remove flammable items, which he would do in case the property was not insured. This increases the probability of the occurrence of a harmful event, thus increasing the costs which the insurance company has to cover on the basis of the insurance contract. Moral hazard also occurs when the property owner him-/herself contributes to its destruction (a part of social wealth is lost).

The principal-agent problem

The principal refers to the person who places a request to the other party, i.e. the agent on the basis of the ownership or a certain given right. The agent has to perform certain tasks beneficial to the principal. A perfect agent decides how the principal would decide if he had the information the agent has. However, working for the principal, the agent may be guided by his/her own interest. Their activities are difficult to monitor and control. The principal-agent problem is a consequence of the asymmetric information which occurs when the agent (due to being better informed), performs the work beyond the agreement in the way that serves his/her own interest, but in a manner which does not coincide with the principal's interest.

The examples and situations where this kind of a relationship appears between two parties are numerous: a paid manager and the company owner, a patient and a doctor, a health insurance fund and a doctor, a public company director and the government, a student and a professor and so forth. Another example of the principal-agent problem is public enterprises. The managers of public enterprises may be interested in obtaining personal power and benefits outside the efficient limits. Since it is expensive to monitor the work of a manager in a public enterprise, there is no guarantee they will achieve efficient business results.

Possibilities of Modeling a Market with Asymmetric Information

The mathematical analysis of the used car market models: This example can mathematically be analyzed based upon utility theory (Pouyet, Salanie & Salanie, 2008). Suppose demand for used cars is mainly determined by the two variables: the price of a car p and the average quality of the used cars traded μ, or $QD = D(p, \mu)$. Both the supply of the used cars and the average quality μ depend on the price or $\mu = \mu(p)$ and $S = S(p)$. In equilibrium, supply must equal demand for the given average quality, or $S(p) = D(p, \mu(p))$. With a fall in prices, quality usually decreases, and it is quite possible that products will not be exchanged at every price level.

Suppose there are two groups of buyers: the utility function of the group 1 is as follows:

$$U_1 = M + \sum_{i=1}^{n} x_i \tag{1}$$

where M is the consumption of other goods (apart from vehicles), x_i is the quality of the i-th car, n is the number of cars. In a similar fashion, the same applies to the second group:

$$U_2 = M + \sum_{i=1}^{n} 3/2 x_i \quad . \tag{2}$$

Regarding these utility functions, the model starts from the three key assumptions:

- if a utility is not linear (e.g. a logarithmic utility), the algebra is needlessly complicated;
- assuming a linear utility enables focusing on the effects of asymmetric information;
- U_1 and U_2 have the property implying that, by adding both the second and the k-th car, the gain in the utility is the same as that with the first car.

This again sacrifices realism to avoid deviating from the primary focus of the analysis. It is further assumed that:

- both type-1 and type-2 buyers maximize the Neumann-Morgenstern expected utility;
- type-1 has N cars with an evenly distributed quality x, $0 \le x \le 2$, and type-2 has no cars at all;
- the uniform pricing of "other goods" M.

The income (including the revenue from car sales) for all type-1 buyers is marked as Y_1, and the income of all type-2 buyers is marked as Y_2. Demand for used cars will be the sum of the demands of both groups.

Demand for the cars of the type-1 buyers will be as follows:

$$D_1 = Y_1/p \qquad \mu/p > 1 \tag{3}$$

$$D_1 = 0 \qquad \mu/p < 1 \tag{4}$$

The supply of the type-1 cars is as follows:

$$S_2 = pN/2 \qquad p \le 2 \tag{5}$$

for an average quality.

$$\mu = p/2 \tag{6}$$

(for the deduction of the relations (5) and (6), an even distribution of cars regarding the quality is assumed).

Similarly, the demand of the type-2 buyers is as follows:

$$D_2 = Y_2/p \qquad 3\mu/2 > p \tag{7}$$

$$D_2 = 0 \qquad 3\mu/2 < p \quad \text{and} \quad S2 = 0 \tag{8}$$

Then, total demand is $D(p, \mu)$:

$$D(p, \mu) = (Y_1+Y_2)/p \qquad if \quad p < \mu \tag{9}$$

$$D(p, \mu) = Y_2/p \qquad if \quad \mu < p < 3\mu/2 \tag{10}$$

$$D(p, \mu) = 0 \qquad if \quad p > 3\mu/2 \tag{11}$$

For the price p, however, the average quality is $p/2$. Therefore, the determined price is the condition for a sale to even occur: despite the condition of for any price between 0 and 3 there are the type-1 sellers who are ready to sell their cars for the price which type-2 buyers are ready to pay.

The foregoing is the opposite of a symmetric information situation. Let us assume that the quality of all cars is evenly distributed $0 \le x \le 2$. Then the demand curve and the supply curve can be defined in the following manner:

Supply

$$S(p) = N \qquad p > 1 \tag{12}$$

$$S(p) = 0 \qquad p < 1 \tag{13}$$

and the demand curves are:

$$D(p) = (Y_1 + Y_2)/p \qquad p < 1 \tag{14}$$

$$D(p) = Y_2/p \qquad 1 < p < 3/2 \tag{15}$$

$$D(p) = 0 \qquad p > 3/2 \tag{16}$$

In equilibrium:

$$P = 1 \qquad if \quad Y_2 < N \tag{17}$$

$$P = Y_2/N \qquad if \quad 2\,Y_2/3 < N < Y_2 \tag{18}$$

$$P = 3/2 \qquad if \quad N < 2\,Y_2/3 \tag{19}$$

If $Y_2 < N$, the additional utility gain exceeds the gain of $N/2$ in the conditions of information asymmetry. If $N > Y_2$, then the income of type-2 customers is insufficient for the purchase of all N cars, there is a gain in the utility of $Y_2/2$. Finally, it should be noted that type-1 and type-2 buyers have the same probability estimations on the quality of certain cars. Although these estimations may vary from car to car - the relations (17), (18), and (19) will still be describing the market equilibrium with one small change: p will then represent the expected price of one unit of quality.

POSSIBILITIES TO MITIGATE OR OVERCOME THE CONSEQUENCES OF ASYMMETRIC INFORMATION

Adverse selection is the cause of market inefficiency. The negative consequences caused by the use of defective products as a result of the inability of a consumer to assess their quality, the need to be prevented at least when food, drinks, medicine, living conditions, and other products of vital importance for people are concerned. The mitigation of such negative consequences (Citanna & Villanacci, 2000) is not simple although there is a number of different measures adopted to achieve it, such as:

- the measures relying on the market mechanism, and
- the measures involving state intervention.

The market mechanism and the activities carried out by market participants in the conditions of information asymmetry

When sellers intend to hide the information essential for a transaction, they want a less informed partner. They intend to hide the unfavorable characteristics

of their product. If they succeed in that endeavor, the product of a better quality is driven out of the market. However, the sellers of the product of a better quality are interested in raising or balancing the information of all participants. Thus a better-informed party often shows a considerable initiative on markets with asymmetric information. When it is in their interest to increase the information awareness of potential partners, they make the missing information available to them. The initiative of the informed party can be very strong (Samuelson, 1984). Also, buyers ready to pay more for a better quality want to obtain information about the quality of the product. There is a number of different market approaches whose application makes it possible to try to reduce the problems arising due to asymmetrically distributed information.

The producer of a high-quality product and the producer of a low-quality product have different attitudes towards the information they have about their own products. The party knowledgeable of the unknown to the other party will gladly provide the information to a potential partner only if that party itself also achieves a utility for itself by providing that piece of information. The producer of a high-quality product may try to maintain and strengthen its position on the market by giving certain signs (signals) based on which a potential buyer could be convinced of the quality of the product (Spence, 1974). Such signals cannot be sent by the producer of a low-quality product. The signal helps to differentiate a high-quality product from a low-quality product. Hence, the better-informed party may contribute to the balancing of the information level by using signals, because it is in its interest. Said signals are sent by the better-informed party when it is in its interest. Thus, the producer of a high-quality product distinguishes himself from the producers hiding their weaknesses. The high-quality product is sold for a higher price to the customer who is willing to pay more for higher quality. Then the seller of a low-quality product may only count on the customers to whom the products of higher quality became unavailable. The signal is only sent by the producer of a high-quality product, and the signal must be such that the producer of a low-quality product is unable to also send it (Jovanović, 1982).

The less-informed party may try to obtain the information the better-informed party has. This is done via screening. Screening is the process opposite to signaling. A special type of screening is labor market screening (Spence, 1974), the analysis of which goes beyond the scope of this paper (Spence & Zeckhauser, 1971). It is an attempt of the less-informed party to "extract" a piece of information from the better-informed party or to lead the better-informed party to the behavior that will indirectly reveal the information that was hidden (certain types of tests, etc.). If it obtains the missing information, the less-informed party will adjust its previous intentions - to cancel the purchase or achieve a lower price. In this, it may encounter significant difficulties since the party having the interest of hiding certain facts will not easily renounce its superior position. The most common examples of signaling and screening are the following ones:

- warranty,
- prestige and reputation,
- standardization, and
- informed and non-informed customers.

Warranty: By providing warranty, it is possible to gain customer trust. It is the apparent signal of the product quality (within the warranty period, possible deficiencies and defects are eliminated by the seller; sometimes, product return is accepted if the buyer is not satisfied). The producer of a low-quality product is not in the position to offer such sales conditions. Providing warranty is thus a powerful signal. The longer the warranty period, the greater the customer belief that the product is of a high quality.

Prestige and reputation: Repeat purchases (the buyer gains the experience of the quality of that product) allow the producer of a high-quality product to gain reputation and prestige. Such a producer must not exhibit the behavior typical of moral hazard. The product brand and the name of the producer become important. The buyer simplifies the purchase by

basing it on the trust in the product brand and the producer.

A reputation acquisition effort is aimed at differentiating that producer from the competitors whose offer is of a low quality. Then the impact of adverse selection is eliminated. When differentiation is achieved, the producer of a high-quality product may compensate for the costs of maintaining the quality at a high level by increasing prices. A lack of information is compensated for by the trust in the brand and the producer, and buying and selling are mutually beneficial. Reputation is a powerful tool in solving problems of asymmetric information and the impact of adverse selection. Once reputation has been gained, the producer must maintain its prestige. Anything that would damage the prestige must be quickly eliminated, even if this implies unplanned costs (Eckard, 1988).

Standardization: Sometimes buyers do not have the opportunity to gain their own experience, because there is no possibility of making repeat purchases. Then they can be assured of a high quality only with product standardization - standard food and lodgings for the people who frequently travel. For example, a network of restaurants in different places, and the food is prepared in the same manner and retains the same quality (for example, the McDonald's restaurant chain). The buyer is informed about the quality in advance, which simplifies the choice, compliance with the standards in these cases being of utmost importance.

Informed and non-informed customers: Not all customers are non-informed. Informed customers significantly contribute to the information awareness of other customers. Their choice and behavior may sufficiently serve to mitigate the consequences of adverse selection. "Expert consumers" have a special role in informing other customers. They convey information in a convenient manner to consumers and provide a useful piece of advice (on cars, stereo devices, computers, phones, etc.) via TV shows or special publications, magazines, and so on. Thus, they protect the interest of less-informed consumers and contribute to an increase in the quality of a product. Furthermore, certain types of services demand a high level of expertise and skill (lawyers, doctors in private practice, dentists, service providers, instructors, coaches, etc.). They find new clients among those to whom they were recommended by their friends, cousins, and/or neighbors.

The unfavorable consequences of moral hazard are difficult to completely eliminate. Moral hazard will be present as long as the hidden action benefits a party in the given economic relation. If a sufficiently good market response was always present, the less-informed party could protect its own interests. However, there is the question of whether the market mechanism itself can resolve the market failures that occur due to an asymmetric distribution of information. The insufficient efficiency and powerlessness of the market may also cause socially unacceptable problems. This points to the necessity of state intervention, where the state takes on the role of the protector of the insufficiently informed.

The role of the state in the conditions of information asymmetry

On the markets with a noticeable information asymmetric distribution, state intervention may improve the condition to a certain level and prevent large failures and socially harmful consequences (Stiglitz, 2000). In this, the key assumption is that the state must also be well-informed.

In the areas of utmost social importance (citizen healthcare, food products, the production and turnover of medicines, etc.), the state necessarily appears playing the role of the protector of the less-informed party. The less-informed party is incapable of improving the level of its information awareness, and in the case of the absence of state intervention, the less-informed party suffers significant damage and other negative consequences may also occur (Trivić, 2009a). The market is inefficient and does not perform the expected role, and the interest of the less-informed party must be protected in order to avoid negative consequences. For example, the use of medicines cannot be left to the action of the

free market. The population's vital interest may be endangered by the hidden actions taken by certain participants in the production and distribution of medicines. Therefore, powerful measures for preventing, revealing, and punishing such a behavior are necessary to be introduced. One of the manners how this is to be achieved implies the control of the quality of production and trade. The control of the conditions under which certain products are created contributes to the protection of the general interest. The obligation regarding obtaining work permits (licenses, certificates, or diplomas), which can only be obtained when certain conditions are met, is imposed on producers. If this type of the protection of the public interest is weakened, society is exposed to a risk, and some mistakes may endanger human lives.

Beside this, the unfavorable consequences of asymmetric information can be mitigated by influencing information flows themselves. It is possible to set the requirements regarding the content of messages sent to customers. Regulations may prescribe the mandatory content of the information that a producer must make available to its customers, as well as the manner of conveying the information (from the chemical ingredients of a product to the minimum size of the letters on the packaging). The state has to regulate this area by applying law, so that the less-informed party does not suffer damage due to a lack of information (especially when a product of vital importance - food, water, medicines, etc. are concerned).

ASYMMETRIC INFORMATION ON THE LABOR MARKET

Asymmetric information is a characteristic of the labor market as well (Trivić, 2009b). Jobseekers know more about their own abilities than employers. The abilities, knowledge and skills that a worker has when concluding an employment contract are his hidden characteristic. Some characteristics of the worker can easily be identified by the employer: such as the worker's gender, age, origin, level of education, and previous work experience. In addition, the worker's behavior may involve a hidden action. A typical example of a hidden action occurs in the worker-employer relationship. It is sometimes difficult for the employer to monitor the level of workers' commitment in the workplace. In some occupations and in some jobs, it is difficult to ensure the constant monitoring of the extent of the worker's commitment to performing work tasks. If control and supervision are simultaneously weak, the worker may almost stop performing work tasks and dedicate him-/herself to some other activity during the working hours (Siemens & Kosfeld, 2014).

On the labor market as well, the main consequences of asymmetric information are manifested in the form of the phenomena of adverse selection, moral hazard and the principal-agent problem.

Adverse selection on the labor market is a consequence of workers' hidden characteristics. The other party (i.e. the employer) does not have timely information about the existence of a worker's hidden characteristic (insufficient expertise, the worker's incompetence), and may be exposed to harmful consequences due to that fact (Kahn, 2013).

Suppose that the worker population consists of the two relatively homogeneous groups of workers: group A - low-productive workers and group B - highly productive workers. When concluding a contract, the employer does not know which group the worker belongs to. However, the employment of the workers from either the group A or the group B results in a different marginal product of labor MPL and a different marginal revenue MR. Thus, if group A worker is employed, he/she will generate a marginal revenue of 10,000 currency units per year; otherwise, if a worker belongs to the group B, a marginal revenue will be 20,000 currency units. Since the employer cannot predetermine which group the worker belongs to, he/she calculates with a marginal revenue of 15,000 currency units. Then workers from the group A earn more (15,000 instead of 10,000), and workers from the group B earn less (15,000 instead of 20,000), i.e. the negative consequences of asymmetric information are to the detriment of the workers whose abilities are

greater, and the allocation of workers then deviates from the optimal.

Moral hazard on the labor market manifests itself when a hidden action of the better-informed party in the economic relationship is taken (the worker consciously and intentionally slacks). The employer cannot notice the action in time, so he/she is exposed to economic damage. Slack in the workplace has always brought the executor of work orders a reduction in the psychophysical effort. For the employer, this means a breach of work discipline and reduced performance. In practice, they try to avoid or at least reduce these damages in various ways (Altonji & Pierret, 2001), primarily by the control and application of different payment methods.

The principal-agent problem on the labor market is a phenomenon accompanying the worker-employer relationship. The worker may take a hidden action in various ways, which reduces the level of the commitment compared to the expected one. The worker-employer relationship is burdened by this opposing interest. The employer is often unable to control the worker's level of commitment in the workplace (Saibal & Debabrata, 2015). By a mutually defined contract (agreement), it is possible to envisage the various measures by which the effort made by the worker is rewarded, whereas slackness is punished. These are attempts to boost the worker's motivation to increase his/her personal productivity and discourage slackness. Their application reduces the need for constant supervision and reduces the costs that control and supervision entail (Altonji & Pierret, 2001).

The previous analysis showed that all the consequences of asymmetric information were present on the labor market, as well as on other markets, yet with certain specifics. This has confirmed the hypothesis H1.

Measures to reduce asymmetric information on the labor market

If an employee invests a smaller effort than usual for the job he/she is performing, lower productivity will negatively affect the business result. The supervision, control, and punishment of such a behavior usually implicate additional costs. Therefore, such a behavior may partially be prevented by applying different methods of wage payment to employees. Different payment methods have different effects on workers' commitment (Bowlus, 1995).

If the worker is paid by the time he/she spends at work, slacking allows him/her a smaller effort and fatigue at work, while not affecting his/her earnings at the same time. Since the wage he/she receives does not depend on the results of the work they have done, they are motivated to invest a smaller effort. When applying this payment method, employers usually try to find a satisfactory way to control the execution of work tasks.

The per-piece payrate means the payment in favor of the worker according to a measurable indicator (according to the number of the units produced, for example). Greater commitment brings higher earnings. Such a payment method is often an effective measure to keep work intensity at a satisfactory level and contribute to a reduction in some costs (such as the costs of supervision, scrap, etc.), and more capable workers earn higher wages. Payment per piece, however, is not always applicable; there are many jobs whose result is not easy to measure, and when more workers work on a team, the result of the work done is shared.

Paying workers by time and per piece are the traditional payment methods the importance of which has not diminished in modern business. Practice and various experiences, however, have developed a number of the payment forms and methods that affect the worker's motivation and diminish his/her interest in slacking in the workplace.

The mathematical model of the labor market with asymmetric information

The worker-employer relationship is also an example of the principal-agent problem (Spence & Zeckhauser, 1971). The worker is hired by the principal (the employer) to perform certain work. Only the

worker is he/she who is aware of the effort he/she invests (asymmetric information), and the worker's invested effort influences the principal's earning. The principal's problem is how to make a contract containing the incentive that will lead the worker to make such an effort that will maximize the principal's earning.

Allow us to assume that e is the worker's (agent's) effort (Bowlus, 1995). The principal's earning is $y = f(e)$. The contract that contains the incentives is the function $s(y)$, which defines the worker's earnings when the principal's earning is y.

The principal's profit then equals as follows:

$$\Pi_p = y - s(y) = f(e) - s(f(e)) \tag{20}$$

Let $\tilde{u}$ be the worker's (reservation) utility when not working. In order to secure that the worker will participate, the contract must offer the worker a utility of at least $\tilde{u}$ (i.e. greater than ũ). The cost of work for the worker in the utility equations when the investing effort level of e is equal to $c(e)$. Hence, the principal's problem is to choose such e, so that:

$$\max \Pi_p = f(e) - s(f(e)) \tag{21}$$

with the limitation $s(f(e)) - c(e) \geq \tilde{u}$ (the participation constraint).

In order to maximize the profit, the principal draws up a contract that will provide the worker with at least his/her reservation utility.

The replacement of $s(f(e))$ leads to:

$$\max \Pi_p = f(e) - c(e) - \tilde{u} \tag{22}$$

The principal's profit is maximized when:

$$f'(e) = c'(e) \tag{23}$$

$$f'(e) = c'(e) \rightarrow e = e^* \tag{24}$$

The contract that maximizes the principal's profit insists on the worker's effort level e^*, which equates the worker's marginal cost of the effort with the principal's marginal profit from the worker's effort. How can the principal make the worker choose $e = e^*$? Actually, $e = e^*$ must be preferred by the worker. That is, the contract $s(y)$ must satisfy the compatibility of the incentives constraint:

$$s(f(e^*)) - c(e^*) \geq s(f(e)) - c(e) \tag{25}$$

Below are some examples of the contracts containing the incentives (Zavadskas, Turskis & Antucheviciene, 2019):

Rent: Then the principal keeps the lump sum R for him-/herself, and the worker appropriates the entire profit above R, ie:

$$s(f(e)) = f(e) - R. \tag{26}$$

Does such a contract maximize the principal's profit?

For the given contract, the following is valid: $s(f(e)) = f(e) - R$.

Then the worker's earning is:

$$s(f(e)) - c(e) = f(e) - R - c(e) \tag{27}$$

and in order to maximize it, the worker should choose the effort level for which:

$$f'(e) = c'(e) \quad e = e^*. \tag{28}$$

What should the principal's rent R be? The principal should extract as high a rent as possible, whereas the worker accepts the job, so R should meet the condition:

$$s(f(e^*)) - c(e^*) - R = \tilde{u}, \tag{29}$$

$$R = s(f(e^*)) - c(e^*) - \tilde{u}. \tag{30}$$

Wages: such a contract envisages the payment of a worker in accordance with the following formula:

$$s(e) = we + K \tag{31}$$

where w is the wage proportionate to the quantity of the invested effort; K is the lump sum payment. Then, $w = f'(e^*)$, while K makes the worker directly indifferent between participating on the job or not participating at all.

Take it or leave it. If he chooses that $e = e^*$, the lump sum amount L will be paid, and if he chooses

$e \neq e^*$, he will be paid a zero. The utility of the worker when choosing $e \neq e^*$ is $c(e)$, so he will choose $e = e^*$. It is assumed that L is chosen so that the worker is indifferent towards either accepting or rejecting the job.

The mutual characteristic of all efficient contracts containing incentives is that they make all the residual rights to the profit attributed to the worker, i.e. each part of the remaining profit must fully be attributed to the worker.

However, starting from the assumption that the employer (principal) motivates the employee (agent) with a certain fee to perform a task, in the end the employer only knows the actions taken by the employee, not how he/she would act in the event of being differently rewarded. If the employer had such a piece of information, he would be able to offer him/her the wage that would be suitable for his/her efficiency level and the problem would so be solved. Thus, efficient market equilibrium would be achieved. The employer, however, tends to define as low as possible, although yet a sufficient reward that would incite the employee to efficiently work. This further complicates the given problem since the employer does not know the worker's utility function. Several approaches may be comprehended for solving the given problem (Contreras-Reyes & Arellano-Valle, 2018).

Allow us to assume that the employee may choose one of the actions from the available set of actions A, where this set is made of the strategies a_0, a_1 and a_2 $(A=\{a_0, a_1, a_2\})$. The action a_0 signifies that the employee does not perform the given work; action a_1 signifies that the employee performs his work, but does not conscientiously do the job, while action a_2 signifies that the employee works conscientiously. Allow us to assume that each action bears a certain cost of work for the employee, $w_i = w(a_i)$, $i = 0, 1, 2$, where $w_0 = 0$. This cost may be described as the sacrifice the employee has made in order to perform the given job.

Take $r_i = r(a_i)$, $I = 0, 1, 2$, as the function that represents the employee's wage (reward) for the work performed, and which is defined by the employer depending on whether and how much the employee does work. Therefore: $r_0 = r(a_0) = 0$.

Utility for the employee $V(t, a_i, r_i)$ depends on how much aversion he/she has to the action required of him/her to take (t), the employee's strategy applied in performing the work (a_i) and the wage (r_i), i.e. the compensation he/she receives for the work he/she does. Aversion to execution is expressed by the function of t, which represents the employee's effort and is known to the employee, but not to the employer. Assuming that the employee is rational and that he/she will always choose the action by which he/she maximizes his/her own utility, the utility for the employee can be expressed as follows:

$$V(t, a_i, r_i) = v(t, a_i) + r(a_i) = r(a_i) - tw(a_i) \quad (32)$$

for $i = 0,1,2$, where $v(t, a_0) = 0$, for each t. Namely, $v(t, a_i)$ is the employee's cost for the effort t and the strategy ai, ie. $c(e)$. Finally, the utility for the employee is the difference between the employee's wage $r(a_i)$ as the utility, and the cost of work for the employee, which is represented by $tw(a_i)$.

Utility for the principal depends on the wage, i.e. the reward that he/she must pay to the employee, as well as on how important the action that the employee needs to perform is to him. Therefore, the utility function for the employer can be expressed as follows:

$$U(a_i, r_i) = u(a_i) - r(a_i), za\ i = 0, 1, 2 \quad (33)$$

where $U(a_i, r_i)$ represents the profit the employer makes depending on the action chosen by the employee, where $u(a_0) = 0$. A profit $U(a_i)$ represents the difference between the employer's earning $u(a_i)$ or $f(e)$ and the wages paid out to the employee $r(a_i)$ or $s(f(e))$. That is, the obtained relation 33 is in accordance with the relation 20.

The presented mathematical model for calculating the worker's (agent's) wages and the principal's profits shows that, based on the simple functional relations in the calculation of the worker's wages, it is possible to reduce the negative effects of the principal-agent problem on the labor market, which proves the hypothesis H2.

CONCLUSION

Asymmetric information theory is one of the most powerful analytic approaches in contemporary economic science. Asymmetric information of the participants in economic transactions leads to market inefficiency. The number of the beneficial trades performed is smaller than the number which would be performed if buyers and sellers were equally informed about the quality of a product, the product durability, and so on. There are numerous examples of asymmetric information markets. It is precisely this fact that may serve as the basis of the thesis that (to a greater or lesser extent) information asymmetry is the characteristic of almost all markets. If such a thesis is accepted, this further means that the consequences of asymmetric information are ubiquitous. Moreover, this means that the results of the way the market works must be corrected by certain market mechanisms and the activities of the market participants themselves, and even state intervention (implying the protection of the less-informed party by introducing certain state measures) is required on some markets. Sometimes, however, the influence of asymmetric information is such that not even state intervention can successfully resolve the entirety of the problem.

The theoretical part of the analysis carried out in this paper has shown that information asymmetry is present on the labor market with all the effects that are characteristic of information asymmetry in general, which has confirmed the hypothesis H1. It was identified that the key problem of the labor market was the principal-agent problem, which represented a new research goal and task - the possibility of the mathematical formalization of the method of calculating wages in the conditions of information asymmetry. The possibility of mathematical modeling is a specific challenge in the analysis of markets with asymmetric information. The paper presents the models of both the used car market and the labor market with asymmetric information of the participants. The specifics of the labor market have resulted in an alternatively defined method of calculating workers' wages in order to mitigate or overcome the principal-agent problem. Some models of the functional connection between employee engagement and the employer's objective function are presented in the paper. The possibility of their formulation and application confirms the defined hypothesis H2. The results of the analysis showed that their application significantly mitigated the principal-agent problem on the labor market, which is the most important contribution made by this paper.

The key limitation of a research study of this type is the limited possibility of its empirical quantification and verification. Research in markets with asymmetric information is a challenge for future theoretical and empirical research in general, and for individual specific markets as well. A particularly important area of future research is the markets in which asymmetric information may endanger participants' health.

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DETERMINANTS OF INVESTMENT RISK IN THE INDIAN CONSUMER GOODS SECTOR: THE DYNAMIC PANEL REGRESSION APPROACH

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The objective of the current paper is to study the relationship between company financial factors, macroeconomic factors and the market measures of risk of the Consumer Goods Sector of the Indian economy. Systematic, unsystematic and total risks are the measures of the risk used. Dynamic panel data regression techniques have been applied to the data of the companies comprising the S&P BSE FMCG index of the Bombay Stock Exchange (BSE) of India. The time frame established for the study is the period from 2011 to 2020. The results show that on average 89.6 percent of total risk is attributable to the unsystematic portion, whereas the rest is attributable to the systematic portion. Furthermore, both the financial variables and macroeconomic variables can be used to gauge the risk related to investments. Moreover, marketing personnel may justify their expenditure that builds their brand value as these efforts will reduce the risk for investors and increase their wealth. The results of this study are especially useful for business managers, as well as investors, helping them to understand risk and the factors contributing to it, which may provide useful insights regarding cost-of-capital and value-of-firm calculations.

Keywords: systematic risk, Indian fast moving consumer goods, unsystematic risk, idiosyncratic risk, dynamic panel data analysis

JEL Classification: G12, G32

INTRODUCTION

Every investor, stock trader and finance academic always seek how 'to exploit risk to earn greater returns' (Malkiel, 2011). For corporations, risk management helps increase their value. In fact, they should optimize their risk exposure so as to gain the maximum advantage (Cupic, 2015). From investors' point of view, there are multiple theories and viewpoints explaining financial markets and risk and return relationships. There are those who opine

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that nobody can beat the market, as markets move in a random fashion. So, nobody can predict market movements and make money. They are called random walk theorists (Malkiel, 2011). Yet, there are many stories of people making unfathomable amounts of money through stock markets, which has led to the development of many other theories suggesting the ways to beat the market. The common ground of the largest number of theories implies that, in order for a man to be able to make money on stock markets, they have to make predictions about the future movements of prices. For this purpose, investors have to consider various pieces of information in order to make their estimations. Generally, long-term investors study companies' fundamentals as opposed to the day traders who are focused on stock price movements (technical information). Furthermore, Indian stock markets have mostly been shown to be of a weak form of efficiency (Mishra, 2009; Gupta & Sankalp, 2017). This also reveals the fact that fundamental financial information can be used to make decisions on Indian stock markets.

Many theories have evolved over the years to help investors make predictions and stock market valuations. The most famous and the most followed theory of stock markets is 'Modern Portfolio Theory', according to which diversifying through creating a portfolio may enable an investor to reduce risk, simultaneously maintaining the same level of return (Malkiel, 2011). Not all risk, however, can be eliminated by simply increasing the number of investments. William Sharpe, John Lintner and Fisher Black analyzed the portion of risk that can be eliminated and the portion of risk that cannot. These analyses led to the creation of the Capital Asset Pricing Model (CAPM). The designated two types of risk are systematic risk (non-diversifiable), which is caused by the factors that affect all the firms on the market making stocks move in tandem with each other, on the one hand, and unsystematic (diversifiable) risk, which is caused by the factors peculiar to every company, such as the discovery of a new product or a workers' strike, on the other. CAPM suggested that investors should only focus on systematic risk and that they could increase their returns by undertaking more systematic risk (Bodie, Kane, Marcus & Mohanty, 2014). In the real world, however, decisions are not so made simply by being based on a single theory only. For example, the risk of bankruptcy might not be evident with just systematic risk, but the total risk must also be considered. Furthermore, there are studies (Gu & Kim, 2003; Kim, Kim & Gu, 2012) that showed that more than 85 percent of total risk was unsystematic and that it was illogical to ignore this portion. Also, empirical researchers have shown that markets are not as perfect and that investors' portfolios are not as diversified, either, as is assumed by CAPM (Levy, 1978; Merton, 1987). With this background in mind, the classification and measurement of risk provided by CAPM is used in the present study. Investors study the financial information of companies so as to gauge the expected performance of a particular company in the future in terms of the expected returns and risks. The focus of the present study is on the analysis of the relationship between companies' financial information and the risk measures provided by CAPM and used by statisticians.

An interesting aspect of the present study reflects in the fact that it is solely based on the companies belonging to the Indian Fast Moving Consumer Goods (FMCG) Sector. Hence the peculiar characteristics of this sector are also included, which makes the study more comprehensive. The products made by the FMCG companies are mostly consumer necessities. To ensure success, it becomes imperative for these companies to build their brand image on the market, which may increase their market share. Advertising plays a very important role in the FMCG Sector in that it improves the image of products and also builds the brand value. Branding and advertising are the business which each company's marketing department are in charge of. The marketing and finance functions are often at a crossroads, given the fact that advertising includes cash outflows without tangible returns, whereas the finance function is focused on companies' shareholders' wealth maximization, which may only happen if derived benefits are greater than the incurred costs. The present study seeks to align the objectives of the two departments by including the variables catering

to their respective objectives. The primary research questions for the study can be listed as follows:

RQ1: Is the fundamental company-specific information relevant for investors in the Indian FMCG Sector?

RQ2: Can accounting and macroeconomic information be used to gauge the risk related to the companies of the FMCG Sector?

RQ3: Can the expenditures incurred by the marketing department be justified with respect to the company's shareholders' wealth maximization principle?

These questions are answered in the present study by finding the relationship between the company-specific variables, the macroeconomic variables and the market-based measures of risk. This is done by using panel data regression. The paper is organized into the seven sections: Section 1 introduces the paper, Section 2 provides a review of the related literature, Section 3 briefs the research methodology used in the paper, Section 4 discusses the findings of the study, Section 5 presents the conclusions of the paper, Section 6 details the implications, and the last, Section 7, apprises of the limitations and the future scope of research.

LITERATURE REVIEW

As discussed, the Capital Asset Pricing Model segregates total risk into systematic and unsystematic risks. CAPM suggests investors should only focus on the systematic portion as the unsystematic portion can be diversified. Hence, most prior studies have only been conducted with respect to systematic risk, whereas a very few of them have considered unsystematic or total risk. Based on CAPM, the literature review in the field of risk determinants was done and the same is presented as per the type of the risk studied.

Systematic risk

Over the years, research in the area of systematic risk has taken multiple financial variables into account so as to explain changes in systematic risk. Numerous studies have been conducted, taking firms' profitability, liquidity, leverage, size and growth variables. Different studies have used different measures of profitability, such as return on shareholders' funds, return on assets, the net profit margin and profit before tax. No unanimous conclusion, however, has been drawn regarding the relationship between profitability and systematic risk. While some studies, like A. D. Castagna and Z. P. Matolcsy (1978) and C. Mar-Molinero, C. Menéndez-Plans and N. Orgaz-Guerrero (2017), have shown a positive relationship between these variables, there are studies, like D. E. Logue and L. J. Merville (1972), and J. H. Hung and Y. C. Liu (2005) having shown the presence of a negative relationship. There is a similar case when speaking of liquidity; namely S. F. Borde (1998) conducted a study on 52 restaurant companies traded on American stock exchanges for the period from 1992 to 1995. The author depicted a positive relationship between systematic risk and liquidity. J. S. Lee and S. S. Jang (2007) conducted a study on 16 airline companies from 1997 to 2002 and depicted a negative relationship of systematic risk with liquidity. They also showed a positive relation between systematic risk and leverage. On the contrary, the use of a higher debt sometimes also proved to be beneficial for companies due to a reduction in their risk as debt providers keep a check on the actions carried out by management (Chun & Ramasamy, 1989; Iqbal & Shah, 2012). M. J. Iqbal and S. Z. A. Shah (2012) conducted a study on 93 firms listed on Karachi Stock Exchange for the period from 2005 to 2009, having evidenced the presence of a negative relationship with leverage, the market value of equity, liquidity, operating efficiency and dividend payout, on the one hand, and the presence of a positive relationship with profitability, growth and the firm size, on the other. Studies like M. Mardini (2013) and D. Y. Liu and C. H. Lin (2015) also corroborated a positive relationship between the size and systematic risk. However, W. J. Breen and E. M. Lerner (1973) and W. S. Lee, J. Moon, S. Lee and

D. Kerstetter (2015) showed a negative relationship, while D. C. Aruna and A. Warokka (2013) showed no statistically significant relationship at all. Beside these commonly used variables, there are studies that have considered sector-specific variables as well. V. Kumar, A. R. Aleemi and A. Ali (2015) studied the relationship between systematic risk in Pakistan's banking sector with the loan portfolio quality. J. S. Lee and S. S. Jang (2007) included a safety measure in their study on the US airline industry. S. N. Tripathi, D. Misra and M. Siddiqui (2020) assessed the impact of advertising intensity on the market risk of the firms in the consumer goods sector of the Indian economy, having shown that an increased advertising expenditure reduced market risk. Some studies have analyzed the relationship between systematic risk and macroeconomic factors, too. H. N. G. Cheema (2016) conducted a study on Pakistan, India and China wishing to identify the factors that affected systematic risk in these countries, considering both financial and macroeconomic factors. In fact, the study concluded that macroeconomic factors exerted a bigger impact on systematic risk in comparison with financial factors. Even the study by G. Boz, C. Menéndez-Plans and N. Orgaz-Guerrero (2015) also corroborated the same results when they found the beta relationship with seven macroeconomic and seven financial variables. A. A. Robichek and R. A. Cohn (1974) and R. Karakus (2017) both showed the presence of a significant relationship between inflation and economic growth and systematic risk, even though both had been conducted on broadly dispersed geographies and time periods. D. K. Patro, J. K. Wald and Y. Wu (2002) used the dynamic panel data model to study the systematic risk of the 16 OECD countries. Inflation and exports showed a positive association with the world beta, whereas imports and government surplus to the GDP showed the presence of a negative association with the world beta.

Unsystematic risk

Relatively few studies have solely focused on unsystematic risk. While CAPM reiterates the fact that systematic risk can be diversified by portfolio creation. Hence, it is not important for investment decisions, but empirical studies have shown a very high percentage of total risk to be unsystematic risk, which is impractical to ignore (Van Horne, 1998; Kim, Gu & Mattila, 2002). Further market imperfections and investors' inability to diversify make unsystematic risk important for stock valuation (Chaterjee, Lubatkin & Schulze, 1999; Gu & Kim, 2003). With this background in mind, some research studies have been conducted in order to discover the relationship between financial variables and unsystematic risk, so that the management of firms can understand investors' expectations and incorporate them in their decisions. Z. Gu and H. Kim (2003) conducted a study on the US hotel REIT firms, demonstrating that the dividend payout and debt ratio positively related with unsystematic risk, while capitalization negatively related with it. L. T. Hsu and S. Jang (2008) also based their study on the hospitality industry. They showed that the firms with higher profits and a bigger size, lower operating costs and a lower debt exhibit lesser volatility in the event of the firm's level changed. M. Dalbor, N. Hua and W. Andrew (2014) explored the impact of management efficiency, including operations management, the size of the firm and financial management on unsystematic risk. Pooled regression revealed the fact that the firms of a smaller size, higher operating expenses, a higher cost of goods sold, higher financial leverage and lower working capital had higher unsystematic risk. They showed that management efficiency was especially critical for restaurant firms in that highly competitive sector. Studies of the variables used in the present study are listed in Table 1.

Total risk

J. Ang, P. Peterson and D. Peterson (1985) examined the total risk determinants for approximately 350 US firms. Their yearly analyses revealed the fact that the size and dividends were negatively related to total risk, financial leverage was positively related, and operating risk and contra-liquidity showed mixed results. The increased size and dividend payout were considered to be a positive signal by investors leading to lower risk. M. H. Chen (2013) also supported this result pertaining to the size when an analysis was

Table 1 The summary of the previous studies

Independent variable	Studies	Result
	Systematic risk	
Size	D. Castagna and Z. P. Matolcsy (1978); M. Brimble and A. Hodgson (2007); K. Angel, C. Menéndez-Plans and N. Orgaz-Guerrero (2018)	Positive
	D. E. Logue and L. J. Merville (1972); M. J. Iqbal and S. Z. A. Shah (2012); W. S. Lee *et al* (2015)	Negative
	V. Kumar, A. R. Aleemi and A. Ali (2015); J. H. Hung and Y. C. Liu (2005); R. C. Moyer and R. Chatfield (1983)	No significant
Liquidity	A. D. Castagna and Z. P. Matolcsy (1978); J. S. Lee and S. S. Jang (2007); W. S. Lee *et al* (2015)	Negative
	S. F. Borde (1998); J. H. Hung and Y. C. Liu, (2005); C. Mar-Molinero *et al* (2017)	Positive
	R. C. Moyer and R. Chatfield (1983); Z. Gu and H. Kim (1998); D. C. Aruna and A. Warokka (2013)	No significant
Profitability	Castagna and Matolcsy (1978); M. J. Iqbal and S. Z. A. Shah (2012); C. Mar-Molinero *et al* (2017)	Positive
	D. E. Logue and L. J. Merville (1972); S. F. Borde (1998); P. D. Biase and E. D'Apolito (2012)	Negative
	S. F. Borde, K. Chambliss and J. Madura (1994); W. S. Lee *et al* (2015); Y. H. Shin, M. Hancer, J. Leong and R. Palakurthi (2010)	No significant
Price to Book	H. N. G. Cheema (2016)	Different in different models
Dividend	Castagna and Matolcsy (1978); D. E. Logue and L. J. Merville (1972); R. Karakus (2017)	Negative
	H. Kim *et al* (2012); M. Brimble and A. Hodgson (2007)	No significant
Advertising	S. N. Tripathi *et al* (2019); W. S. Lee *et al* (2015); K. McAlister, R. Srinivasan and M. Kim (2007)	Negative
	Y. Kim, M. Kim and J. O'Neill (2013)	No significant
Brand value	J. Dahlgren and H. Lindvall (2010)	Negative
	R. C. Moyer and R. Chatfield (1983)	No significant
Economic growth	G. Boz *et al* (2015)	Negative
	C. Mar-Molinero *et al* (2017)	No significant
Inflation	K. M. Al-Qaisi (2011)	Positive
	M. Arfaoui and E. Abaoub (2010)	No significant
US/world stock market	G. Boz *et al* (2015)	Negative
	C. Mar-Molinero *et al* (2017)	No significant
Interest rate	M. Arfaoui and E. Abaoub (2010)	Negative
	Unsystematic risk	
Size	Z. Gu and H. Kim (2003); L. T. Hsu and S. Jang (2008); M. Dalbor *et al* (2014)	Negative
	M. H. Chen (2013)	No significant
Liquidity	Z. Gu and H. Kim (2003)	No significant
Profitability	L. T. Hsu and S. Jang (2008)	Negative
	M. H. Chen (2013)	No significant

Dividend	Z. Gu and H. Kim (2003)	Positive
	L. T. Hsu and S. Jang (2008)	No significant
Advertising	Y. Kim, M. Kim and J. O'Neill (2013)	Positive
Inflation	M. Arfaoui and E. Abaoub (2010)	Negative
Trade openness	M. Arfaoui and E. Abaoub (2010)	Positive
Interest rate	M. Arfaoui and E. Abaoub (2010)	No significant
	Total Risk	
Size	J. Ang, P. Peterson and D. Peterson (1985); M. Arfaoui and E. Abaoub (2010)	Negative
	J. S. Lee and S. S. Jang (2007)	No significant
Liquidity	J. Ang *et al* (1985); S. F. Borde *et al* (1994); S. F. Borde (1998)	Positive
	A. Jahankhani and M. J. Lynge (1979)	Negative
	J. S. Lee and S. S. Jang (2007); Chen (2013)	No significant
Profitability	J. S. Lee and S. S. Jang (2007)	Negative
	M. H. Chen (2013)	No significant
Dividend	J. Ang *et al*. (1985); A. Jahankhani and M. J. Lynge (1979); S. F. Borde (1998)	Negative

Source: Authors

carried out of China's hotel industry. However, when J. S. Lee and S. S. Jang (2007) conducted an empirical study on the US airline industry, they failed to find any significant relationship between risk and the size of the firms. The result pertaining to dividend payout was supported by A. Jahankhani and M. J. Lynge (1979) and S. F. Borde (1998) as well. Liquidity is another important variable considered by the largest number of the studies of risk. J. Ang *et al* (1985), S. F. Borde, K. Chambliss and J. Madura (1994) and S. F. Borde (1998) showed that higher liquidity was the cause of concern for investors as it meant that the companies were not using their cash efficiently and were investing in more short-term investments. On the other hand, A. Jahankhani and M. J. Lynge (1979) showed the presence of a negative relationship between the two, and J. S. Lee and S. S. Jang (2007) and M. H. Chen (2013) were unable to find any significant relationship at all. M. H. Chen (2013) was unable to find any significant relationship between total risk and profitability, either. However, J. S. Lee and S. S. Jang (2007) found a negative relationship as higher profitability reduces investors' risk.

Research Gap

While there have been quite a few studies on the factors that affect systematic risk on international markets, on the one hand, their results have been very inconsistent, on the other. There are but few studies on Indian markets. For unsystematic risk and total risk, there is quite a limited number of the studies on international markets, as well as those conducted on Indian markets. The present study includes all the three measures of risk to make the study comprehensive. Furthermore, it has been shown that the analysis made on a single industry has better explanatory power than that conducted on firms from across industries (Patel & Olsen, 1984). Thus, the present study is restricted to only one single sector of the Indian economy, namely the FMCG Sector. Beside the usual company factors considered by the largest number of previous researchers (i.e. profitability, liquidity, the size, the dividend) as the risk determinants, the present study takes into account two more factors specific to the FMCG Sector, viz. advertising intensity and the brand value measured by the market share of each company. Moreover, macroeconomic variables were also used in a very few studies. The present study includes the macroeconomic variables as the explanatory variables for all the risk measures. After an exhaustive literature review, the following hypotheses are set:

H1a,1b,1c: Profitability does not exert any significant impact on systematic risk, unsystematic risk and total risk.

H2a,2b,2c: Liquidity does not exert any significant impact on systematic risk, unsystematic risk and total risk.

H3a,3b,3c: The size does not exert any significant impact on systematic risk, unsystematic risk and total risk.

H4a,4b,4c: The investors' perception does not exert any significant impact on systematic risk, unsystematic risk and total risk.

H5a,5b,5c: Investors' expectations do not exert any significant impact on systematic risk, unsystematic risk and total risk.

H6a,6b,6c: Advertising Intensity does not exert any significant impact on systematic risk, unsystematic risk and total risk.

H7a,7b,7c: The Dividend does not exert any significant impact on systematic risk, unsystematic risk and total risk.

H8a,8b,8c: Brand value does not exert any significant impact on systematic risk, unsystematic risk and total risk.

H9a,9b,9c: The World Stock Market does not exert any significant impact on systematic risk, unsystematic risk and total risk.

H10a,10b,10c: Economic Growth does not exert any significant impact on systematic risk, unsystematic risk and total risk.

H11a,11b,11c: Trade Openness does not exert any significant impact on systematic risk, unsystematic risk and total risk.

H12a,12b,12c: Inflation does not exert any significant impact on systematic risk, unsystematic risk and total risk.

H13a,13b,13c: The Interest Rate does not exert any significant impact on systematic risk, unsystematic risk and total risk.

Where a stands for systematic risk, b stands for unsystematic risk, and c stands for total risk.

RESEARCH METHODOLOGY

The present section sets forth the variables, the empirical and conceptual models and the data source used for the purpose of the research study.

The description of the variables

The present research study used the two categories of variables, namely dependent and independent ones. The independent variables are further divided into the company-specific and macroeconomic variables. The description of each variable is discussed in detail in this section.

The dependent variables

In the present study, three dependent variables, i.e. the three measures of risk as per CAPM: Systematic Risk, Unsystematic Risk and Total Risk are used. Systematic risk is the risk to firms due to the external factors such as political risk, the fiscal policy, etc., which affect all the firms on the market. Unsystematic risk is a risk caused due to the firm-specific factors such as the financial position and managerial capabilities. Total risk arises due to a combination of all the factors. The calculation of each risk measure is now explained. W. F. Sharpe's (1963) single index model is used to calculate systematic risk. According to that model, the relationship between market return and security return can be estimated via a linear function reading as follows:

$$R_s=\alpha_s+\beta_s R_M+e_s \quad (1)$$

where, R_s is security return, β_s (beta) is the slope, R_M is return on the market portfolio, α_s is the intercept term, e_s is the error term.

H. Levy and M. Sarnat (1984) took the variance of the equation (1) to clearly segregate total risk into systematic and unsystematic:

$$\sigma_S^2=\beta_S^2\sigma_M^2+\sigma_e^2 \quad (2)$$

where, σ_S^2 is the variance of daily returns over the period of one year, σ_M^2 is the variance of daily market

returns over the period of one year, $\beta_S^2 \sigma_M^2$ is the security covariance with the market, i.e. systematic risk, σ_e^2 is the residual portion of total risk i.e., unsystematic risk.

Just like previous studies (Jahankhani & Lynge, 1979; Borde *et al*, 1994; Gu & Kim, 2003), the present study uses beta as the measure of systematic risk, the standard deviation as the measure of total risk, and the variance of the residual term as unsystematic risk. Beta (β_s), the measure of systematic risk, is calculated for each company for each year by regressing the company's daily returns over the market's daily returns (using the equation 1). To calculate security returns (R_s) for each company/security (s), the daily share prices (P) are used, as in the equation (3):

$$R_S = \frac{P_t - P_{t-1}}{P_{t-1}} \quad (3)$$

where, P_t is the current day's price and P_{t-1} is the previous day's price.

The S&P BSE 500 index is used as a proxy for the market index, given the fact that it is the only index on the Bombay Stock Exchange (BSE) with such a large sample of 501 companies. This index represents about 95 percent of the market capitalization (free float) of all the stocks listed on the BSE. Market returns (RM) are calculated in the same manner as stock returns are, i.e. by calculating the percentage change in daily index values. Total risk is calculated for each company for each year by finding the standard deviation of daily returns. Unsystematic risk is calculated using the equation (2) in the following manner:

$$\sigma_e^2 = \sigma_S^2 - \beta_S^2 \sigma_M^2 \quad (4)$$

where, σ_S^2 is the variance of daily returns over the period of one year, σ_M^2 is the variance of daily market returns over the period of one year, $\beta_S^2 \sigma_M^2$ is the security covariance with the market, i.e. systematic risk, σ_e^2 is the residual portion of total risk, i.e. unsystematic risk.

The independent variables

To explain the market measures of risk, company-specific and macroeconomic variables are used in this research study. On the side of the company-specific variables, profitability, liquidity, the size and the dividend are the variables most commonly used in the previous studies. In the present study, return on total assets is used as a measure of profitability; the current and quick ratios are used to measure liquidity; the log of market capitalization is used to measure the size, and the dividend rate is used to account for dividend payments. Apart from these commonly used variables, the study also includes investors' expectations (measured by the Price-Earnings Ratio) and investors' perceptions (measured by the Price-to-Book ratio). Moreover, the two variables specific to the FMCG sector are also added, viz. the advertising intensity of the firms and their market share indicating their brand value. To see the impact of the macroeconomic variables on risk, five variables are considered, namely the MSCI All Country World Index (to capture the impact of the world stock markets on the Indian firms), Indian economic growth (measured by the Annual GDP growth rate), the Current Account Balance as a percentage of the GDP (in order to incorporate the impact of international trade), the domestic inflation rate (the CPI growth rate), and the domestic interest rate (the repo rate). The description and measurement of all the variables are tabulated in Table 2.

Empirical models

To examine the impact of the company-specific and macroeconomic variables on systematic risk, unsystematic risk and total risk, dynamic panel data regression was used in this research study. The conceptual model proposed for analyzing the impact of the company-specific and macroeconomic variables on systematic risk, unsystematic risk and total risk is shown in Figure 1.

The study incorporates the two-step System Generalized Method of Moments (SGMM) propounded by M. Arellano and O. Bover (1995)

Table 2 The list of the variables and their description

Predicted Variables	Measurement	Description
Systematic Risk (SysRisk)	Beta; calculated by regressing security returns on the market (the S&P BSE 500 index) returns.	Beta measures the sensitivity of stock returns to market returns.
Unsystematic Risk (UnsysRisk)	The difference between total and systematic risks.	This is the idiosyncratic risk caused by the factors specific to each single company.
Total Risk (TotalRisk)	The standard deviation of daily returns.	Variability in daily returns is taken as a measure of total risk.
Explanatory Variables	Measurement	Description
	Company-specific variables	
Current Ratio (CR)	Current assets/current liabilities	It measures the liquidity position.
Return on Total Assets (RoTA)	Net income/total assets	It measures the profitability of each company. Profitable companies are expected to be less risky.
Market Capitalization (MktCap)	A log of (the number of the shares outstanding on the last day of the year*the closing price on last day of the year).	This is a measure of the size of a firm.
Price Earnings Ratio (PE)	Market price per share/earnings per share	Investors' expectations about earnings can be gauged from this ratio.
Price to Book Ratio (PB)	Market price per share/book value per share	Investors' perception about the real worth of the business can be gauged from this ratio.
Advertising Intensity (AdvInt)	Advertising expenditure/sales	Advertising is important for consumer goods, which involves huge outlays.
Dividend Rate (Div)	Dividend per share/face value per share	Dividend payment signals the position of a company to its investors and hence may affect risk.
Quick Ratio (QR)	(Current assets-inventories-prepaid expenses)/current liabilities	It measures the liquidity position with respect to quick assets.
Market share (MktShare)	Sales of a company/total sales of all the companies of that industry	It measures the value of a brand on the market.
	Macroeconomic Variables	
Annual returns of MSCI ACWI (ACWI)	The MSCI ACWI index (All Country World Index) is a stock price index representing the whole world's capital markets.	
Annual GDP growth rate (GDP)	It shows the economic growth of a country.	
Current Account balance as percentage of GDP (CAB)	It shows the trade openness of a country. This measure is included in order to see the effects of globalization on Indian stock markets.	
Growth rate of consumer price index (CPI)	This measure is included in order to see the impact of the inflation level of the economy on the risk measures.	
Interest rate (IntRate)	The repo rate given by the Reserve Bank of India (RBI)	

Source: Authors

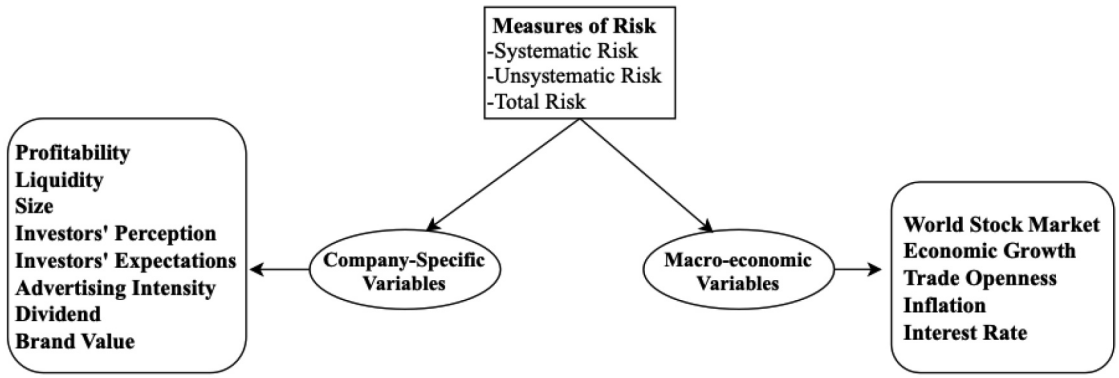

Figure 1 The research model

Source: Authors

and R. Blundell and S. Bond (1998). Because of the likelihood of heteroskedasticity, serial correlation, and endogeneity in the data, the SGMM is regarded as the most appropriate method when compared to the static panel method or any other dynamic panel data methods. The study proposes three regression models. Model 1, Model 2 and Model 3 examine the impact of the company-specific and macroeconomic variables on systematic, unsystematic and total risk, respectively. The regression equation of each model reads as follows:

Model 1

$$SysRisk = \alpha + \beta_1 CR_{it} + \beta_2 RoTA_{it} + \beta_3 MktCap_{it} + \beta_4 PE_{it} + \beta_5 PB_{it} + \beta_6 AdvInt_{it} + \beta_7 QR_{it} + \beta_8 MktShare_{it} + \beta_9 ACWI_{it} + \beta_{10} GDP_{it} + \beta_{11} CAB_{it} + \beta_{12} CPI_{it} + \beta_{13} IntRate_{it} \varepsilon_{it} \quad (5)$$

Model 2

$$UnsysRisk = \alpha + \beta_1 CR_{it} + \beta_2 RoTA_{it} + \beta_3 MktCap_{it} + \beta_4 PE_{it} + \beta_5 PB_{it} + \beta_6 AdvInt_{it} + \beta_7 QR_{it} + \beta_8 MktShare_{it} + \beta 9 ACWIit + \beta_{10} GDP_{it} + \beta_{11} CAB_{it} + \beta_{12} CPI_{it} + \beta_{13} IntRate_{it} \varepsilon_{it} \quad (6)$$

Model 3

$$TotalRisk = \alpha + \beta_1 CR_{it} + \beta_2 RoTA_{it} + \beta_3 MktCap_{it} + \beta_4 PE_{it} + \beta_5 PB_{it} + \beta_6 AdvInt_{it} + \beta_7 QR_{it} + \beta_8 MktShare_{it} + \beta_9 ACWI_{it} + \beta_{10} GDP_{it} + \beta_{11} CAB_{it} + \beta_{12} CPI_{it} + \beta_{13} IntRate_{it} \varepsilon_{it} \quad (7)$$

where, α is the constant, β_1…… β_{13} are the coefficients calculated for the firm i (1, 2, ..43) for the time period t (2011, 2012,…2020), ε is the error term and the other variables are discussed above.

The data and sample selection

The constituent companies of the S&P BSE Fast Moving Consumer Goods Index of the BSE, an Indian stock exchange, which is also Asia's first stock market, are the sample for the current study. The S&P BSE FMCG index has 63 constituents, whose data were collected and analyzed for the period of 10 years from 2011 to 2020. Out of the 63 companies, 20 had to be excluded for the reason of a lack of data for all the years mentioned above. For the remaining 43 companies, the stock price data were retrieved from the BSE website and the same were adjusted for the bonus issues and the stock splits. The financial information of all the companies were retrieved from the CMIE Prowess IQ database and the macroeconomic statistics were retrieved from the Reserve Bank of India, the IMF (the International Monetary Fund), UNCTAD (The United Nations Conference on Trade and Development), and the MSCI (Morgan Stanley Capital International) websites.

RESULTS AND DISCUSSION

The descriptive statistics

All the variables used in the study are summarized in Table 3, where the number of the observations, the mean values, the standard deviations, the minimum values and the maximum values are listed for each variable. There are 43 companies and a period of 10 years, so there are a total of 430 observations for each variable. The mean value of beta is 0.883, while the market beta is 1. Therefore, the FMCG industry can be said to be less volatile than the overall market.

Table 3 The descriptive statistics of all the variables

Variable	Obs	Mean	Std. Dev.	Min	Max
SysRisk	430	0.883	0.428	-0.256	2.287
UnsysRisk	430	0.001	0	0	0.003
TotalRisk	430	0.026	0.009	0.007	0.055
Diversifiability (unsystematic/total risk) = 0.896					
CR	430	1.505	0.825	0.34	5.92
RoTA	430	10.444	8.457	-13.59	38.67
MktCap	430	9.952	2.145	4.161	15.42
PE	430	25.559	156.23	-1750	1924.9
PB	430	6.703	7.96	-2.131	61.95
AdvInt	420	0.056	0.052	0	0.203
Div	430	286.184	530.352	0	3980
QR	430	0.772	0.688	0.05	5.33
MktShare	430	0.104	0.165	0	0.822
ACWI	430	0.101	0.125	-0.089	0.273
GDP	430	6.665	1.35	4.23	8.5
CAB	430	-2.187	1.301	-4.915	-0.536
CPI	430	7.325	2.817	2.491	11.989
IntRate	430	0.068	0.011	0.044	0.085

Source: Authors

Total risk varies from 0.7% to 5.5%, with a mean of 2.6% and a standard deviation of 0.9%. The diversifiability ratio is also calculated, which is the ratio of unsystematic risk to total risk (Chen, 2013). The average diversifiability ratio for the sample firms is 0.896, which shows that on average 89.6 percent of total risk is attributable to the unsystematic portion and rest is attributable to the systematic portion. The average returns on total assets in the FMCG sector over the 10-year period are 10.44 percent, with a very high standard deviation of 8.46 percent. The minimum RoTA being -13.59 percent and the maximum exceeding 38 percent. Similarly, with the help of the summary statistics, the distribution of all the variables can be understood.

Correlation analysis

A correlation matrix was made so as to see the association between all the variables (reference is made to Table 4).

Mostly all the independent variables showed significant correlation with the dependent variables. All the variables, except for the current ratio and the market share, significantly correlated with systematic risk. Interestingly, none of the macroeconomic variables showed any significant association with unsystematic risk or with total risk. Also, a high degree of correlation between the independent variables leads to the problem of multicollinearity. D. N. Gujarati and D. Porter (2009) suggested that the data had a problem of multicollinearity when the degree of correlation was greater than 0.8. In the present study, no independent variable showed a value greater than 0.8. Another thumb rule for multicollinearity is that a Variance Inflation Factor (VIF) of 10 or above implies the presence of multicollinearity (O'brien, 2007). The VIF scores were calculated, the results of which are accounted for in Table 5. The outcomes of the mean VIF scores depict that the scores for each model are 2.57, which is less than the threshold limit. Hence, it can be concluded that there is no multicollinearity.

The diagnostic tests

Before running panel data regression, it is vital that a few diagnostic tests (Table 5) were performed so as to apply an appropriate regression technique. First,

Table 4 The correlation matrix

Variables	SysRisk	UnsysRisk	TotalRisk	CR	RoTA	MktCap	PE	PB	AdvInt	Div	QR	MktShare	ACWI	GDP	CAB	CPI	IntRate
SysRisk	1.000																
UnsysRisk	0.4906*	1.000															
TotalRisk	0.5729*	0.9852*	1.000														
CR	0.019	-0.1568*	-0.1381*	1.000													
RoTA	-0.2826*	-0.4342*	-0.4353*	0.3838*	1.000												
MktCap	-0.2770*	-0.7407*	-0.7197*	0.2023*	0.5847*	1.000											
PE	-0.2042*	-0.4885*	-0.4932*	0.047	0.2418*	0.6018*	1.000										
PB	-0.3289*	-0.5836*	-0.5876*	0.078	0.6752*	0.7926*	0.6616*	1.000									
AdvInt	-0.3689*	-0.4739*	-0.4781*	-0.021	0.2340*	0.4985*	0.5508*	0.5765*	1.000								
Div	-0.3605*	-0.6588*	-0.6496*	0.2335*	0.6703*	0.8244*	0.4083*	0.6439*	0.3991*	1.000							
QR	-0.1415*	-0.3363*	-0.3203*	0.7424*	0.5048*	0.3795*	0.2810*	0.3770*	0.2601*	0.3820*	1.000						
MktShare	0.072	-0.3373*	-0.2932*	0.1047*	-0.011	0.3989*	0.1379*	0.1000*	0.1003*	0.3143*	0.011	1.000					
ACWI	-0.0999*	-0.031	-0.009	0.021	0.009	0.007	-0.076	-0.038	-0.004	0.015	0.015	0.013	1.000				
GDP	0.1428*	0.028	-0.006	-0.029	0.017	0.026	0.1456*	0.1199*	0.025	-0.027	-0.031	-0.011	-0.1515*	1.000			
CAB	0.2751*	-0.014	0.047	0.1386*	0.1469*	0.2185*	0.1253*	0.1605*	-0.095	0.088	0.1063*	0.046	0.1152*	0.2727*	1.000		
CPI	-0.3541*	0.091	0.072	-0.1379*	-0.1567*	-0.2744*	-0.2068*	-0.2253*	0.1080*	-0.1042*	-0.1307*	-0.046	0.2121*	-0.067	-0.5758*	1.000	
IntRate	-0.3409*	0.051	-0.015	-0.1632*	-0.1498*	-0.2342*	-0.0977*	-0.1325*	0.1256*	-0.0987*	-0.1489*	-0.055	-0.3609*	-0.061	-0.6422*	0.5933*	1.000

Note: *shows significance at the 0.05 level

Source: Authors

Table 5 The results of the diagnostic tests

Tests	Model 1: SysRisk		Model 2: UnsysRisk		Model 3: TotalRisk	
	Findings	Interpretation	Findings	Interpretation	Findings	Interpretation
Levin-Lin-Chu Test (Stationarity)	All variables were stationary at level					
Breusch-Pagan Test (Heteroskedasticity)	Chi^2 = 24.43; Prob > chi^2 = 0.0000	The presence of hetero-skedasticity	Chi^2 = 62.23; Prob > chi^2 = 0.0000	The presence of hetero-skedasticity	Chi2 = 46.20; Prob > chi^2 = 0.0000	The presence of hetero-skedasticity
Wooldridge Test (Autocorrelation)	F(1, 41) = 7.653; Prob > F = 0.0005	The presence of the first-order auto-correlation	F(1, 41) = 10.250; Prob > F = 0.0006	The presence of the first-order auto-correlation	F(1, 41) = 24.109; Prob > F = 0.0000	The presence of the first-order auto-correlation
Ramsey RESET Test (Omitted Variables)	F(3, 402) = 9.04; Prob > F = 0.0000	The model omitted the variables	F(3, 402) = 25.52; Prob > F= 0.0000	The model omitted the variables	F(3, 402) = 11.02; Prob > F= 0.0000	The model omitted the variables
Wu-Hausman Test (Endogeneity)	F(1,363) = 8.545; Prob > F = 0.0037	The variables are endogenous	F(1,363) = 6.505; Prob > F = 0.0012	The variables are endogenous	F(1,363) = 6.714; Prob > F = 0.0000	The variables are endogenous
Mean Variance Inflation Factors (Multicollinearity)	2.57	No multi-collinearity	2.57	No multi-collinearity	2.57	No multi-collinearity

Source: Authors

the Levin-Lin-Chu unit root test was performed to check for the stationarity of all the variables (Levin, Lin & Chu, 2002). This test is considered to be the most suitable test in the case of balanced panel data. The results of the test rejected the null hypothesis for all the variables at a 5-percent significance level, indicating the fact that the variables were stationary and there was no unit root. Second, one of the most important assumptions of regression is homoskedasticity, which indicates the fact that the error term has a constant variance. Heteroskedasticity is the violation of this assumption. The Breusch-Pagan test was done to test heteroskedasticity. The findings obtained by doing the test for all the three models confirmed the presence of heteroskedasticity as the null hypothesis was rejected.

Additionally, the Wooldridge test for serial correlation was used to test autocorrelation (Wooldridge, 2007). The result depicts that the null hypothesis is rejected, and it is possible to draw conclusions related to the presence of the first-order autocorrelation, which means that the error terms follow the pattern rather than being independent of each other. Another diagnostic test implies checking if any important independent variable is omitted from the model, and the problem of underspecifying or misspecifying variables in the model arises. The omitted variables lead to the violation of the exogeneity assumption. In order to check if the model has (or has not) omitted the variables, the Ramsey Regression Equation Specification Error Test (RESET) was applied (Ramsey, 1969). The findings of the test demonstrate the rejection of the null hypothesis and inferences as to the presence of the important, however omitted variables can be drawn. Lastly, the Wu-Hausman test was performed so as to check for endogeneity. The null hypothesis asserts that the OLS estimator is consistent and that the considered variable can be deemed to be exogenous. The outcome indicates the fact that the null hypothesis is rejected, as the F-statistics are significant at a 5-percent significance level and the interpretation of the endogenous variables can be concluded as such (Wu, 1973; Hausman, 1978).

Regression analysis

With respect to solving the heteroskedasticity problem, autocorrelation, the omitted variables and endogeneity, the dynamic panel data regression technique was applied in the study. To investigate the impact of the company-specific and macroeconomic variables on the risk measures, SGMM regression was performed. As discussed earlier, the present paper refers to the nine company-specific variables, namely CR, RoTA, MktCap, PE, PB, AdvInt, Div, QR, and MktShare. Also, each model includes the five macroeconomic variables, namely ACWI, GDP, CAB, CPI and IntRate. Regarding the assessment of the impact of these variables, three regression models were developed. The findings of the models 1, 2 and 3 are tabulated in Table 6. Firstly, the results of the present study are coherent with the theory. The number of the macroeconomic variables that affect systematic risk is greater as compared to the number of the macroeconomic factors affecting unsystematic risk. Also, the number of the company-specific variables that significantly affect unsystematic risk is greater as compared to those that affect systematic risk. Furthermore, there are certain factors that affect systematic, unsystematic and total risk, too, in a similar manner. Profitability (measured by return on total assets) showed a positive association with all the three measures of risk. So, the hypotheses H1a, H1b and H1c remain rejected. This result is contradictory to the underlying theory stipulating that highly profitable firms should pose lower risk for investors. However, the previous studies such as C. Mar-Molinero *et al* (2017), M. J. Iqbal and S. Z. A. Shah (2012) and A. D. Castagna and Z. P. Matolcsy (1978) also showed the presence of a positive association between profitability and systematic risk. Confirming the results of the previous studies (Logue & Merville, 1972; Patro *et al*, 2002; Karakus, 2017), the dividend showed a negative association with not only systematic risk, but unsystematic and total risk as well, which means that the hypotheses H7a, H7b and H7c are rejected. The firms paying higher dividends are perceived to be performing well; hence investors perceive them to be characterized by a smaller risk. The price-to-book ratio showed the presence of a positive association with unsystematic risk and total risk. So, the hypotheses H4b and H4c are rejected, whereas the hypothesis H4a is not rejected. When the market value of shares is higher as compared to their book value, such a situation may be risky since stocks are overvalued on the market and might fall back to their book-value level. However, this concern does not affect the magnitude with which a firm is affected by economic changes, i.e. the PB ratio does not significantly affect systematic risk. Systematic risk is also affected by its lag value, on the one hand, whereas, on the other, unsystematic and total risks are not affected by their respective lag values, which means that the systematic risk of one year has a role in the next year's value as well.

Two measures specific to the FMCG sector are used in the present study. Both advertising intensity and the market share are significant in explaining risk. The hypotheses H6a, H6c, H8b and H8c are rejected, whereas the hypotheses H6b and H8a are not. While the higher advertisement expenses reduced systematic and total risks, the higher market share reduced unsystematic and total risks. Both advertisements and the higher market share create a positive brand image leading to investors' lower risk perceptions. Measured by the current ratio and the quick ratio, the size of the firm and the PE ratio, liquidity showed a significant positive relationship with only unsystematic risk. Out of the 2nd, 3rd and 5th hypotheses, the hypotheses H2b, H3b and H5b are rejected, whereas the others are not, which means that investors find higher liquidity to be a sign of the inefficient utilization of cash, hence a risky position for business. They also believe a big size to be detrimental to the organization because of the inefficiencies that might creep in or because firms might opt for riskier investments. Smaller firms have more flexibility in running their operations (Lee & Jang, 2007). Investors' positive expectations about the company, as reflected in high PE ratios, also imply a risky situation, given the fact that the company is put a lot of pressure on in order for it to perform according to such expectations.

The GDP showed a positive association with all the three risk measures. The hypotheses H10a, H10b and H10c are rejected. G. Boz *et al* (2015) showed that when

Table 6 The dynamic panel data regression results

Independent Variables	Model 1: SysRisk		Model 2: UnsysRisk		Model 3: TotalRisk	
	Coefficient (t-value)	Standard Error	Coefficient (t-value)	Standard Error	Coefficient (t-value)	Standard Error
Constant	1.016 (3.11)***	0.327	0.002 (5.67)***	0.000	0.046 (6.16)***	0.007
SysRisk (-1)	0.270 (4.33)***	0.062	-	-	-	-
UnsysRisk (-1)	-	-	0.051 (0.84)**	0.061	-	-
TotalRisk (-1)	-	-	-	-	0.118 (1.64)**	0.072
RoTA	0.008 (6.68)***	0.001	0.000 (5.57)***	0.000	0.000 (2.90)***	0.000
CR	-0.130 (-1.64)	0.080	0.000 (2.64)***	0.000	0.001 (1.16)	0.001
MktCap	0.021 (0.69)	0.030	0.000 (-2.92)***	0.000	-0.001 (-1.69)*	0.001
PB	-0.006 (-1.91)*	0.003	0.000 (2.08)**	0.000	0.000 (3.23)***	0.000
PE	0.000 (-1.13)	0.000	0.000 (-2.75)***	0.000	0.000 (-1.12)	0.000
AdvInt	-2.771 (-2.38)**	1.164	-0.001 (-0.68)	0.001	-0.044 (-2.21)**	0.020
Div	-0.000 (-3.00)***	0.000	-0.000 (-2.57)**	0.000	-0.000 (-2.16)**	0.000
QR	0.163 (1.54)	0.106	0.000 (-2.88)***	0.000	-0.002 (-1.14)	0.002
MktShare	0.291 (0.74)	0.395	-0.001 (-2.61)***	0.000	-0.013 (-1.96)*	0.007
ACWI	-0.284 (-4.63)***	0.061	0.000 (-4.86)***	0.000	-0.006 (-5.55)***	0.001
GDP	0.031 (2.81)***	0.011	0.000 (-1.82)*	0.000	-0.001 (-4.95)***	0.000
CAB	0.001 (0.09)	0.010	0.000 (4.13)***	0.000	0.001 (10.90)***	0.000
CPI	-0.038 (-3.86)***	0.010	0.000 (-0.73)	0.000	0.000 (2.35)**	0.000
IntRate	-3.284 (-2.50)**	1.314	-0.001 (-0.47)	0.002	0.007 (0.17)	0.040
Wald Chi^2	1384.678, Prob > chi^2 = 0.000		6891.600, Prob> chi^2 =0.000		2508.665, Prob > chi^2 = 0.000	
AR (1)	-3.697, Prob > z = 0.000		-3.011, Prob > z = 0.000		-3.570, Prob > z = 0.000	
AR (2)	1.225, Prob > z = 0.221		-0.680, Prob > z = 0.496		-0.820, Prob > z = 0.412	
Sargan test	33.49, Prob > chi^2 = 0.759		30.01, Prob > chi^2 = 0.645		33.02, Prob > chi^2 = 0.633	

Note: *** p<0.01, ** p<0.05, * p<0.1

Source: Authors

the economy grew, people started spending more on tourism, which reduced the risk for investors in the tourism sector. On the same grounds, when the economy grows, spending shifts from the necessities like the FMCG sector to the luxuries like tourism, which leads to an increase in the risk for investors in the FMCG sector. The hypotheses H9a, H9b and H9c are all rejected. MSCI ACWI significantly affected all the risk measures. This result confirms the volatility transmission between the world financial markets, as explained by P. Kofman and M. Martens (1997). The current account balance as a percentage of the GDP shows a country's openness to trade. The greater value of this measure increased unsystematic risk and total risk. The hypotheses H11b and H11c are rejected, whereas the hypothesis H11a is not rejected. G. Bekaert and C. R. Harvey (2000) also showed that exposure to the global risk factors increased with the increase in trade openness. Furthermore, inflation showed a significant positive relationship with total risk. As per Fisher's theory, stocks provide a hedge against inflation, so stock returns must be positively

related to inflation. With this explanation in mind, the present result can be interpreted in the manner that a rise in inflation increases capital flows to stock markets, leading to an increase in total risk (Patro *et al*, 2002). On the contrary, systematic risk showed a negative association with inflation, thus leading to the rejection of the hypotheses H12a and H12c, but not to the rejection of the hypothesis H12b. The interest rate showed a significant negative association only with systematic risk, not with unsystematic and total risks. The hypothesis H13a is rejected, whereas the hypotheses H13b and H13c are not. Lowering interest rates increases the capital mobility on the financial markets, which makes companies more susceptible to systematic risk (Arfaoui & Abaoub, 2010).

Postestimation tests

After the regression analysis, it is essential that postestimation tests should be done, which includes the AR(1), AR(2) and Sargan-Hansen tests. These tests are performed in order to check the first-order autocorrelation, the second-order autocorrelation and over-identifying restrictions in the model. The outcomes of these postestimation tests are presented in Table 6. As discussed earlier, the models had a problem of the first-order autocorrelation and the same results are shown through AR(1). The findings of AR(2), however, demonstrate that the null hypothesis cannot be rejected; hence the autocorrelation problem is solved at the second level (Arellano & Bond, 1991). In addition to this, the results of the Sargan-Hansen test for all the models fail to reject the null hypothesis, as the p-value is greater than 0.05 (therefore, it is possible to make a conclusion that the used instruments are valid).

CONCLUSION

The present study reiterates the importance of considering unsystematic risk in decision-making. The results show that on average 89.6% of total risk is attributable to the unsystematic portion and the rest is attributable to the systematic portion. This is an interesting finding for the Indian FMCG sector, and investors should not ignore this kind of risk. Furthermore, the present study seeks to demonstrate the factors that affect the different measures of the market risk. Dynamic panel models were used for the empirical analysis. First of all, the fundamental financial information is found to be relevant for investors' decision-making, given the fact that this piece of information affects risk measures, which is critical for investment decisions. The results suggest that both financial variables and macroeconomic variables can be used to gauge the risk related to investments. The results of the present study are coherent with theory. The number of the macroeconomic variables that affect systematic risk is greater than the number of the macroeconomic factors affecting unsystematic risk, whereas the number of the company-specific variables that significantly affect unsystematic risk is greater than the number of those that affect systematic risk. Systematic risk, however, is not solely affected by macroeconomic variables, and unsystematic risk is not solely affected by company-specific variables. Profitability, dividends, the world stock markets, and a country's economic growth are the most significant variables for investors, since these affect all types of risk. Moreover, with the help of results of the present study, marketing personnel can justify advertising expenditure, as well as their other marketing efforts that build their brand value and increase their market share, given the fact that these efforts will reduce risk for investors and increase their wealth.

The results obtained in this study are especially useful for business managers to understand risk and the factors contributing to it. This in turn will help them to observe important information about the cost of capital and the market value of the firm as well. With the help of the findings accounted for in the present study, both managers and investors of FMCG firms may gain useful insights which they can be incorporate in their decision-making process. Now, managers know which financial factors affect their firms' risk measures, so they can try to gain control over such financial measures. Specifically, profitability and dividends significantly affect risk measures, so managers can try to improve these

measures so as to reduce the risk for investors and attract more investors at the same time. Likewise, investors have to carefully evaluate these variables for the FMCG companies they want to invest in. Apart from company-specific variables, investors also have to evaluate the conditions of the world stock markets, as well as a country's economic conditions, through the GDP, inflation, foreign trade and interest rates. Furthermore, investors may use the results of the present study to predict the risk levels of FMCG companies. For the listed companies, beta and the cost of capital can easily be calculated with the help of the available information about the price. For non-listed companies or for new ventures, however, such calculations are impossible. In such cases, accounting information can be used as an alternative to market information. Another implication of the present study is that it supports the efficient market hypothesis by showing that accounting information is impounded in market prices.

There are certain limitations to the present study. As the study uses CAPM, all the limitations of CAPM hold for this research as well. Particularly, the assumptions about perfect capital markets without taxes and the ability to diversify all unsystematic risk are all but true in real life. Furthermore, it is very difficult to measure beta with absolute precision. The model suggests that beta should be calculated based upon the whole of the market, which should include every asset ranging from stocks to bonds, to metals, to real estate, even to human capital. Beta values may broadly vary depending on the measure used for a particular market. The present study used S&P BSE 500 as a proxy for the market. The results are only as good as this assumption. No market index perfectly represents the general market. So, the beta calculated by using a market index may actually fail to capture many factors or elements of systematic risk. Moreover, the limitations of beta are also the limitations of this study. Suppose there are two stocks, A and B, both having the same beta value showing their riskiness in comparison with the market. Allow the stock A to have a higher frequency of downside movements, simultaneously allowing the stock B to have a similar higher frequency of upward movements. Beta does not account for this direction of price movements. Future studies can increase the sample size and they can also include a larger number of variables or different measures of the same variables. Behavioral finance theories have lately been seen as an improvement over traditional finance theories. As suggested by M. Lekovic (2019), the behavioral finance components can be included so as to complement traditional theories, such as modern portfolio theory. So, future studies can further the current work done with behavioral finance components.

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ENHANCING PRODUCTION AND SALE BASED ON MATHEMATICAL STATISTICS AND THE GENETIC ALGORITHM

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Enhancing production and sale has a very significant effect on the competitive advantage of any production enterprise. In practice, especially in companies with highly diversified production, products have a different impact on generating revenue. Therefore, operational management pay attention to the products of the utmost importance. The Pareto analysis is the most broadly used product classification method. It can be said that the results obtained by this analysis are still very burdened by decision-makers' subjective attitudes. This paper proposes a model for selecting products with the biggest impact on generating revenue in an exact way. In the model's first stage, whether there is a linear relationship between volume demand and a discounted amount is analyzed applying mathematical statistics methods. In the second stage, the Genetic Algorithm (GA) method is proposed so as to obtain a near-optimal set of the most important products. The proposed model is shown to be a useful and effective assessment tool for sales and operational management in a production enterprise.

Keywords: product portfolio selection, enhancing production and sale, descriptive statistics, regression analysis, genetic algorithm

JEL Classification: C40, C61

INTRODUCTION

Due to the frequent changes that occur in the environment, the complexity of operational management in production companies is increasing (Ferdows, 2018). Those problems might be analyzed in different domains, such as the diversification of the production program, the production capacity management, or sales management. All of the foregoing relates to products, where a product (Kotler & Keller, 2016) is everything that can be offered on the market in order to meet customer needs, including a physical product, services (hereinafter ISO 9000: 2016 product), satisfaction, an event, a place, a property, organization, information, and ideas. Given the fact

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that people do not buy products, but they rather buy the expected benefits or solutions according to T. Levitt (1980), it becomes clear that products are becoming increasingly more complex. The fact that the effectiveness of operational management is propagated throughout the company and that it significantly affects the achievement of the most important business goals such as the company's profit, survival, growth, and development should be emphasized.

Starting from the fact that the production program consists of many products, operational management needs to classify products in order to increase the effectiveness of management. Effectiveness is described as the execution of right actions in the right manner, which fact can be applied in different industries (Pakulin, Tsypkin & Pakulina, 2016). In this sense, classification should result in prioritizing products which should be taken into account while executing those actions (Lorenc & Lerher, 2019). Without classification, all products would be treated in the same way, so neither revenue nor the effectiveness of management would be maximized. Several methods developed in the literature are used to classify different items (Chu, Liang & Liao, 2008). The ABC method is the simplest and most broadly used classification method. It is integrated in the literature, together with other methods (Puente, Fuente, Priore & Pino, 2002; Hadi-Vencheh & Mohamadghasemi, 2011; Kefer, Milanovic, Misita & Zunjic, 2016). The sorting problem can be solved by using multicriteria decision-making methods (Alvarez, Ishizaka & Martínez, 2021). Multi-attributive decision-making approaches and the Pareto analysis could be combined for this purpose (Liu, Liao, Zhao & Yang, 2016). It is, however, mathematically more correct to pose the classification problem as the optimization problem of varying complexity. The product classification problem can be considered to be a Nondeterministic Polynomial-time (NP) problem. Numerous metaheuristic methods for solving NP problems have been developed in the literature (Sadigh, Mokhtari, Iranpoor & Ghomi, 2012). Using the Genetic Algorithm (GA), which is the most used method, a near-optimal solution is given (Senvar, Turanoglu & Kahraman, 2013; Nestic, Stefanovic, Djordjevic, Arsovski & Tadic, 2015; Rezoug, Bader-El-Den & Boughaci, 2018; Tadić, Djordjević, Aleksić & Nestić, 2019; Lu, Pei, Liu, Qian, Mladenovic & Pardalos, 2020; Gojković, Djurić, Tadić, Nestić & Aleksić, 2021), as is done in this paper. The fact that the application of heuristic methods provides optimal solutions should be highlighted. NP problems, such as the problem discussed in this paper, cannot be solved using heuristics. In such cases, evolutionary algorithms such as the GA are most often used so as to obtain near-optimal solutions.

The motivation for the research comes from the fact that the literature does not provide us with a significant number of the models treating the relationship between demand and the unit sale price of certain products in a portfolio. The subject matter of the research conducted herein is the analysis of the relationship between demand and a discounted amount, as well as the selection of the products that affect an increase in revenue the most. The goal of the research study is of a complex nature, with the two specific objectives:

- to determine the dependence between demand and a discounted amount, and
- to determine the products whose unit sale price could be decreased to a purposeful level, so that it can significantly enhance the generation of revenue for the company.

In accordance with the mentioned objectives, two hypotheses can be set:

H1: The dependence between demand and a discounted amount can be determined in an exact way.

H2: As the unit sale price decreases while demand increases, it is possible to determine the products in the portfolio the demand for which will generate more revenue than others in an exact way.

The scientific instruments employed in the research are descriptive statistics methods, regression analysis, and the GA. The goal of the research study is achieved through an appropriate research

methodology. Real-life data are collected from the representative company, so the analysis-based descriptive statistics are performed. The descriptive statistics method and regression analysis are broadly used as scientific instruments for solving different problems, such as the determination of the statistical dependence between customer trust and a purchase intention when choosing a wellness offer (Kocic & Radakovic, 2019). The analytical relationship between product demand and a decrease in the unit price is performed by regression analysis. The determination of the products that generate the highest revenue is obtained by applying the GA.

New management concepts treat the volume of production as strictly defined according to the demand that comes from end-users and depends on the degree of their satisfaction (Turkyilmaz, Oztekin, Zaim & Demirel, 2013). Customer satisfaction is based on the product attributes that can be both tangible and intangible. Tangible attributes are a functionality, a purpose, quality, the unit sale price, and so on (Gupta, 2018). Intangible attributes are associated with the symbolic characteristics of a product, such as its style, design, status symbol, ability, brand, and so forth (Goode, Davies, Moutinho & Jamal, 2005). The production capacity management, among other things, should be based on the knowledge of the dependence of demand and product attributes (Jiang, Kwong, Ip & Wong, 2012). In this research study, demand dependence and a discounted amount are investigated using mathematical statistics methods.

This paper is organized into the following chapters: after the Introduction, Chapter 2 provides a literature overview; In Chapter 3, the proposed methodology is presented, and in Chapter 4 a case study based on the data from a manufacturing company is given.

LITERATURE REVIEW

This section is dedicated to a detailed review of the literature dealing with the two main research areas:

- demand forecasting, and
- solving the classification problem.

Prediction methods can be of different complexity (Stevenson, Hojati & Cao, 2014). Experts' predictions based on a previous experience might be considered as simple. Complex methods are obtained by developing or using mathematical models and tools (Pinçe, Turrini & Meissner, 2021). Bearing in mind the fact that there are different situations in business when forecasting demand is needed, the models for it can be chosen differently. M. Ulrich, H. Jahnke, R. Langrock, R. Pesch and R. Senge (2021) propose an approach implying a choice of different existing forecasting models in the retailer industry, taking into account different information data that should be incorporated in the appropriate decision tree. The models that can be used for this purpose are linear regression, generalized additive models for the location, the scale and the shape, and quantile regression. Beside the mentioned models, there are also other demand forecasting models that can be used, such as optimization methods (Petrovic, Xie, Burnham & Petrovic, 2008; Mimovic, 2012), machine learning (Tsao, Chen, Chiu, Lu & Vu, 2021), and so forth. The following part is a presentation of the papers describing the models proposed for demand forecasting.

Starting from the generally known approaches, such as linear regression for time series forecasting (Ilic, Görgülü, Cevik & Baydoğan, 2021), demand forecast can be determined. To forecast demand, the formal linear regression model can be enhanced with partially linear additive quantile regression (Lebotsa, Sigauke, Bere, Fildes & Boylan, 2018). Linguistic variables modeled by discrete fuzzy sets can be used to describe customer demand (Petrovic *et al*, 2008). In the mentioned research study, the total costs in the considered supply chain were determined by decomposing the general model into several simpler sub-models. In separate models, costs are represented by linear affiliation functions with a tolerance between acceptable and pessimistic cost values. The constraints set in the coordination model were phase-discrete sets for the sub-model control. The optimal solution was found from the condition that the total costs that represented the function of the goal reached the minimum value, yet simultaneously meeting all the set limits. If rapid changes and vague

conditions over time are considered, the problem of demand forecasting is considered in the presence of uncertainty (Mimovic, 2012). Within the scope of the presented research (Mimovic, 2012), the values of the factors influencing demand were estimated by experts. They based their estimates on their knowledge, their experience, and the projected demand trends as well using a predefined measurement scale. The solution to the considered problem was obtained by applying the Analytical Network Process (ANP). Machine learning models can be used to analyze Business-to-Business (B2B) server industry demand forecasting (Tsao *et al*, 2021). The data were collected from the sales departments' historical data. The proposed machine learning models consisted of clustering, classification, and multiple regression. The results were compared with Simple Exponential Smoothing with Seasonality, Holt-Winters Exponential Smoothing, the autoregressive integrated moving average model, the extreme gradient boosting model, and the random forest model. The comparison was based on the Root Mean Square Percentage Error (RMSPE), the Mean Average Deviation (MAD), and the Mean Absolute Error (MAE).

This research study assumes that demand depends on a discounted amount. Demand forecasting is based upon the application of regression analysis. The main difference between this research study and the discussed sources in the literature (Ilic *et al*, 2021) lies in the application domain.

The literature provides no strict definition of or recommendations with respect to how to choose the products characterized by the greatest impact on the achievement of the business goals of a company (Stevenson *et al*, 2014). So, companies choose different approaches. According to the best practice results, product selection is based on the subjective assessments made by operational management. They make their assessments based on the data obtained from records, experience and current information about the changes that have occurred in the company and/or environment. In many industrial companies, the determination of product importance is based on the Pareto analysis. This method is simple, easy to understand and easily applicable. Many authors suggest the integration of the Pareto analysis and other methods for the purpose of increasing the accuracy of the solution (Hadi-Vencheh & Mohamadghasemi, 2011). Furthermore, a brief overview of the papers that can be found in the literature is also given. They propose the methods based on a combination of the Pareto analysis and other methods.

The ABC method could be integrated with the Fuzzy Analytic Hierarchy Process (FAHP) and Data Envelopment Analyses (DEA) (Hadi-Vencheh & Mohamadghasemi, 2011), whose integration leads to a unique presentation of all observed data and their classification in a unique and mutually comparable way. Classification can be made according to the criterion calculated as a product of the defuzzification of two uncertain criteria (Chu *et al*, 2008). Other scholars treated the product classification problem in a similar manner (Puente *et al*, 2002), so the value of classification criteria can be defined as a product of the two uncertain criteria: the volume of demand and the unit sale price. If classification criteria employ uncertainty with different weights (Kefer *et al*, 2016), criteria weights can be obtained by applying the FAHP (Chang, 1996). In compliance with that fact, a classification criterion could be defined as the distance of difficult normalized values from the positive ideal and the negative ideal solutions (Kefer *et al*, 2016). Combining the ABC with the other methods has led to the increased accuracy of classification solutions. No solution to the classification problem, however, has been obtained in an exact way, so its accuracy is still questionable.

In our research, the treated problem is referred to as a discrete optimization problem. Product selection is set as a classical Knapsack Problem (KP). Although filling a knapsack with a given set of objects with associated values and space requirements associated with them have a simple structure, this problem is known to be NP-hard. The KP has very important applications in the financial and industrial domains (Gojković *et al*, 2021), such as resource distribution, investment decision-making, the shipment of items, the budget controlling, production planning (Kellerer, Pferschy & Pisinger, 2004) and so on. According to many authors, the solution to the NP can be based on

the application of the GA (Gabaldon, Lerida, Guirado & Planes, 2014; Nestic *et al*, 2015; Metawa, Hassan & Elhoseny, 2017; Tadić *et al*, 2019). E. Gabaldon *et al* (2014) considered the estimation of the task execution slowdown used to guide the GA search process for the Job Scheduling Problem. A slowdown estimation is applied to express the fitness function. The fitness function defined for the slowdown estimation of the ranking of the Key Performance Indicators (KPIs) of the manufacturing process can be presented using the GA (Nestic *et al*, 2015). In this case, the two-goal functions were defined. The first was to maximize the sum of the overall weighted coefficient of the KPIs for the small and medium-sized enterprises (SMEs) and the second was to minimize the sum of the variance of the overall weighted coefficient of the KPIs for the SMEs. Beside manufacturing, other domains could also be analyzed by applying the GA approach. N. Metawa, M. K. Hassan and M. Elhoseny (2017) discussed the problem of bank ranking. In this case, the goal function was set as maximizing the bank's profit and minimizing the costs of crediting. D. Tadić *et al* (2019) discussed the problem of the site selection for the construction of the recycling centers using a two-objective GA. The procedure for determining the fuzzy suitability index was proposed. The goal function was set as maximizing the defuzzified suitability index values and minimizing the total distance between the randomly selected locations and the other nearest locations not selected for building the recycling center.

METHODOLOGY

In this chapter, a methodology for improving the effectiveness of operational management is presented. The production plan consists of the I products formally presented as a set of the indices {1,…,*i*,…,*I*}. The index of a product is denoted as i, $i = 1,\ldots,I$. The total period of the analysis T is divided into the discrete time intervals t. In the case study presented in this paper, that period is a period of one month. At the level of each period $t = 1,\ldots,m$ the data explaining the regular unit sale price, the realized unit sales price, and the sales volume can be obtained. The sales volume and economic revenue per unit are monitored and analyzed in the first half and in the second half of each time period, respectively. Demand for each the discrete time period t, $t = 1,\ldots,m$ can be treated as demand for the first half of that period x_{it}^1, and the demand for the second half of that period x_{it}^2. The unit sale price used for the first half of the time period is denoted as c_{it}^1, and the unit sale price used for the second half of the time period is denoted as c_{it}^2.

The proposed algorithm

A two-stage algorithm was developed (Figure 1). Based on the data obtained from the evidence (the values of demand for each product at each time period and the unit price for each product for each time period) the input data for the stage model were calculated using descriptive statistics (steps 1-4). Those input data included the total mean value of demand for each product at each time period, the total revenue for each product at each time period, and the discounted amount for each product at each time period.

In the first stage (Step 5), the dependence between demand and the discounted amount is described using a regression analysis. In the second stage (steps 6 to 7), the products that are considered as the most important for operational management in terms of increasing the total revenue are identified.

The proposed algorithm can be implemented through the below steps.

Step 1. Let x_{it}^1, x_{it}^2, represent the values of demand for the product i, $i = 1,\ldots,I.$ at the level of the first part or at the level of the second part of each discrete time period t, $t = 1,\ldots,m$, respectively. The total mean value of demand when the first part of each time period is taken into account is calculated in the following manner, x_i^1:

$$x_i^1 = \frac{1}{T} \cdot \sum_{t=1}^{T} x_{it}^1$$

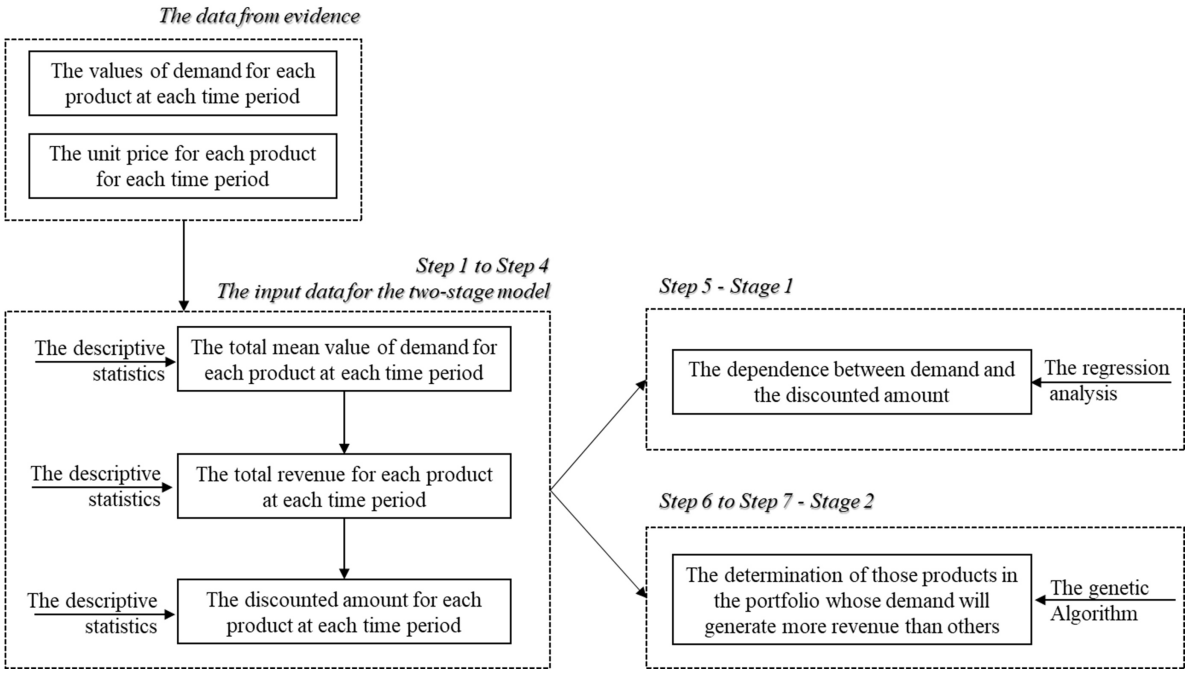

Figure 1 The proposed model

Source: Authors

The total mean value of demand when the second part of each time period is taken into account *t*, x_i^2 is determined in a similar fashion.

Step 2. The total revenue obtained in the total analyzed time period taking into account the first half of each denoted time period d_{it}^1 is obtained as follows:

$$d_i^1 = \sum_{t=1,..,T} x_{it}^1 \cdot c_{it}^1$$

Similarly, the value of the revenue for the second half of the month is calculated, d_{it}^2.

Step 3. The unit sale price is very often reduced by a decision made by the sales management. The value decrease index is marked as z_{it}^1, z_{it}^2, respectively, taking into consideration the first and the second halves of each denoted time period. The discounted amount is calculated as the difference between the regular and reduced unit prices.

Step 4. The mean value of the discounted amount at the level of the total analyzed time period *T* for the first half of each denoted time period z_i^1 is calculated as follows:

$$z_i^1 = \frac{1}{T} \cdot \sum_{t=1}^{T} z_{it}^1$$

The mean value of the discounted amount at the level of the total analyzed time period *T* for the second half of each denoted time period z_i^2 is calculated in a similar manner.

Step 5. The dependence between demand and the discounted amount should be examined by applying the regression analysis method (Black, 2019), in which way sales managers can determine the amount of the price discount while simultaneously generating revenue instead of a loss.

Step 6. The determination of those products whose unit sale price could be decreased to a purposeful

level, so that they can significantly enhance the generation of revenue for a company. This is stated as the KP problem:

the fitness function:

$$max \sum_{j=1,..,J} d_j^t, \quad j \in \{1,...,i,...,I\}$$

the objective:

$$\frac{1}{J-1} \cdot \sum_{j=1,..,J} z_j^t \leq z^*$$

$$\sum_{j=1,..,J} x_j^t \leq x^*$$

The values of the right side of the constraint (z^*, x^*) are defined on the data record and operational management. Those values may vary from one company to another and those are valid for the product selection in the first half of each discrete time period *t*

and

$$j = \begin{cases} 1 & \text{if the object j is selected} \\ 0 & \text{otherwise} \end{cases}$$

The problem is set in a similar way for the product selection in the second half of each discrete time period *t*.

Step 7. The near-optimal solution of the treated problem is generated by using the GA. In this case, the near-optimal solution represents those products in the portfolio demand for which will generate more revenue than others.

CASE STUDY

The proposed methodology is illustrated on the data obtained from the supply chain that operates in the Republic of Serbia. In the company, the process of furniture production is being realized with production plans that are defined based on the demand for each product from the product range. A small part of the manufactured products is sold to foreign customers. The operational management of the company strives to implement the Just in Time (JIT) business principle where retail is organized as a chain of 38 retail stores.

Action discounts are carried out monthly. Additional discounts are usually granted at the end of the calendar month. Based on the current production plan, it is determined when it is possible to produce/deliver any model. After confirming the purchase, the demand for the product is confirmed, based on which the production plan is updated. There is a causal link between the sale and the production plan. This is further reflected in the plan for the procurement of raw materials, employment planning, transport, revenue, and expenditure plans. Therefore, each purchase in any of the retail facilities in part affects the determination of the aggregate plan. If they relied entirely on this way of planning without any long-term predictions, it would be very difficult to maintain the profitability of the company as well as plan the development.

The analysis of the product portfolio

The product portfolio includes upholstered furniture: sofas, two-seaters, corner sets, beds, and armchairs. All pieces of furniture are delivered from the factory in several parts which can be assembled very easily, thus reducing the transport space. By packing on pallets, it is possible to load about 80 units into a transport truck, which greatly reduces the share of the transportation costs in the total cost of the product. In this paper, 35 products of the product range of the considered company are included. The data were collected over a period of 12 months. Demand for these products is not continuous. Sales promotions (discounts) are conducted on a monthly basis, and they are aimed at a specific product or a specific group of products. In addition to the monthly shares, there are also the short-term shares carried out at the end of the month or at the times when a change that requires an additional reduction is made on the market. No time periods in which there was

no demand for the products were included in the data processing. This assumption was introduced so as to avoid scattering the results.

An application of the proposed model

An illustration of the proposed algorithm (Step 1 to Step 3) is presented on the example of the product I = 30 (Table 1). This product was randomly selected. All other products from the company production program were considered in the same way.

The average value of demand at the level of the entire considered period of time for the first half of each month is as follows:

$$x_{30}^{1} = \frac{1}{11} \cdot (111 + 8 + 4 + 37 + 46 + 25 + 20 + 38 + 16 + 10 + 6) = 29.18$$

The revenue realized by selling the considered product for the first half of the month reads as follows:

d_1^1= 101.93·111 + 123.13·8 + 75.68·4 + 98.18·37 + 80.73·46 + 76.10·25 + 94.66·20 + 104.50·38 + 132.36·16 + 105.20·10 + 62.29·6 = 31250

The average value of the discounted amount at the level of the entire considered period of time for the first half of the month is as follows:

$$z_{30}^{1} = \frac{1}{11} \cdot (0.226+0.125+0.349+0.243+0.326+0.258+0.258 + 0.213 + 0.081 + 0.210 + 0.413) = 0.246$$

The average volume of demand, the total generated revenue, and the average discounted amount are shown in Figure 2. The values of the average volume of demand, the total generated revenue, and the average discounted amount for all the other products are calculated in a similar manner. The results of said calculation are given in Appendix, Table A.

The total average volume of demand for the product I = 30 at the level of each considered time period is presented in the form of a histogram in Figure 2a). The graphic of the total generated revenue for the product

Table 1 The demand values, the unit prices, and the discounted amount for the product I = 30

	c_{30t}^{1}	x_{30t}^{1}	z_{30t}^{1}	c_{30t}^{2}	x_{30t}^{2}	z_{30t}^{2}
t=1	101.93	111	0.226	105.84	284	0.207
t=2	123.13	8	0.125	99.20	13	0.238
t=3	75.68	4	0.349	79.74	26	0.331
t=4	98.18	37	0.243	105.08	358	0.211
t=5	80.73	46	0.326	83.65	41	0.312
t=6	76.10	25	0.258	83.79	26	0.193
t=7	94.66	20	0.258	108.72	30	0.193
t=8	104.50	38	0.213	100.83	26	0.231
t=9	132.36	16	0.081	124.68	17	0.118
t=10	105.20	10	0.210	95.71	12	0.255
t=11	62.29	6	0.413	39.79	2	0.520

Source: Authors

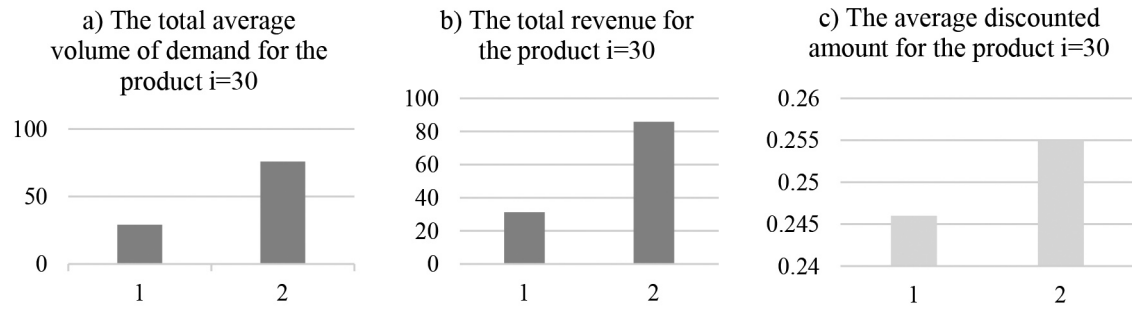

Figure 2 The graphic demonstration of a) the average volume of demand, b) the generated revenue, and c) the discounted amount for the product i=30 at the level of the total time period of 12 months

Source: Authors

I = 30 at the level of each considered time period is presented in the form of a histogram in Figure 2b). The average discounted amount for the product I = 30 is calculated based on the data obtained from the records at the level of each considered time period and the same is presented in the form of a histogram in Figure 2c).

By applying regression analysis, the dependence between the average volume of demand and the discounted amount (the Step 5 of the proposed Algorithm) should be examined.

Let us consider the first half of each time period (the first part of each month) by applying the pspp4windows software (Table 2). The pspp4windows software is a program for the statistical analysis of sampled data. In this case, a regression analysis module was used.

The regression line that describes the dependence between demand and the discounted amount is as follows:

$$\hat{x}_i = -0.18 + 53.89 \cdot z_i$$

The correlation coefficient is r = 0.41. The fact that some products could be described using a more elastic or less elastic demand (Mankiw, 2020) is worth mentioning. It may be considered that elastic demand means that in the case of a small change in the price, change in demand will be significant.

In the second half of each time period, a linear dependence is assumed to be present between demand and the discounted amount (Table 3).

Table 2 The obtained solution by using the pspp4windows software

The model summary

R	*R square*	*Adjusted R square*	*Std. error of the estimate*
0.41	0.17	0.15	9.18

ANOVA

	Sum of squares	*df*	*Mean square*	*F*	*Sig.*
Regression	560.63	1	560.63	6.65	0.015
Residual	2698.95	32	84.34		
Total	3259.57	33			

Coefficients

	Unstandardized coefficients		*Standardized coefficients*	*t*	*Sig.*
	B	*Std. error*	*Beta*		
(Constant)	-0.18	5.15	0.00	-0.03	0.973
	53.89	20.90	0.41	2.58	0.015

Source: Authors

Table 3 The obtained solution by using the pspp4windows software

The model summary

R	*R square*	*Adjusted R square*	*Std. error of the estimate*
0.35	0.12	0.09	17.69

ANOVA

	Sum of squares	*df*	*Mean square*	*F*	*Sig.*
Regression	1412.26	1	1412.26	4.51	0.041
Residual	10331.51	33	313.08		
Total	11743.77	34			

Coefficients

	Unstandardized coefficients		*Standardized coefficients*	*t*	*Sig.*
	B	Std. error	Beta		
(Constant)	-6.19	12.16	0.00	-0.51	0.614
	100.47	47.30	0.35	2.12	0.041

Source: Authors

The regression that describes the dependence between demand and the discounted amount is as follows:

$$\hat{x}_i = -6.19 + 100.47 \cdot z_i$$

The analysis of the correlation coefficient is delivered in a similar way as in the first time period. The value of the correlation coefficient is $r = 0.35$.

Considering the data from Table 2 and Table 3, it can be concluded that the dependence between demand and the discounted amount produces a positive, though not statistically significant. With respect to the hypothesis 1, a conclusion can be drawn that the analyzed dependence is nonlinear, and the type of the dependence should be examined in future research.

Concerning the results of the Pareto analysis, about 30% of the total product development can be said to be of great and medium importance for operational management. Based on this fact, it was determined that 10 products should be selected from the set of the available products that operational management must consider. In compliance with the Step 6 of the proposed algorithm, the company management introduced the value of the constraint $z^* = 0.333$, which is determined according to the statistical analysis since it represents the threshold of the non-loosing revenue below that value. The value $x^* = 250$ was determined according to the information obtained from the market. According to the proposed algorithm (Step 6 to Step 7), the obtained near-optimal solution on an annual basis for the first half of the month was obtained. Figure 3 clearly shows that the near-optimal solution was achieved in about 630 iterations.

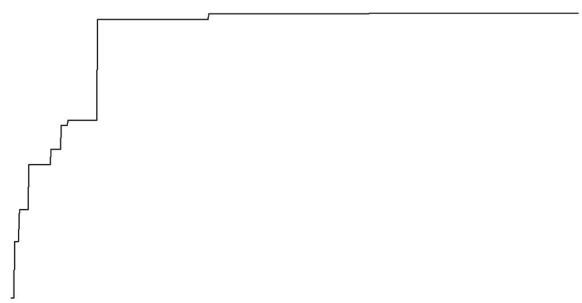

Figure 3 The obtained solution by using the GA at the level of the first half of the month

Source: Authors

The near-optimal solution is (i = 12; i = 16; i = 21; i = 24; i = 26; i = 28; i = 30; i = 32; i = 33; i = 34). The recommendation for management is to consider those products as the most significant for each considered first period of time at the total time interval.

In the same way, the data obtained at the second time period are analyzed on the set of the significant products denoted by applying the GA algorithm.

For the second part of each time period (the second part of each month), the GA search is presented in Figure 4.

The near-optimal solution is achieved in 612 iterations as (i = 6; i = 16; i = 18; i = 21; i = 24; i = 26; i = 28; i = 30; i = 33; i = 34). The recommendation for management is to consider those products as the most significant

for each considered second time period at the whole-time interval. In this way, the products contributing to an increase in revenue are identified while the discounted amount and the sales volume are predefined. In this way, the hypothesis 2 is confirmed.

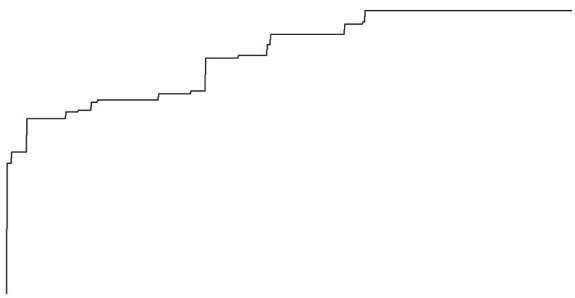

Figure 4 The obtained solution by using the GA at each considered second time period

Source: Authors

DISCUSSION

The model is presented as a two-stage model. The first stage (Step 5) is dedicated to the sales managers with a goal of making a practical contribution, in which way sales managers can determine the amount of the price discount while simultaneously generating revenue instead of making a loss. Stage 2 (Step 6 to Step 7) is dedicated to operational management with the goal to make a practical contribution, in which way operational managers can determine the products in the portfolio demand for which will generate more revenue than others. In that way, the company can pay more attention to the management of those products.

The results of the descriptive statistics indicate the following (Step 1 to Step 4): for 9% of the products, the sales volume and the generated revenue are higher in the first half of the month; for 11% of the products, the sales volume and the generated revenue are approximately the same in the first and the second halves of the month. The sales volume of the largest number of the products (about 80%) is higher in the second half of the month. The generated revenue corresponds to the sales volume. At the same time, the obtained results indicate the fact that, for most products (80%), the sales are higher in the second half of the month for several reasons. The sales shares (discounts) are promoted at the end of the month, which leads to increased purchases. Sellers' motivation in retail stores increases at the end of the month when they are busy working on the implementation of the set sales plans. To equalize demand and the sales volume in all parts of the month, it is necessary to do additional research and define a strategy to reduce this difference. Also, after finding all the reasons for this difference in sales, their analysis should be used as the input in the planning department for procurement planning and the production cycle planning in future time intervals. There are several products with stable demand. For 11% of the products, there is no relationship between the part of the month in which they are sold and the sales volume.

The results of the descriptive statistics are used for the regression analysis. In this way (Step 5), it is shown that there is a linear dependence between demand and the discounted amount. At the level of each product, change in demand can be the subject matter of forecast by an analysis of the value of the discounted amount.

By applying the GA (Step 6 to Step 7), the near-optimal solution is obtained on an annual basis for both time periods under consideration. Production and sales management perceive the near-optimal solution as a list of the products exerting the biggest impact on the revenue generated by the company. The obtained solutions are not identical. This is an important piece of information for both production and sales management since it could serve as an input for production planning, which represents the main managerial implication of the conducted research study. The practical implications refer to operational management, since those products should be treated more carefully from the quality management, transport, and logistics perspectives.

CONCLUSION

The case study analysis performed based upon the actual business results of a production and sales company highlights the most important results of the conducted research. The theoretical contribution of the research study could be summarized as follows:

- the dependence between demand and the discounted amount is determined on a large sample in an exact way;
- it is also shown that it is possible to determine the products in the portfolio demand for which will generate more revenue than others in an exact way as the unit sale price decreases, on the one hand, and demand increases, on the other.

The observed sales results were very suitable for proving the mentioned dependences, because changes in the product prices were often propagated, which clearly and unambiguously reflected on the sales volume and on the revenue as well. There is an evident difference in the sales volume between the two periods of the month, namely the first and the second halves of the month, for about 80% of the products included in the study. This difference in the sales volume in favor of the second half of the month is presumably a result of the campaign discounts propagated most often in the second half of the month. This assumption is also proven.

Practical contribution - The obtained research results should be viewed from the aspect of a practical contribution in sales planning, procurement planning, and production planning. The managers of the named departments should use the obtained regression line to determine the forecast values so that planning can be enhanced in those departments. This confirms the necessity for the cooperation of all the parts of a company. Every, even the smallest change in sales can be said to affect all the aspects of the company's business to a greater or lesser extent. If income and expenses are planned from the economic point of view for a certain period of the proven dependence, they can help to forecast the same most accurately. Since the mentioned dependence was established, when planning a purchase or production, sales plans should be considered. If production wants to achieve a certain production volume, it can use the procurement service to influence increased demand, i.e. to increase the sales volume using a product price discount as a corrective factor. The sensitivity of each product to the corrective price reduction index should serve as the basis for the day-to-day planning of sales campaigns in the future. The main constraint of the proposed method pertains to a relatively great number of the input data and the collection of those, since it is a complex task.

In today's business environment, defining an optimal portfolio is crucial for a market success. To define the optimal portfolio, it is very important to qualitatively evaluate and interpret the existing historical business results. Poorly interpreted information about the previous performance of a certain product on the market may lead to a situation where a wrong strategy may be introduced. In this paper, the importance of the product is determined by the Pareto analysis according to each considered criterion separately, namely according to the sales volume, the total revenue, and the discounted amount. The overall importance of the product is determined based upon the tautology, the conjunction method. In this way, the form of the conventional Pareto analysis is not disturbed. The importance of the product obtained in this way is an unambiguous indicator for the further planning of its development. Future research could be oriented towards a modification of the mathematical model in the direction of the improvement of the defined GA constraint, where the variance of the discounted amount could be performed at the level of each product.

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APPENDIX

Table A The average volume of demand, the total generated revenue and the average discounted amount

	x_i^1	d_i^1	z_i^1	x_i^1	d_i^2	z_i^2
i=1	16	$3.65 \cdot 10^3$	0.303	22.75	$4.94 \cdot 10^3$	0.335
i=2	10.75	$5.76 \cdot 10^3$	0.211	16.50	$8.80 \cdot 10^3$	0.233
i=3	9.75	$2.92 \cdot 10^3$	0.293	20	$4.91 \cdot 10^3$	0.208
i=4	14.12	$12.76 \cdot 10^3$	0.251	21.50	$18.62 \cdot 10^3$	0.260
i=5	14	$4.48 \cdot 10^3$	0.293	19.33	$6.31 \cdot 10^3$	0.262
i=6	10.14	$8.06 \cdot 10^3$	0.152	8.29	$8.32 \cdot 10^3$	0.191
i=7	7.92	$7.43 \cdot 10^3$	0.304	15.15	$9.55 \cdot 10^3$	0.286
i=8	7.25	$2.36 \cdot 10^3$	0.289	5	$1.66 \cdot 10^3$	0.243
i=9	10.20	$5.19 \cdot 10^3$	0.199	33.33	$16.75 \cdot 10^3$	0.248
i=10	9.25	$3.52 \cdot 10^3$	0.288	19.25	$6.56 \cdot 10^3$	0.365
i=11	5	$1.29 \cdot 10^3$	0.222	7	$1.71 \cdot 10^3$	0.242
i=12	25.09	$41.68 \cdot 10^3$	0.208	29.50	$14.51 \cdot 10^3$	0.219
i=13	1.67	$0.43 \cdot 10^3$	0.067	2.67	$0.52 \cdot 10^3$	0.175
i=14	10.50	$10.45 \cdot 10^3$	0.144	14.12	$14.28 \cdot 10^3$	0.154
i=15	1.20	$0.97 \cdot 10^3$	0.253	3.80	$2.85 \cdot 10^3$	0.284
i=16	11.30	$15.20 \cdot 10^3$	0.179	13.60	$15.33 \cdot 10^3$	0.224
i=17	2.75	$1.84 \cdot 10^3$	0.181	5.25	$3.26 \cdot 10^3$	0.23
i=18	2.50	$1.90 \cdot 10^3$	0.161	2.67	$2.07 \cdot 10^3$	0.148
i=19	6.75	$4.64 \cdot 10^3$	0.279	11	$7.27 \cdot 10^3$	0.301
i=20	13.50	$5.08 \cdot 10^3$	0.453	13.75	$5.21 \cdot 10^3$	0.407
i=21	13.71	$28.49 \cdot 10^3$	0.223	21.86	$40.89 \cdot 10^3$	0.280
i=22	10.20	$4.63 \cdot 10^3$	0.253	12.60	$6.38 \cdot 10^3$	0.195
i=23	16	$11.45 \cdot 10^3$	0.212	15.20	$10.11 \cdot 10^3$	0.239
i=24	30.60	$45.93 \cdot 10^3$	0.220	41.10	$59.47 \cdot 10^3$	0.233
i=25	9.14	$10.44 \cdot 10^3$	0.207	15.86	$16.43 \cdot 10^3$	0.239
i=26	11.43	$12.91 \cdot 10^3$	0.191	14.14	$16.77 \cdot 10^3$	0.199
i=27	4.50	$2.66 \cdot 10^3$	0.289	4.50	$2.85 \cdot 10^3$	0.346
i=28	21.50	$46.24 \cdot 10^3$	0.238	49.81	$71.81 \cdot 10^3$	0.241
i=29	6	$4.04 \cdot 10^3$	0.312	8.50	$5.29 \cdot 10^3$	0.258
i=30	29.18	$31.25 \cdot 10^3$	0.246	75.91	$85.88 \cdot 10^3$	0.255
i=31	4.17	$3.74 \cdot 10^3$	0.242	4.17	$3.47 \cdot 10^3$	0.235
i=32	51.50	$18.64 \cdot 10^3$	0.437	83.83	$30.51 \cdot 10^3$	0.411
i=33	15.62	$18.59 \cdot 10^3$	0.159	11	$10.91 \cdot 10^3$	0.148
i=34	13.55	$13.81 \cdot 10^3$	0.182	11.45	$15.28 \cdot 10^3$	0.234
i=35	3.33	$3.53 \cdot 10^3$	0.151	5	$4.20 \cdot 10^3$	0.192

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DETERMINANTS OF ABNORMAL AUDIT FEES IN INTERNATIONAL FINANCIAL REPORTING STANDARDS-BASED FINANCIAL STATEMENTS

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This study essentially examines the audit effort as a possible determinant of the abnormal audit fees evinced in International Financial Reporting Standards-based financial statements. Therefore, the secondary data were sourced from the audited annual reports and the relevant financial statements of the Nigerian listed banks for the period of observation (2010-2019). An analysis was performed using the relevant techniques that include descriptive statistics, the correlation matrix and panel regression. The findings showed that the IFRS, the client complexity (CPX) and the client size (SIZ) were negatively correlated with abnormal audit fees (ABFEE), whereas joint audit (JAD) recorded a positive correlation with such abnormal audit fees. Lucidly, joint audit showed a stronger relationship with abnormal audit fees, whereas the client size showed a significant, but negative relationship with abnormal audit fees. Similarly, the fact that, with a probability value 0.9494, the relationship between ABFEE and the client complexity was not significant was noticed. Given these research outcomes, it can be concluded that abnormal audit fees are primarily motivated by extra or unexplained audit efforts and the costs associated with them. It is, therefore, recommended that, proportionately with the service(s) rendered, accounting professional bodies should review, harmonize and tactically institute a limit for professional charges through the enforcement of regulated benchmarks for audit fees payable by clients.

Keywords: abnormal audit fee, IFRS, joint audit, client size, audit effort

JEL Classification: C23, G21, M4, M42

INTRODUCTION

Concerns about abnormal audit fees have tremendously increased in recent years, as is evinced in a handful of the research attention showcased by prior research studies. Specifically, studies have examined how audit fees can statistically be linked to the variables such as the audit quality and the audit opinion (Xie, Cai & Ye, 2010; Eshleman & Guo, 2014; Krauss, Pronobis & Zülch, 2014; Fitriany & Anggraita, 2016). Observably, a bulk of such prior research studies are found in both developed and emerging economies. Notwithstanding that fact,

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our research study found that, as a follow up to the recommendation of R. Doogar, P. Sivadasan and I. Solomon (2015), the study carried out by O. J. Ilaboya, M. O. Izevbekhai and G. Ohiokha (2017) focused on examining the determinants of abnormal audit fees and an emphasis was placed on the variables such as the client size, the Big4, profitability, joint audit and leverage as the possible determinants of abnormal audit fees. Notably, apart from the study's focus on only companies in the manufacturing sector, the construct of O. J. Ilaboya *et al* (2017) only consists of the variables attributable to the audit effort school of thoughts (just like other prior studies), whereas the position of the International Financial Reporting Standards (IFRS) was not considered at all. From the audit effort perspective, it is no doubt practically arguable that the adoption of the IFRS may possibly have certain effects on the abnormal audit fee since the financial statements prepared according to the IFRS require more detailed disclosures than the previously adopted local GAAPs, thereby expanding the scope of the audit work (implying a greater audit effort). Therefore, it is obvious that prior studies (Ilaboya *et al*, 2017) do not appear to have considered this dimension as a part of the determinants of abnormal audit fees. Thus, the gap in the literature necessitates a further research enquiry, for which reason this study was performed.

The main thrust of this research inquiry is to reappraise the determinants of abnormal audit fees by considering the audit effort perspectives and the IFRS-based financial data.

Given the above research focus, the study's goals include the investigation of how the measures of audit efforts are related to abnormal audit fees by discussing the influence that the adoption of the IFRS would exert on that relationship. The research study is empirical by nature and quantitative techniques such as summary statistics, correlation analysis and other appropriate inferential statistics are used in it. Accountancy regulatory bodies, business entities, audit practitioners, and other relevant stakeholders at both the national and global levels will benefit from the findings obtained in this study given the fact that the explanations of the link between the measures of the audit effort and abnormal audit fees are presented in light of the adoption of the IFRS.

Bearing in mind the foregoing, this study aims to specifically examine:

- the relationship between abnormal audit fees and IFRS-based financial reporting,
- the effect joint audit may have on abnormal audit fees,
- the influence of the client size on abnormal audit fees, and
- whether the client complexity does exert a significant influence on abnormal audit fees or not.

Taking into consideration the foregoing specific objectives, the hypotheses follow accordingly:

H1: There is no significant relationship between abnormal audit fees and IFRS-based financial reporting.

H2: Joint audit has no significant effect on abnormal audit fees.

H3: The client size has no significant influence on abnormal audit fees.

H4: The client complexity exerts no significant influence on abnormal audit fees.

The paper is divided into the four sections in addition to the Introduction and Conclusion. The Literature Review is the first to follow, after which there is the section dedicated to an empirical review and the theoretical basis of the research study. The third section is focused on the methodology applied in this study, whereas the fourth section is focused on the findings/results of the study.

LITERATURE REVIEW

The concept of abnormal audit fees

In performing their contractual obligations, auditors have the pristine rights of gaining access to the clients' accounting information. Such rights allow

auditors to gain more knowledge of their clients' activities, which enables auditors to obtain a piece of information that may not be available in the public domain. The nature of information before the auditor coupled with the available work to be done in the entire audit process is believed to have some forms of the multiplier effect on chargeable professional fees by auditors. Where the professional fees earned by auditors exceed the normal level of the fees required for specific audit engagements, it becomes obvious that certain abnormal fees may have been incurred by auditors' clients. Therefore, the concept of abnormal audit fees refers to the amount by which the audit fees received by external auditors exceed the normal range and/or level of the expected fees chargeable for a given engagement assignment. When pricing professional fees, auditors will (to some extent) take into account the magnitude of the evidence obtained while performing an engagement alongside the anticipated tasks or the audit work they are going to do/have done. Accordingly, auditors sometimes charge fees based on available private information about audited firms. In most cases, such information is usually not within the framework of the public domain, so stakeholders may be unaware of the very fact that there actually are such pieces of information.

While an agreement may be reached upon the fact that Nigeria's prior research concerning the possible motivations for abnormally high audit fees counts but few studies, it is obvious that the research evidence of abnormal audit fees from Asia, Europe and the largest number of developed economies is abundant, although with mixed conclusions (DeFond, Raghunandan & Subramanyam, 2002; Krishnan, Sami & Zhang, 2005; Doogar *et al*, 2015).

It is noteworthy that a bulk of prior related studies are mainly focused on what determines audit fees, the audit quality and the accounting quality, with very few concerns about the subject matters such as "abnormal audit fees" (Soyemi & Olowookere, 2013; Monye-Emina & Jeroh, 2014; Urhoghide & Izedonmi, 2015; Sagin & Shil, 2019). Notwithstanding, apart from O. J. Ilaboya *et al* (2017), who (based on the recommendations of R. Doogar *et al*, 2015) investigated the determinants of abnormal audit fees in Nigeria, there are but few studies on abnormal audit fees mostly focused on their impact on the other related variables such as the auditor's independence, disclosure and the audit quality (Oladipupo & Monye-Emina, 2016; Dabor & Uyagu, 2017). Specifically, the studies such as those conducted by M. L. DeFond *et al* (2002), J. Krishnan, H. Sami, and Y. Zhang (2005), R. Hoitash, A. Markelevich and C. Barragato (2007), and P. Hribar, T. Kravet and R. Wilson (2014) either focused on the measures of the accounting quality or the examination of the relationship between an abnormally high audit fee and the audit quality, among other things. Notably, these sets of studies are mostly concerned about how variations on identified variables can be explained by the amount of abnormal audit fees.

Furthermore, while there are abundant studies on the reversal of abnormal accruals and the market valuation of earnings surprises (DeFond *et al*, 2002), it is pertinent to note the fact that, regarding the abnormal audit fee issue, J. Krishnan *et al* (2005) assessed whether the provision of non-audit services is likely to exert a significant impact on the investor's perceptions of the auditor's independence. The study also tested the linearity of the relationship between abnormal audit/engagement fees and the audit quality, finding that relationship to be significantly negative. Conversely, M. L. DeFond *et al* (2002) found no relationship between abnormal audit fees and the going-concern opinion, as it related to the sampled companies. Notwithstanding that, and contrary to the previously identified empirical positions, the outcome of the study carried out by J. Krishnan *et al* (2016) suggests that abnormal audit fees increase over the time and ignite a reduction in the audit quality. This finding is not in consonance with that of R. Hoitash *et al* (2007), who previously found a positive relationship between abnormal audit fees and the audit quality. While it is possible to agree upon the fact that earlier empirical documentation presents a schema of contradictory arguments, it is evident that, in spite of the fact that the biggest number of those studies came from developed economies, no attention has yet properly been paid to how the audit effort (the adoption of the IFRS, joint audit, the client size and the client complexity) are likely to affect the levels of

abnormal audit fees charged by audit practitioners. This partly accounts for what this present study is setting out to address.

Succinctly, the pricing of audit fees stems from the three key factors (Dickins, Higgs & Skantz, 2008). Accordingly, the first key factor concerns the estimation of the auditor's effort; the second part pertains to the available personnel and the ranks/status required to efficiently conduct audit; the third factor dwells on the perceived risk and the associated expected rewards of the audit firm (the audit effort). This perceived risk includes the company's industry (whether their stock is publicly traded and a possibility of failing), whereas the reward includes the client's reputation or the likelihood that being associated with that particular client might attract new clients (economic bonding). The second component reflects the abnormal audit fees that are particular to the auditor-client relationship (economic bonding). Prior studies (Dickins *et al*, 2008) have measured the abnormal audit fee as a residual from the regression of the total audit fee on a number of variables. These variables are expected to control normal audit fees charged by the auditor for some level of the effort and risk in carrying out his/her audit. This is because rendered audit services are either underpaid or overpaid and the sign of a residual actually matters. A negative residual implies underpayment, whereas a positive residual implies overpayment. Therefore, the abnormal audit fee studied in this paper is measured using a residual from the regressing audit fee on itself.

INTERNATIONAL FINANCIAL REPORTING STANDARDS AND ABNORMAL AUDIT FEES

It is obvious in today's economic environment that globalization and changing trends in financial markets have triggered cross-border trading and convergence in accounting practice irrespective of nationalities or countries of residence (Jeroh, 2020; Spasic, Abouagla & Sekerez, 2021). This situation, however, has contributed to several calls for the adoption of a common accounting language aimed at fostering uniform across-the-globe financial reporting standards. One possible way to achieve the latter was the introduction of the global sets of standards - the International Accounting Standards (IAS) and, subsequently, the International Financial Reporting Standards (IFRS). Notably, the IFRS were developed after the careful consideration of diverse viewpoints from across the globe (Obradovic, 2014). This approach was welcomed by the majority of countries (both developed and developing ones) throughout the world, including Nigeria. Specifically, the listed Nigerian companies were mandated starting from January 2012 in line with the set roadmap to the adoption of the IFRS to comply with the IFRS provisions pertaining to the preparation of financial statements. As of today, all the Nigerian listed companies have keyed into the adoption of the global standards (IFRS) by preparing their respective company financial statements in compliance with the IFRS.

As articulated by the IFRS Foundation (Melville, 2019), it is noteworthy that the major the IASB's main goal in the IFRS development is to introduce transparency, accountability and efficiency in the financial market operations. Nevertheless, following the IFRS introduction, researchers have carried out several studies on IFRS and its impact on different variables like disclosure quality, comparability, and audit fees, among other things (Barth, Landsman, Lang & Williams, 2006; Barth & Schipper, 2008; Taylor, Tower & Nelson, 2010; Yip & Young, 2012; Choi, Peasnell & Toniato, 2013; Ajekwe, Onobi & Ibiamke, 2017; Soedaryono, 2017). According to the largest number of the prior studies, the measurement of the adoption of the IFRS was performed by means of the dummy variables of one (1) and zero (0), as appropriate. Therefore, in line with B. Soedaryono (2017) and other prior studies, this study measures the adoption of the IFRS using the dichotomous measure of 1 for any year in which companies implement the IFRS, and zero (0) for the non-IFRS years. It is, however, expected that the effort required to perform an audit assignment during and the IFRS era may not be the same as those previously required prior to the IFRS era. Bearing this fact in mind, the effect the adoption of the IFRS may have on abnormal audit fees in Nigeria is examined.

Joint audits and abnormal audit fees

The need to consciously improve the quality of audit has been an issue of global concern to accountants, practitioners and regulators. This is partly due to the aftermath of recent corporate and audit failures in high-profile companies around the world, the majority of which were found culpable. Resulting from the known cases of corporate financial scandals, many investors notably suffered severe losses, thereby being led to an abysmal loss of confidence in capital markets, their regulations and operations. Notably, the Enron Arthur Anderson scandals led to distrust in the quality of audit reports. Another concern is the Green Paper Report issued by the European Commission (EC) in 2010, entitled the "Audit Policy". In line with a part of the issues raised by the EC document of 2010, the President of the Institute of Chartered Accountants of Nigeria (ICAN) called for mandatory joint audit early in 2010. This call was made so as to address the audit quality issue in both developed and developing nations, hoping to contribute to the trending debates on how quality could be improved in the external auditing field in addition to whether joint audit should be encouraged or not (Ajaegbu, 2014).

As noted by N. Razinger-Sakel, S. Audosset-Coulier, J. Kettumen and C. Lessage (2013), joint audit refers to any audit engagement requiring the audit of clients' financial statements by two or more external auditors. This shows that any given joint audit task requires the engagement of more than one independent auditor to a respective opinion of the clients' financial statements. Such an engagement will hopefully not only improve the quality of the work done, but it will additionally raise concerns about the required efforts that will be made by such concerned auditors, knowing fully well that the services rendered by the other auditors in the joint assignment may simultaneously serve as checks to the quality of the services currently being rendered. Therefore, the expected relationship between the abnormal audit fee and joint audit also forms a part of the gap this study intends to fill. To achieve this, and in line with prior studies (Andre, Broye, Pong & Schatt, 2015; Ilaboya *et al*, 2017), joint audit is measured by the dummy variables of "1" (for companies using joint auditors), and "0" (otherwise).

The client size and abnormal audit fees

The issue of whether larger companies have an influence on audit fees or not has been debated over the years due to the fact that this issue calls for a concern. According to D. C. Hay, W. R. Knechel and N. Wong (2006), the metal-analysis they had conducted found that the client size was the most frequent variable determining the amount of the chargeable audit fee (either high or low). As recorded in the 87 studies reviewed by D. C. Hay *et al* (2006), as many as 85 reported the presence of a positive association between the client size and audit fees. Arguably (in terms of the size) larger companies are likely to be more involved in huger activities, thus requiring more attention and audit efforts as compared to that of smaller firms. In their respective studies, B. Al-Shammari, P. Brown and A. Tarca (2008) and Y. Xu, A. L. Jiang, N. Fargher and E. Carson (2011) found that the relationship between (abnormally) higher audit fees and the client size were inconclusive, thus creating a gap in the literature. In their study, M. Causholli, M. De Martinis, D. Hay and W. R. Knechel (2011) found that the client size was the most significant determinant of audit fees being either abnormally higher or abnormally lower. Therefore, the thrust of our investigation stems from our belief that the client size may possibly drive the required audit effort and engagement, and that it may consequently have a significant effect on abnormal chargeable audit fees.

The client complexity and abnormal audit fees

Consistent with earlier studies E. Carson, N. Fargher, D. T. Simon and M. H. Taylor, (2004) and R. W. Knechel and S. E. Salterio (2017), it is believed that one probable determinant of audit fees is the nature and complexity of the firm being audited. Presumably, clients with a more complex structure may require more tasks and ultimately a greater audit effort. Explicitly, firms with more subsidiaries may have expanded activities,

thus resulting in more complex decisions at both the managerial and divisional levels. D. A. Simunic (1980) avers that, for companies with a high complexity level, decisions are usually made at the administrative/ managerial level of parent companies. Therefore, such decisions require a certain monitoring level in order to guarantee the goal congruence sought to attain by every company.

Note that, where companies have several and complex subsidiaries, an increased number of activities and expansion in transactions may undoubtedly expose auditors to higher levels of risk. Such exposures may therefore induce demand for higher audit fees (abnormally high audit fees) by statutory auditors, hoping to compensate for all forms of (a) loss exposure(s) that might arise in the course of the audit. This argument is premised on the fact that companies with complex structures require more time for auditors to assemble, harmonize and implement the audit process. The extended time for the audit process may lead to enhancement in the quality of the entire audit process, thereby attracting higher audit fees (Gerrard, Houghton & Woodliff, 1994). Take for instance the complexities that may arise from the existence of numerous estimations needed for several journal entries arising from the multiplicity of transactions of highly diversified firms with many affiliates (Knechel & Salterio, 2017). Under this circumstance, auditors are expected to perform more tasks that will require an all-inclusive audit necessitating higher audit fees from such complex clients. In support of the notion that auditors need more time and manpower to conduct the statutory audit of complex firms, empirical documentations (Simunic, 1980; Firth, 1985; Low, Tan & Koh, 1990; Chan, Ezammel & Gwilliam, 1993; Butterworth & Houghton, 1995; Carson *et al*, 2004; Knechel & Salterio, 2017) revealed a significant and positive relationship between the level of the client complexity and the audit fee (either a normal audit fee or an abnormal audit fee).

An empirical review

In this section, a further review of the related empirical studies is presented. Accordingly, our review of the mentioned shows that, by relying on the documentation from an analysis of the 532 observations out of the data of the sampled French audit market, M. Haak, M. Muraz and R. Zieseniß (2018) sought to know if, in any joint audit, the audit work allocated to a given audit team affects the audit quality and the fees charged by the auditors. The findings show that there is an inverse relationship between the audit work allocated to concerned auditors in a given joint audit and the quality of the work done (the audit quality), thereby enhancing the amount of the audit fees to be charged. This means that the greater the cooperation between two auditors, the higher (abnormally high) audit fees.

In the Korean context, H. J. Nam (2018) examined whether mandatory transition to the IFRS reporting would affect the audit effort and the subsequent audit fee to be charged by auditors. In the study, the five-year data about the 421 Korean companies listed on the Korean Stock Exchange were analyzed. The data used covered the period of the financial years 2007 to 2011 of the sampled companies. The results obtained from the relevant econometric and statistical analyses provided the evidence that the audit hours (a proxy for the audit effort) were statistically more associated with the intensity of the audit work in comparison with the audit fees, which implied the fact that the effort required from an auditor to perform in an engagement was highly dependent on the nature of the audit to be conducted. This has a consequential effect on the amount of the fees that will be earned by the auditor in the long run, as auditors may request that they should be paid higher audit fees where an audit engagement requires that they should spend more of their time (the audit hours) and make a bigger effort.

B. Soedaryono (2017) assessed the underlying concept of abnormal audit fees and examined its relationship with the audit quality by comparing the outcome during the pre- and post-IFRS regime in Indonesia. The data were collected from the financial reports of the listed Indonesian companies of the automobile and transport sectors. The data were secondary by nature and covered a period of five years (from 2011 to 2015). The data about the audit quality were generated

from the residuals of discretionary accruals. The results obtained in that study showed that, during the pre-IFRS regime, abnormal audit fees had had an insignificant relationship with the audit quality, whereas on the other hand, a positive and significant relationship was found to have been recorded between both variables during the post-IFRS era. With this result, the study concludes that the auditors' clients were exposed to greater discretion in the choice of discretionary accruals after the adoption of the IFRS, thereby encouraging auditors to charge the audit fees deemed to be abnormal and exceptionally high *vis-a-vis* the audit work done, which is in line with the tenets of the theory of economic bonding.

M. Salehi, S. Farhangdoust and A. Vahidnia (2017) critically analyzed abnormal audit fees as a concept and x-rayed its link with future restatements. The data obtained from the 936 listed companies in Tehran over a period of six years (from 2009 to 2014) were examined. The study specifically emphasized the critical examination of whether the companies with restated financial statements had higher amounts of audit fees in comparison with the companies without such restated financial statements. A negative/inverse relationship between abnormal audit fees and future restatements was recorded. Conclusively, the researchers maintained that abnormal audit fees were usually found to be low in the periods of the announcement of said restatements.

In Nigeria, O. J. Ilaboya *et al* (2017) investigated the factors that possibly determined abnormal audit fees, although with an emphasis on the listed manufacturing firms as at December 2014. A total of 56 quoted companies were sampled and the secondary data were compiled for the purpose of the analysis. The results unveiled clearly suggested that, while some variables were significant in explaining the levels of abnormally high audit fees with a positive association, the others recorded a negative, but significant relationship with abnormal audit fees. Additionally, some factors were also found to have a positive, but insignificant relationship with abnormal audit fees. Further empirical documentation from the study was that the companies that patronized the services of the Big 4 audit firms seemed to be paying abnormally high audit fees in comparison with their counterparts, who regularly engaged the services of non-Big 4 firms.

S. C. Okaro, G. O. Okafor and G. N. Ofoegbu (2018) investigated the different perspectives of and calls for mandatory joint audits in Nigeria. The primary data compiled from the responses to the 200 questionnaires previously given to the selected stakeholders (accountants, auditors and academics) were analyzed. The participants were required to give justification for or against and to indicate whether joint audits should be made mandatory in the country or not. The findings suggested that there was a unified agreement among the various stakeholders who believed that the cost of mandatory joint audit would outweigh the benefits of the same. As noted by the majority of the participants, joint audits would make room for abnormally high audit fees payable by the audit clients. With this result in mind, it is our expectation that the joint audit will record a positive effect on exceptionally high professional fees (abnormal audit fees).

A theoretical review - productive theory

Productive theory (PT) originates from the economics field and was popularized by I. Gough (1972). Its major emphasis is placed on the output from the input, i.e. on using available resources in order to create a service that will be beneficial for the survival of the client's business. In his theory, Gough believes that chargeable fees are the determinant factors of the work effort. Thus, chargeable fees are expectedly higher for the jobs or schedules that demand more efforts from professionals/the labor force. Consistently with the position of productivity theory, M. Alhadab (2018) argues that where auditors aspire to improve the quality of audit and discourage earnings manipulation, abnormal audit fees are mostly charged since such engagements may require additional audit tasks. According to the tenets of productivity theory, abnormal audit fees would presumably demonstrate a significant and positive link with the audit effort.

It is noteworthy that prior empirical studies have provided the evidence that the audit fees deemed to

be abnormally high will spur auditors to make better efforts in a given assignment *vis-a-vis* the nature of the client's line of activities. In spite of this observation, it is evident that the aftermath of the introduction of the IFRS saw an expansion of the statutory audit scope, thus requiring an increased audit effort in engagements involving IFRS-compliant companies. Hence, A. A. Widyawati and A. Viska (2013) conclude that the implementation of the IFRS requirements has increased the efforts made by the auditors who are now expected to explore a variety of audit evidence relating to several disclosure requirements by the global standards. While we may agree with this position, we also believe that joint audit has a way to reduce the audit effort (i.e. audit hours) since the responsibility of the audit process is jointly shared. Given the fact that this study intends to assess how the factors such as joint audit, audit efforts, the client size and complexity affect audit fees, hence we have found productivity theory (PT) useful, and therefore this study hinges on PT.

METHODOLOGY

The study design is longitudinal and panel-based, as it is conventional and implies studying repeated observations of similar variables over a time period (specifically, a ten-year period). Our population covers a sample of 21 listed banks in Nigeria. However, by excluding the only one listed noninterest bank in the country (Jaiz Bank), the study's data were therefore sourced from the respective audited financial statements of the 20 listed commercial banks for the given period (from 2010 to 2019).

The idea behind the audit effort schools of thought formed the basis of the study framework and is based on productive theory. The analytic framework is therefore depicted in Figure 1, which presents a schematic description of the expected linkage between the abnormal audit fee (the dependent variable) and the independent variables comprising of the audit effort schools of thought variables. D. A. Simunic (1980) classified both the abnormal and normal audit fees as the functions of audit hours (efforts).

However, while audit fees are observable and quantifiable, audit efforts are not easily observable which leads to the audit effort schools of thought clearly explained in productivity theory. M. Alhadab (2018) linked productivity theory to auditing, indicating that abnormal audit fees were mostly associated with the additional audit tasks or procedures that would enhance the audit quality so that it became too difficult for managers to manipulate reported earnings. Thus, following the assumption of productivity theory that the abnormal audit fee is a proxy for the audit effort, a total of the four explanatory variables in Model I (1) that form a part of the framework as the composites of audit efforts

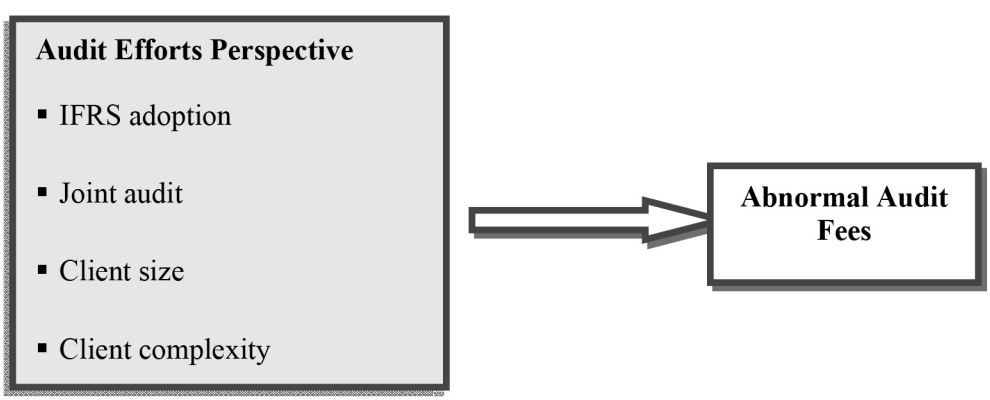

Figure 1 The model framework

Source: Authors

are drafted in the study. The review of the variables, measurements and the relevant literature sources is given in the Table 1.

Following the above-mentioned theoretical projections, a functional relationship between the four variables identified from the audit effort school of thought and abnormal audit fees are presented below as follows:

Abnormal audit fees = *f* (IFRS adoption, joint audit, client size, client complexity) (1)

This can be specified in the econometric form as follows:

$$ABFEE_{it} = \Upsilon_O + \Upsilon_1 IFRS_{it} + \Upsilon_2 JAD_{it} + \Upsilon_3 SIZ_{it} + \Upsilon_4 CPX_{it} + \varepsilon \quad (2)$$

where:

Υ_O = the constants or intercepts

Υ_1 *to* Υ_4 = the unknown coefficients or parameters to be estimated

it = "*i*" represents the number of the companies (1,…20) and "*t*" is the period to be covered (1,…10yrs)

ABFEE = abnormal audit fees

IFRS = the IFRS adoption

JAD = joint audit

SIZ = the client size

CPX = the client complexity

ε = the stochastic error term

The data were analyzed using descriptive statistics, correlation and panel regression analyses. In order to confirm how the specified model fits and ascertain whether the basic assumptions underlying the regression analysis use (for a study of this nature) are good, certain diagnostic tests had been done. On this note, the collated data were specifically subjected to the Variance Inflation Factor (VIF) test for multicollinearity, the heteroskedasticity test, the serial correlation test and the Ramsey RESET test for the model (mis)specification. The results obtained from those tests are, however, presented by means of the tables accompanied by a relevant analysis. The analysis was, however, carried out using the Eviews (10) software.

Table 1 The variables, measurements, notation and *a priori* expectations

Variables	Notation	Measurements	Source(s)	*a priori* expectations
The dependent variable:				
Abnormal audit fees	ABFEE	A residual from regressing the audit fee to itself	Gros and Worret, (2014)	-nil-
The independent variables:				
IFRS adoption	IFRS	The dichotomous variable of '1' for the years the companies have been implementing the IFRS, and zero '0' for the non-IFRS years.	Soedaryono (2017)	+
Joint audit	JAD	The dummy variable of '1' for the firms using joint auditors, '0' otherwise.	Ilaboya *et al* (2017)	+
Client size	SIZ	The natural log of the total assets	Choi, Kim & Zang, (2010)	+
Client complexity	CPX	The number of subsidiaries of the company being audited	Choi *et al* (2010)	+

Source: Authors

RESULTS

The summary statistics

The outcome of the summary statistics is presented in Table 2, including the results of the mean, the median, the standard deviation, skewness, the kurtosis, Jarque-Bera alongside the minimum and maximum values, among other things.

The descriptive statistics accounted for in Table 2 shows the characteristics of the variables used in the study. As is shown, the ABFEE (abnormal audit fees) variable has the minimum and maximum values of -4.21 and 0.522, respectively, which implies that the sampled firms were engaged in the payment of both abnormally high (positive abnormal) and abnormally low (negative abnormal) audit fees within the 10-year period covered by the study. Also, the mean value of ABFEE (the audit fee residual) has a negative value -0.15, which signifies the fact that the actual audit fees paid by all the sampled firms were on average jointly lower than the predicted industry average in value. The IFRS variable shows the mean value 0.695, which signifies the fact that about 70% of the 10-year period observed in this study can be classified as the IFRS era, namely the two-year pre-IFRS period (2010-2011) and the eight-year post-IFRS (2012-2019) period. Furthermore, the JAD (joint audits) variable shows the mean value 0.170, which means that only about 17% of the sampled firms engaged the joint auditors' services during the ten-year period observed in the study, whereas the remaining 83% of all the companies engaged single audit firms during the same period. This suggests that the culture of joint auditing is still not rife in the Nigerian financial sector.

Speaking about the size of the firms (SIZ) represented by the actual value of the total assets, the mean value shows that the average total assets of the sampled firms are ₦1,296,921,477,000, with the minimum and maximum values ₦1,590,411 and ₦8,223,984,226, respectively. Finally, speaking about on the complexity of the firms (CPX) as represented by the number of the sampled firms' subsidiaries, the mean value 9.695 shows that the average number of the operating subsidiaries of the sampled firms is 10. The highest number of the operating subsidiaries of the sampled firms is 53, whereas the minimum value zero (0.000) shows that some of the banks do not have any subsidiary at all. When the Jarque-Bera statistics test of the goodness-of-fit is concerned, the outcome suggests that all the variables show a significant departure from normality owing to their low (respective) probability

Table 2 The descriptive statistics

	ABFEE	IFRS	JAD	SIZ	CPX
Mean	-0.15	0.695	0.170	1296921477	9.695000
Median	0.000	1.000	0.000	580225940	6.000000
Maximum	0.522	1.000	1.000	8223984226	53.00000
Minimum	-4.21	0.000	0.000	1590411	0.000000
Std. Dev.	0.988	0.462	0.377	1700807484	11.42825
Skewness	-2.41	-0.847	1.757	1.634845	2.101941
Kurtosis	8.767	1.718	4.087	5.074167	6.693215
Jarque-Bera	471.4	37.624	112.76	124.3173	260.9372
Probability	0.000	0.000	0.000	0.000000	0.000000
Sum	-30.10	139.00	34.000	2.58E+11	1939.000
Sum Sq. Dev.	194.2	42.395	28.220	5.73E+20	25990.39
Observations	200	200	200	199	200

Source: Authors

values, which are all less than 0.05 (< 0.05). Although the violation of the normality assumption poses no major problem in the panel data with large sample observations of ≥ 200 in line with the Central Limit Theorem, as cited in A. Ghasemi and S. Zahediasl (2012), the normality status could be attributed to the following two reasons: firstly, the majority of the variables were used in their original values solely for the purpose of the descriptive statistics in order to ensure unambiguous interpretations; secondly, the dichotomous or categorical variables (the IFRS adoption and the joint audit variables) were included, the categorical data usually not being generated from a normal distribution.

Correlation analysis

Correlation was performed on the data for all the variables, as shown in Table 3. This analysis was essentially intended to establish the pattern and direction of the relationships among the variables and to find out if there were signs of multicollinearity among the dataset for the explanatory variables.

In Table 3, the Pearson correlation matrix for all the variables used in the study is presented. The adoption of the IFRS, the firm size (SIZ) and the firm complexity (CPX) are all negatively correlated with the variable of our interest (i.e. the ABFEE variable). They are all statistically significant at different levels as indicated by the asterisk (*) signs. This implies that all things are equal, the variables of the IFRS, SIZ and the CPX move in the opposite direction from that of ABFEE, implying the one ascending and the other descending, thus signifying the inverse relationships. Evidently, where companies grow bigger, with a more complex structure, negative abnormal fees tend to reduce. On the other hand, the JAD variable is positively correlated with ABFEE owing to the 0.136 positive correlation coefficients. However, it is only the JAD (joint audits) variable that was statistically (although weakly) significant at the 10% levels (p-value = 0.054), which suggests that joint audit moves in the same direction as the abnormal audit fees do. Thus, higher joint audits are strongly associated with high positive abnormal audit fees. Speaking about the strength and direction of the associations among the explanatory variables, JAD is negatively associated with the IFRS and strongly positively correlated with the CPX (r = 0.497854, p-value = 0.0000), which means that the adoption of and compliance with the IFRS requirements may not necessarily require that firms should engage joint auditors' services although highly complex firms are associated with joint auditors. Similarly, the SIZ and JAD variables strongly positively correlated (r = 0.248155, p-value = 0.0004),

Table 3 The correlation matrix

Correlation					
Probability	ABFE	IFRS	JAD	SIZ	CPX
ABFEE	1.000000				

IFRS	-0.205824	1.000000			
	0.0035***	--------			
JAD	0.136492	-0.076036	1.000000		
	0.0540*	0.2846	--------		
SIZ	-0.579527	0.111033	0.248155	1.000000	
	0.0000***	0.1175	0.0004***	--------	
CPX	-0.167582	0.110884	0.497854	0.462109	1.000000
	0.0177**	0.118	0.0000***	0.0000***	--------

Note: Covariance Analysis: Ordinary; Included Observations: 200

***, **, * Correlation is significant at the 1%, 5% and 10% levels, respectively

Source: Authors

which means that larger firms are more associated with joint audits.

Regression diagnostic tests

The tests done in this section include the variance inflation factor (VIF) test for multicollinearity and the heteroskedasticity test (the so-called Hettest). To clearly show whether the model is rightly or correctly specified or not, the result of the serial correlation test and the Ramsey RESET Test for the model (mis) specification is also presented and analyzed.

Judging from the VIF results, the applicable decision rule is that if each of the explanatory variables has low VIF values below 10, it will be suggestive of the fact that such a variable does not correlate with other independent variables. However, if a variable exhibits a VIF up to or greater than 10, then it correlates with (an)other independent variable(s) and as such should be dropped. As can be seen in Table 4, the values for the centered VIF for all the variables are below the benchmark value 10. In line with E. Jeroh (2020a), the above results suggest the absence of multicollinearity issues among the variables. Thus, there is no issue of unstable parameter estimates in the regression line.

Table 5 shows the results of the heteroscedasticity test which checks for the presence/absence of the nonconstant variance. This test was done using the Breusch-Pagan-Godfrey test. The decision rule is that the variables do not show the signs of heteroscedasticity if the corresponding probability value of the F-statistics is greater than the 5% level. If that is the case (i.e. if the p-value is greater than 5%), a conclusion can be drawn that there is homoscedasticity, which is desirable. Noticeably, the p-value 0.1482 (14.82%) shows the absence of heteroscedasticity, which means that the residuals of the model are homoscedastic, which is desirable for regression analysis.

In the second row of the table, the outcome of the Breusch-Godfrey Lagrange Multiplier (LM) test for higher-order serial correlation is outlined. This test specifically checks for the presence or otherwise of serial correlation. The outcome revealed that the hypotheses of zero autocorrelation in the residuals could be rejected, which is because the probability values (Prob. F, Prob. Chi-Square) are less than 5%. However, the presence of serial correlation does not affect the non-biasness or consistency of the panel data estimators. Thus, it does not pose a major problem for the performed analysis since this study adopted the panel data approach.

In the third row of the table, the outcome of the Ramsey RESET test for the model specification is reported so as to test the accuracy of the regression model. The result reported an F-statistic of 0.595128 and a probability value of 0.7431 (74.3%). The high probability value is suggestive of the fact that there is no significant evidence of misspecification. Thus, the result cannot not sustain the wrongly specified model.

Table 4 The results of the VIF Tests

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.541368	202.8896	NA
IFRS	0.013284	3.459970	1.055291
JAD	0.031261	1.991668	1.653085
SIZ	0.001730	246.8285	3.885331
CPX	3.52E-05	2.951268	1.712577

Note: Variance Inflation Factors; Sample: 1.200; Included observations: 200

Source: Authors

Table 5 The other regression diagnostics test(s) results

Heteroskedasticity Test: Breusch-Pagan-Godfrey	
F-statistics	2.106875
Prob.	0.1482
Breusch-Godfrey Serial Correlation LM Test:	
F-statistics	34.50643
Prob.	0.0000
Ramsey RESET Test	
F-statistics	0.595128
Prob.	0.7431

Source: Authors

The outcome shown in Table 6 reveals that the probability value of the Hausman Test (p-value = 0.0085) is less than 5%, which is a confirmation of the appropriateness of the fixed effect model in capturing the relationships among the panels. Therefore, the fixed effect regression result is accepted for drawing conclusions.

Table 6 Hausman Test Result

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	20.531294	8	0.0085

Note: Correlated Random Effects - Hausman Test;
Equation: Untitled; Test cross-section random effects

Source: Authors

The regression output

According to Table 7, the statistical significance of the models cannot be rejected at the 5% levels owing to the F-statistics values 37.09337 (p-value = 0.000). This is the indication that there is a linear relationship between the dependent variable (ABFEE) and the explanatory variables taken all together at the 1% significance level. As far as the proportion of the variations in the dependent variable accounted for by the explanatory variables taken all together is concerned, the result shows a total of 43.21%. However, the adjusted R-squared controlling the effect of the inclusion of the successive explanatory variables at the freedom degrees stood at 42.05%, which implies that the remaining proportions of 57.95% were not captured by the individual models and that they were taken care of by the error term. This de facto means that the IFRS, JAD, SIZ and CPX variables explained reasonable variations in abnormal audit fees (ABFEE), which on its part aptly suggests that changes in abnormal audit fees are reasonably explained by the measures of the audit efforts. Concerning the behaviors of the audit effort proxies with respect to ABFEE as shown in the model, the outcome shows that it is only the JAD variable that has a positive coefficient sign, whereas the IFRS, CPX and SIZ variables have negative coefficient sign. The variables that significantly contributed to the variance in ABFEE, however, are the IFRS (at a 5% level), JAD and SIZ (at a 1% level, respectively), whereas CPX (complexity) was not significant owing to its high p-value of 0.9494, which implies that increases in joint audits by one unit will lead to a unit significant increase of about 0.756 in ABFEE. On the other hand, increases in SIZ and the IFRS will have significant decreasing effects on ABFEE, all things being equal.

CONCLUSION

The paper focuses on the determinants of the abnormal audit fees based on the audit effort perspective. The study was carried out in response to the growing concerns that little is known of the drivers and determinants of abnormal audit fees in Nigeria and the audit effort approach was applied. There were also the questions of whether the factors determining normal audit fees are the same as those determining abnormal audit fees since both originate from the auditor's service. There were also the beliefs that abnormal audit fees were primarily motivated by extra or unexplained audit efforts and the costs associated with them.

Thus, guided by the tenets of productivity theory as popularized by I. Gough (1972), the link between abnormal audit fees and audit efforts was the subject

Table 7 Panel Regression Results of the Models

Audit Effort	Dependent Variable: ABFEE Sample (2010 - 2019); Periods included: 10 Total observations: 200 (20 cross-sections)		
Variable	Coefficient	t-Statistic	Prob.
C	4.847234	10.57861	0.0000
IFRS	-0.241357	-2.047214	0.0420**
JAD	0.755574	4.572141	0.0000***
SIZ	-0.256204	-10.42892	0.0000***
CPX	-0.000377	-0.063525	0.9494
R-squared			0.432105
Adjusted R-squared			0.420456
F-statistic			37.09337
Prob(F-statistic)			0.000000

***, **, *. Significant at the 1%, 5% and 10% levels, respectively.

Source: Authors

matter of our examination, which was carried out considering the size and complexity of the auditor's clients, joint audit and the implication of the adoption of the IFRS on audit efforts. The data used in the paper were secondary by nature and the analysis was conducted using relevant econometric tools.

The key findings arising from this study are indicative of the fact that, when taken together, ABFEE has a linear relationship with the predictor/input variables, with the IFRS, CPX and SIZ variables recording a negative correlation with ABFEE. Impliedly, where companies grow bigger with more complex structures, there are tendencies of such companies recording a reduction in negative abnormal audit fees Alternatively, JAD recorded a positive correlation with ABFEE, which means that the records of high positive abnormal audit fees are mostly associated with the companies engaging joint auditors' services. Additionally, the variables that significantly contributed to the variance in ABFEE were the IFRS (at a 5% level), JAD and SIZ (at a 1% level, respectively), whereas CPX (client complexity) was not significant owing to its high p-value of 0.9494, which implies that increases in joint audits by one unit will lead to a unit significant increase of about 0.756 in ABFEE. On the other hand, increases in SIZ and the IFRS will have significant decreasing effects on ABFEE, all things being equal. The further implications of the results arising from this study suggest that larger companies with more complex structures are more associated with joint audits. Regarding the regression output for the hypotheses test, the following conclusions are made:

- there is a significant relationship between abnormal audit fees and the IFRS-based financial reporting;
- joint audit has a significant effect on abnormal audit fees;
- the client size exerts a significant influence on abnormal audit fees, and
- the client complexity exerts no significant influence on abnormal audit fees.

With these results in mind, the study however recommends the following:

- accounting professional bodies should review, harmonize and enforce the minimum audit fee-benchmarks for the various categories of the audit firms engaged in the provision of specified professional audit services;

- firms should embrace joint audit as a way to discourage abnormal audit fees through a deliberate reduction in required audit hours and audit efforts, which will ultimately give relevance to smaller auditing firms in Nigeria.

This study's scope, however, is delimited to only the four indicators of the audit effort and the data used were solely derived from the commercial banks' financial statements. Therefore, the resulting suggestion implies that future investigations should expand this scope by looking at the additional factors of influence, such as the audit of fair values and the other estimates that may increase the likelihood of companies paying abnormal audit fees. Furthermore, since our study is solely focused on the data obtained from commercial banks, additional research in the other factors that generate the atypical audit fees paid by corporations in various industries might be conducted by future researchers.

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BRAND QUALITY, CONSUMPTION EMOTIONS, AND A DECISION TO PURCHASE WASHING MACHINES

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The largest number of studies on the determinants of the consumer's decision to purchase washing machines have explored the influence of the price, the product quality, the perceived value and related constructs without the effects made by consumption emotions. Therefore, the purpose of this study is to determine the impact of brand quality, consumption emotions and socioeconomic factors on the consumer's decision to purchase washing machines in Nigeria's Delta State. The data used in the study were obtained from a cross-section of 385 consumers drawn from Asaba, Sapele and Warri, the three most populous towns in Delta State. The results show that brand quality, consumption emotions and socioeconomic variables, such as the household size, the education level and income are the significant determinants of a decision to purchase washing machines in the study area. The significance of emotions as predictors of a purchase decision underscores the need for manufacturers of electrical home appliances to ensure that the design and functionality of their products elicit the positive emotions that will foster customers' attachment and loyalty to a brand in order for the manufacturers to maximize their revenue and sustain a profit.

Keywords: consumer purchase decisions, consumption emotions, brand quality, washing machines, demographic factors

JEL Classification: D12, M30, M31

INTRODUCTION

Emotions are multidimensional feelings revealing information about consumers' relationship with their physical and social surroundings and the interpretations related to these relationships (Lambie & Marcel, 2002; Bigdeli, Bigdeli & Bigdeli, 2014). Consumers make some purchases simply for the 'fun and joy of use', and sometimes the emotion of the 'joy of use' has a whole variety of implications. How emotions are evoked can enhance our understanding of what makes us consume an array of products. However, the literature is filled with information on how consumers emotionally respond to products and

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what aspects of the overall product quality trigger their emotional reactions. In this fast-changing and competitive business world, emotional factors have become an important aspect of customer purchasing behavior and are increasingly being incorporated in the advertisement and promotional campaigns of branded products. Therefore, firms strive to establish a strong emotional bond and mutual collaboration with the customer so as to secure competitive advantage, because emotionally connected consumers are very crucial to the brand success (Rossiter & Bellman, 2012). Furthermore, the connection that product brands establish with consumers and the emotions such products/services evoke among customers have become a significant sales performance factor.

In competitive markets, customers' desires are more important than their needs. Therefore, the state of mind and emotions are becoming the predominant influencers of a purchase decision. Apart from the question of the price and quality, the consumer wants trust, love, and dreams, the emotion thus becoming very important with the principle of the consumer pleasure (Jenkins & Molesworth, 2017). Thus, companies must develop the strategies that factor emotions as a distinctive element that must be adopted in order to enhance product/service supply. The consumer does not look for the product/service that meets both the needs and the rational processes, but they seek the object that becomes the center of symbolic meanings, psychological and cultural, and a source of feelings, relationships and emotions. This is the reason why customers' purchase decisions are driven by the two kinds of needs: the functional needs satisfied using a product and the emotional needs associated with the psychological fulfilment of the product ownership (Desmet & Hekkert, 2007). Furthermore, owing to an increasing similarity in products' technical characteristics, the emotions elicited by the consumers of products are becoming more defining factors for manufacturers. Thus, companies are making strategic efforts to enable their products to meet both the functional quality and the consume's emotional needs to gain a competitive edge in the marketplace (McDonagh, Bruseberg & Haslam, 2002; Desmet, 2003).

P. Kotler and G. Armstrong (2021) define product quality (PQ) as "the ability of a product to perform functions, includes the product's overall durability, reliability, precision, ease of operation and repair, and other valued attributes". It could be defined as the customer's assessment of a product's overall performance. This important element in manufacturing the products is considered superior to their competitors. Consumers are increasingly desirous to purchase goods of a high quality. Therefore, the quality of a product brand is considered to be the major contributor to the manufacturer's competitive advantage on the durable goods market. Product quality is the extent to which a product succeeds in meeting its customers' needs, shapes the manufacturer's reputation and influences the consumer's purchase decision in retail stores. Furthermore, it is the consumer's assessment of a product's attributes that will meet their needs and provide them with the expected benefits. Because quality affects product performance, it is closely linked to customer value and satisfaction. Performance is the main characteristic or function of a product and is the main benefit of the products purchased by consumers. Product quality is a specific function of a product, while conformance quality is a measure of how much a product conforms to the previously set quality specifications (Kotler & Keller, 2016).

The purchase decision process includes five stages, implying that the purchasing process begins a long time before the actual purchase is made. Thus, there is the need for marketers to focus on the entire process of making a purchase decision instead of only focusing on the actual purchase decision (Kotler & Keller, 2016). Apart from the product brand quality, consumers' purchase decisions are influenced by their perceptions, motivations, learning, attitudes and beliefs. The process of consumers' making their purchase decisions arises from consumers' realization of the needs and wants they are about to satisfy. From here, the consumer will realize the disparity between his/her actual status and his/her ideal needs which he/she had a wish to satisfy from social and psychological aspects. Consumers adopt this process regarding market transactions before, during, and after the

actual purchase of a product. Thus, the entire process can be seen as a particular form of a cost-benefit analysis in the presence of multiple alternatives. The consumer comes to the decision based upon the place for the purchase, the brand that he/she wants, the model, the quantity, when to buy, how he/she is prepared to spend, and other factors as well. These decisions are given by the market by sharing the information about products with consumers so as to enable them to make rational evaluations (Hanaysha, 2018). According to L. G. Schiffman and J. Wisenblit (2015), consumers often seek the relevant information connected with their needs based upon their past experiences or the information learnt from other people or external sources. Therefore, the experience of the past purchases is considered to be a vital source of the internal information used prior to making a decision to buy.

Significant economic progress has been made in Nigeria since the onset of democratic governance, namely since the year 1999. It was a situation that has promoted rapid urbanization and a remarkable improvement of the socioeconomic wellbeing of the citizenry. However, with a recent slowdown in the economic conditions of the nation and the rising cost of living, both spouses in many urban households now engage themselves in income generating activities in order to enhance their family's living standards. Specifically, many urban women have been combining traditional roles of home-keeping with the management of their own businesses or paid employment so as to enhance their families' living standards. Therefore, to balance their home and work responsibilities and to reduce the stress they are exposed to, many urban women have purchased home appliances such as washing machines, freezers/refrigerators and microwave ovens that may help reduce their workload. Beside the utility derived from the functional capacity of washing machines, the emotional fulfilment arising from reduced work stress on consumers and the pleasure of use are the critical factors that may determine a decision to buy. Since consumption emotions are strongly associated with customers' buying behaviors, consumption emotions are thus a very crucial factor for manufacturers and shopping product marketers to maintain and expand their market share on the global market. This study was conceived so as to provide answers to the following research questions: Is there any association between consumers' buying decision, the product brand quality and consumption emotions? What effects do the product brand quality and consumption emotions have on consumers' buying decision? Thus, the major objective pursued in the study is to ascertain the effects of the product brand quality and the positive and negative consumption emotions set on the consumer's decision to buy washing machines. Specifically, the study ascertains the direction and strength of the relationship between the consumer's buying decision and brand quality, the positive emotions and negative emotions sets, the determination of the impact of the independent variables on the consumer's decisions to buy washing machines.

LITERATURE REVIEW

D. B. Grisaffe and H. P. Nguyen (2011) reported that emotional attachment offers a special promise as an affective basis of loyal brand repurchasing, because repeatedly purchased brands consistently contribute to a firm's revenue and profit. Working on a sample of 579 respondents comprising undergraduate and graduate students, as well as the students' acquaintances outside the community of the University of Texas, they developed a multivariate coding system in order to capture all the categories of emotional responses. The results indicated that superior marketing characteristics had created brand attachment through the perceived value, differentiation, and customer satisfaction. Furthermore, marketing communication, such as aggressive advertising, had also produced the strong emotional attachment that stimulated a strong positive attitude towards the product brands. In conclusion, the authors highlighted the five factors that drove emotional attachment to the brands that lead to a continual product repurchase.

Using the data of the online survey of 12.150 restaurant patrons that provided 435 usable responses, J. Song and H. Qu (2017) conducted a

study of the mediating role of consumption emotions on the relationship between hedonic and utilitarian values and Customer Satisfaction (CS) in Asian ethnic restaurants in the United States of America. The results revealed that utilitarian value directly and indirectly affected CS, but hedonic value only affected CS indirectly through the influence of positive emotions. The findings further affirmed that unless customers experienced positive emotions from every value, not every perceived hedonic value would lead to CS. Since negative emotions are evoked from the unfulfilled utilitarian aspects of customer values, therefore restaurant managers should adopt strategies to manage customers' negative emotional reactions by providing high-quality services to their clients.

Consumer behavior is constantly evolving just as consumer needs and desires are changing due to the external and internal factors that determine their buying decisions. W. D. Wahyu, F. Achmad and A. Zainul (2017) studied the effect of the online store atmosphere on emotions and its impact on a purchase decision' in Indonesia, with the data collated from 105 consumers of electronic products by means of an online questionnaire using the 'Google Form'. The collected data were analyzed by means of descriptive and inferential statistics with the help of the Generalized Structured Component Analysis (GSCA) model. The findings revealed that emotions had a significant positive influence on the process of making a buying decision, because the "prospects" emotional state stimulated by the store atmosphere influenced their final purchase. The authors affirmed the fact that, since emotional responses were spontaneous and often unplanned and abrupt, a person's emotions may have a major impact on what is being bought. The authors suggested that, in order for the online marketing firm (Kaskus.co.id) to win new buyers and retain its old ones in the Indonesian online market space, the company needs to improve the design of its website so as to make it simple and dynamic for new users. Which is very crucial because a complex, sophisticated website is likely to dampen a prospective consumer's emotions and negatively affect his/her buying decision.

A similar study by N. Octaprinanta, A. Kusumawati and E. Pangestuti (2017) also examined the influence of the situational factors on consumers' emotional status and consequently impulse purchase behavior using the data collected from a random sample of 119 respondents in the major supermarket in Malang, Indonesia. The data were analyzed applying descriptive and path analyses. The results indicated that the store environment significantly influenced buyers' emotional states, whereas consumers' emotional condition also had a significant impact on impulse buying behavior. A store design and the environment can stimulate positive emotional responses in an individual, which may lead to unplanned and impulsive purchases (Kim, Kim, Yoo & Park, 2020).

K. Senthilkumar (2018) carried out a study so as to ascertain the influence of emotional and rational factors on decisions to buy children's products in Coimbatore City, India. The data were collected from the 500 respondents who had purchased children's products and a well-structured questionnaire was used for that purpose. Consumers' perceptions were assessed by means of a 5-point Likert scale of strongly disagree (1) to strongly agree (5). The results indicated that although the price, the quality and the value received for the money invested significantly affected the decision to buy children's products, a bigger influence was exerted by the emotional factors. The author suggested that the consumers of children's products should be more rational in the process of making a decision to buy so as to strike a better bargain whenever they make buying decisions with respect to children's products and brands.

M. Simanjuntak, H. R. Nur, B. Sartono and M. F. Sabri (2020) analyzed the effects of the perceived crowding, store image, and shopping motives towards emotions and the repurchase intention in modern retail stores in Indonesia. The study employed a cross-sectional design involving the collecting of data out of a random sample of 244 customers with the help of an online questionnaire. A 5-point Likert scale of (1) strongly disagree to (5) strongly agree was used so as to elicit the consumers' perceptions of all the construct statements. The results showed that the perceived crowding, store image, and shopping motives positively affected the customers' emotions.

Emotions also had a significant and positive effect on the intention to purchase again. The authors concluded that, since the buyers' emotions were the critical factor that positively affected the intention to make a purchase again, efforts should be geared towards making the shopping environment and conditions more conducive so as to elicit positive emotional responses from buyers in order to encourage continued future purchases.

RESEARCH METHODOLOGY

The conceptual framework for the study leaned on the papers found in the extant literature, where it was hypothesized that the consumer's purchase decision was influenced by the sociodemographic characteristics such as the gender, the age, the marital status, the education level, the household size, income, brand quality, and the positive and negative emotions sets (Figure 1).

The research hypotheses

The hypotheses tested in the study are as follows:

H1: The brand quality has a significant impact on the consumer's purchase decision.

H2: Positive emotions have a significant effect on the consumer's purchase decision.

H3: Negative emotions have a significant influence on the consumer's purchase decision.

Causal research design which shows cause-and-effect relationships between variables is the design to have been adopted in this study, because it is particularly useful in identifying, determining and explaining the causality among the measured variables. The goal of the research design is to describe a detailed plan of how a researcher will behave with respect to answering the posed research questions. Research design is not only used to structure the project, but also how all the major parts of a research project work together in order to answer the posed research questions (Pituch & Stevens, 2016). The use of an

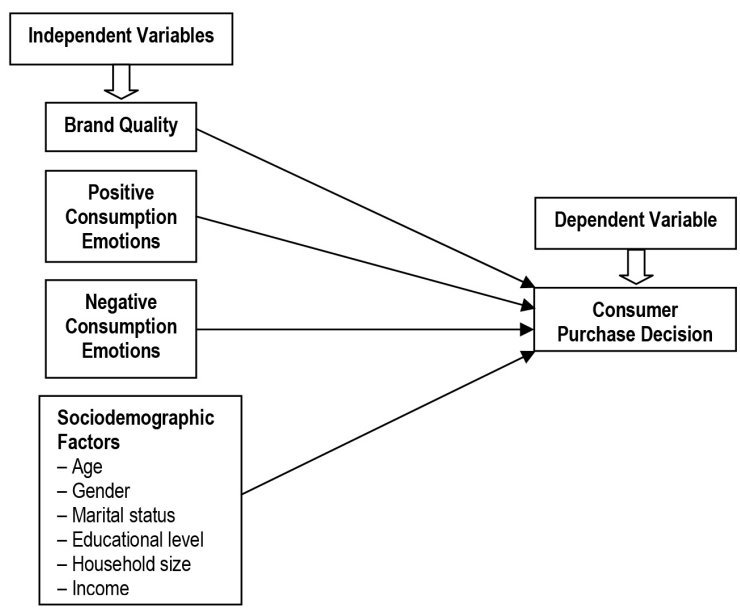

Figure 1 The conceptual model for the study

Source: Authors

appropriate research design is therefore crucial to the study because it determines the method and nature of the data to be collected, the sampling plan and the time schedule of the research study (Hair, Black, Babin & Anderson 2014). However, the study adopted causal design as structured questions were used to collect data from a cross-section of the buyers of washing machines in Asaba, Sapele and Warri, Delta State, Nigeria, in order to determine the effects of brand quality and the emotions set on the consumer's decision to purchase products.

The used constructs and statements were modified from the extensive literature search. The questionnaire is composed of the five parts. Section A is focused on the consumers' sociodemographic factors. Section B addresses the overall product performance. Section C elicits the information on the consumers' emotions based on the Consumption Emotion Set, which includes both the negative emotions (anger, discontent, envy, fear, guilt, pride, sadness, shame) and the positive emotions (contentment, eagerness, excitement, joy, love, optimism, peacefulness, relief, surprise, worry). Section D is dedicated to the brand quality, whereas Section E deals with the consumer's purchase decision. All the statements were assessed on a 5-point Likert scale of strongly disagree (1) to strongly agree (5) for the sections D and E, whereas it was none (1) to very much (5) for the section C (Appendix). Because the respondent target population is unknown, the R. V. Krejcie and D. W. Morgan (1970) formula for calculating the sample size for an infinite population was employed so as to reach a representative sample as follows:

$$n = \frac{Z^2 p(1-p)}{M^2} \tag{1}$$

where n is the sample size for the infinite population; Z is the Z-value (e.g. 1.96 for a 95% confidence level), p is the population proportion expressed as a decimal and assumed to be 0.5 (50%) and M is a margin of error at 5% (0.05)

$$n = \frac{(1.96)^2 \times 0.5(1-0.5)}{(0.05)^2}$$

$$n = \frac{3.8416 \times 0.5(0.5)}{0.0025}$$

$$n = \frac{3.8416 \times 0.25}{0.0025}$$

$$n = \frac{0.9640}{0.0025}$$

$$n = 384.16 \quad \approx 385$$

The total population of the three most populous towns in Delta State, namely Asaba (73.374), Sapele (161.686) and Warri (536.023), is 771.083 (World Population Review, 2020). Buyers were drawn using the simple random sampling technique with a proportional allocation to the population size of each town. Therefore, 37 samples were drawn from Asaba, 81 from Sapele, and 267 from Warri. Out of the 421 copies of the distributed questionnaire, only 385 properly filled ones were analyzed. The survey was conducted between October and November 2019, and from August to October 2020.

The collected primary data were analyzed using descriptive and inferential statistics. Descriptive statistics, such as tables, percentages and means, were used to profile the consumers' demographic characteristics, whereas inferential statistics, such as correlation and regression analyses and the Analysis of Variance (ANOVA), were used to determine the effects of the demographic factors, the consumers' emotions and the product brand quality on the consumers' purchase decision. The data were analyzed using the SPSS software.

RESULTS AND DISCUSSION

Different brands of washing machines are currently being used by the respondents in the study area. Table 1 shows the crosstabulation of the functionality and the brands of the appliances: LG, Haier Thermocool and Samsung being the leading brands of washing machines used by 48% of the households. In terms

of their functionality, 57.4% of them are automatic machines, whereas 42.6% are manually operated machines. The most manually operated machines are Haier Thermocool, whereas LG dominated the automatic ones. The competitive prices and the availability of after-sales services are the major reason the consumers gave for their purchasing the LG brand, because the company has two such service points within the study location. F. Furaiji, M. Łatuszyńska and A. Wawrzyniak (2012) reported that competitive prices are the major determinant of the choice of home electrical appliances in Iraq, whereas A. Kumar and P. Gupta (2015) found that the brand image, the after-sales service and the price were the determinants of the choice of electronic home appliances (refrigerators, washing machines and microwave ovens) in India. Moreover, the presence of readily accessible service points helps to build consumer trust in the brand as buyers are confident that their appliances will be handled by the company-trained personnel with genuine parts. The finding is in agreement with the report of I. O. Ladokun, S. A. Adeyemo, and P. O. Ogunleye (2013) in Ibadan, Nigeria, who found that the after-sales service was a significant predictor of customer satisfaction (CS), customer retention (CR) and repurchase intention (RI) among the customers of LG electronics. S. Murali, S. Pugazhendhi and C. Muralidharan (2016) also found that the after-sales service significantly influenced CS, CR and loyalty among the buyers of home appliances in their study in India.

The analysis of the consumers' socioeconomic profile shows that the female respondents accounted for the majority (52.7%) of the consumers, whereas the remaining 47.3 % were the male respondents. About 84% of the respondents were between 27 and 56 years of age, the mean age being 46 years (Table 2). The results further indicated the fact that about 65% of them had acquired tertiary education with either a diploma, degree or postgraduate degree. The average number of the persons per household was 6, although the majority (72%) of the consumers of washing machines lived in homes together with other 2 to 7 persons. Public employees accounted for 29.1% of the sample, only to be followed by private workers and self-employed individuals in that order. The income distribution ranged from ₦= 39,599.75 to ₦= 201,602.75, the mean monthly income being ₦= 104,464.29.

The descriptive statistics of the model's variables are presented in Table 3. It shows the mean, minimum and maximum values, the standard deviation, the skewness and kurtosis of the variables in the study. Apart from the gender and the marital status, the other variables are normally distributed: the skewness values range from -0.004 to 0.738, and kurtosis ranges from -0.253 to 0.197. Their values are within the range of -1 to +1 (Hair *et al*, 2014). The reliability and internal consistency of the constructs were determined by Cronbach's coefficient alpha (Table 4). All the values are greater than 0.7, the minimum threshold advocating for an adequate internal consistency (Nunnally & Bernstein, 1994; Hair *et al*, 2014), while

Table 1 The cross tabulation of the functionality * the brand of the washing machines used by the respondents

Count									
		The brand of the washing machines used by the respondents							Total
		Haier Thermocool	Samsung	LG	Scanfrost	Nexus	Hisence	Ignis	Royal	
Functionality	Manual	28	25	25	26	18	8	10	22	162 (42.6)
	Automatic	30	28	49	19	12	37	38	10	223(57.4)
Total		58(15.1)	53(13.7)	74(19.2)	45(11.7)	30(7.8)	45(11.7)	48(12.5)	32(8.3)	385

Source: Authors

Table 2 The respondents' sociodemographic profile (n=385)

Variable	Frequency	Percentage (%)	Mean (mode)
Gender			
Male	182	52.7	
Female	203	47.3	(female)
Age			
27-36	75	19.5	
37-46	116	30.1	46 years of age
47-56	132	34.3	
57-66	62	16.1	
Marital Status			
Single	98	25.5	
Married	213	55.3	(married)
Divorced	43	11.1	
Widow	20	5.2	
Widower	11	2.9	
Years of formal education			
Primary education	46	11.9	
Secondary education	87	22.6	
ND; NCE	97	25.2	
HND/First Degree	127	33.0	(HND/First Degree)
M.Sc./Ph.D	28	7.3	
Household size			
2-4	93	24.2	
5-7	184	47.8	6 persons
8-10	108	28.0	
Occupation status			
Artisan	53	13.8	
Trader	61	15.8	
Public sector employee	112	29.1	(public sector employees)
Self-employed	70	18.2	
Private sector employee	76	19.7	
Retiree	13	3.4	
Monthly Income (N= *)			
₦= 39,599.75 – ₦= 80,099.75	99	25.7	
₦= 80,100.75– ₦= 120,600.75	181	47.0	N= 104,464.29
₦= 120,601.75– ₦= 161,101.75	67	17.4	
₦= 161,102.75– ₦= 201,602.75	38	9.9	

* 1US Dollar = ₦= 500 (Nigerian Naira)

Source: Authors

their construct validity was determined by the Pearson correlation coefficient between the items of each construct and the overall construct score (Pituch & Stevens, 2016). The correlation coefficients for brand quality scale items ranged from 0.138 to 0.337, while the consumers' purchase decision was from 0.361 to 0.767 and all were statistically significant ($p < 0.01$), thereby confirming the construct validity of the measurement scales.

The results of the correlation analysis

The Pearson correlation analysis showed the direction and strength of the relationship between the brand

Table 3 The descriptive statistics of the model's variables

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
						Statistics	Std. Error	Statistics	Std. Error
Purchase Decision	385	2.33	5.00	3.7078	0.58772	-0.038	0.124	-0.815	0.248
Brand quality	385	2.80	4.80	3.8984	0.37165	-0.205	0.124	-0.127	0.248
Positive emotions	385	2.30	4.90	3.7244	0.42760	-0.335	0.124	0.081	0.248
Negative emotions	385	1.63	4.88	3.5412	0.52187	-0.665	0.124	0.879	0.248
Valid N (listwise)	385								

Source: Authors

quality, the positive emotions and the negative emotions, and the purchase decision. The study used J. Cohen (1992) as the benchmark in interpreting the results. A correlation coefficient between 0.10 and 0.29 indicates a weak correlation, that between 0.30 and 0.49 is indicative of a medium correlation, whereas the one between 0.50 and 0.95 indicates a strong correlation. The results of the correlation between the purchase decision and brand quality, the positive emotions and the negative emotions are shown in Table 5. The brand quality showed a positive and significant relationship with the purchase decision ($r = 0.725$, $p < 0.01$), which implies that the higher the consumers' perception towards brand quality, the higher the purchase decision.

The positive emotions also showed a positive and significant ($r = 0.652$, $p < 0.01$) association with the purchase decision. The implication is that, as consumers exhibit high positive emotions towards a product, then the purchase of the product is likely to rise.

Table 4 Cronbach's coefficient alpha values of the constructs

Construct	No. of items	Cronbach's coefficient alpha
Brand quality	10	0.81
Positive emotions set	10	0.82
Negative emotions set	8	0.72
Purchase decision	12	0.82
Research instrument	40	0.86

Source: Authors

Table 5 The Pearson correlation coefficients between the purchase decision and the other variables

Variables		Purchase Decision
Brand Quality	Pearson correlation	0.725**
	sig. (2-tailed)	p< 0.01
	N	385
Positive Emotions	Pearson correlation	0.652**
	sig. (2-tailed)	p<0.01
	N	385
Negative Emotions	Pearson correlation	-0.302**
	sig. (2-tailed)	P<0.01
	N	385

** The correlation is significant at the (P< 0.01) level (2-tailed)

Source: Authors

The relationship between the negative emotions and the purchase decision is also significant, the correlation coefficient value being (r = -0.302, p < 0.01). The result implies that the more negative emotions consumers express towards some brands of washing machines, the lesser the likelihood of such products being purchased by such consumers.

The regression results

The regression results of determining the factors of the consumers' purchase decision for washing machines are shown in Table 6. The model fits well with the adjusted R^2 0.74, which is indicative of the fact that 74% of the variance in the purchase decision is jointly explained by brand quality and the emotions set. The ANOVA results showed the statistical significance ($F_{(8,\ 376)}$= 140.235, p < 0.01) of the model. The Durbin-Watson (D.W.) statistics 1.94 indicated the independence of the error terms and the absence of autocorrelation among the variables. The variance inflation factor (VIF) showed that the independent variables were not collinear, given the fact that all the VIF values ranged between 1.02 and 1.607, which is far below the threshold of 10 (Hair *et al*, 2014; Pituch & Stevens, 2016). Furthermore, the results revealed that the household size, the level of attained education, income, brand quality, as well as the positive consumption emotions, had a positive and significant impact on the consumers' purchase

Table 6 The regression results of the determinants of the consumers' purchase decision

A. The model summary[b]

Model	R	R^2	Adjusted R^2	Std. error of the estimate	Change statistics					
					R^2 change	F change	df1	df2	Sig. F change	Durbin-Watson
1	0.87[a]	0.75	0.74	0.298	0.75	140.24	8	376	0.001	1.94

B. ANOVA[b]

Model		Sum of squares	df	Mean square	F	Sig.
1	Regression	99.345	8	12.418	140.235	0.001[a*]
	Residual	33.296	376	.089		
	Total	132.641	384			

C. Coefficients[b]

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.	Collinearity statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	1.06	0.166		6.384	0.000		
Age	0.00	0.002	0.007	0.258	0.796	0.975	1.025
Occupation	-0.001	0.011	-0.002	-0.058	0.954	0.858	1.166
Household size	0.03	0.008	0.115	4.110***	0.001	0.760	1.316
Education level	0.07	0.015	0.134	4.507***	0.001	0.668	1.498
Monthly income	2.35E-6	0.000	0.142	4.493***	0.001	0.622	1.607
Brand quality	0.33	0.024	0.440	13.44***	0.001	0.665	1.504
PCemotions	0.34	0.032	0.338	10.67***	0.001	0.873	1.145
NCemotions	-0.06	0.027	-0.058	-2.086**	0.038	0.980	1.020

[a] The predictors: (Constant), NCemotion, Age, Leveleduc, Occupation, Hholdsize, Mnthincom, PCemotion, Brndqualty

[b] The dependent variable: the consumers' purchase decision.

*** Significant (p < 0.01); ** Significant (p < 0.05)

Source: Authors

decisions. Nevertheless, the negative consumption emotions had a depressing effect on the decision consumers made with respect to the purchase of washing machines.

The number of the persons living in one household is a significant ($\beta = 0.115$ $p < 0.01$) determinant of the purchase decision for washing machines, because the bigger the size of the family, surely the greater the laundry volume, which leads to an increase in demand for the time required to do the laundry in such a growing family. Although the influence of the household size is somewhat low, a 1% increase in the number of the persons living in the family will increase the purchase decision by 0.12 percentage points. The positive impact of the family members on the purchase decision for energy efficient household appliances was reported by M. Baldini, A. Trivella and J. W. Wente (2018) in their study conducted in Denmark. Furthermore, Z. Baoling and A. K. Mishra (2020) reported that the household size determined the purchase decision for refrigerators, washing machines and televisions in rural China, because big-size families are characterized by greater demand for food storage, consequently increasing demand for refrigerators, as well as washing machines, all in order to reduce the arduous task of washing clothes.

The customers' education level is yet another variable that had a significant ($\beta = 0.134$, $p < 0.01$) effect on the purchase decision. The research study showed that the attained education level had a significant influence on the individuals' purchasing behaviors, because it is the crucial indicator of acquired knowledge and skills (Mazloumi, Efteghar, Ghalandari, Saifi & Aghandeh, 2013). Highly educated individuals show a high degree of the acceptance of new technologies and innovations that could improve their overall wellbeing compared with their counterparts with a low degree of attained education. Furthermore, the beta coefficient value 0.134 shows the extent to which the purchase decision will increase if there is a unit rise in the education level. The result is in agreement with that of H. Harajli and A. Chalak (2019) in Lebanon, whereby university degrees had a significant and positive impact on the consumers' willingness to buy energy-efficient appliances, such as washing machines, air-conditioners, and refrigerators. The finding is also supported by the work of Z. Baoling and A. K. Mishra (2020), who found senior high-school education as an important predictor of consumers' purchase decisions for washing machines among rural Chinese households. However, I. Ashofteh and H. Dehghanan (2017) found no significant influence of education on consumers' purchase decisions for home appliances in their study carried out in Iran.

Income also significantly ($\beta = 0.142$, $p < 0.01$) affected the consumers' purchase decisions for washing machines as a unit increase in income will drive up the buying behavior by 0.142 points. Households require adequate income to be able to purchase any domestic appliance, because without income no effective demand can be made at all. Thus, as the higher the income, the higher the propensity to purchase more energy efficient appliances for family use. This finding is in consonance with the report of M. Baldini *et al* (2018) in Denmark, and also with that of Z. Baoling and A. K. Mishra (2020) in China, where high income was a mild predictor of the probability of washing machines being purchased. I. Ashofteh and H. Dehghanan (2017) also found income to have exerted a significant influence on the purchase decision for microwaves and vacuum cleaners in Iran.

The brand quality was yet another variable that significantly affected the purchase decision. In fact, brand quality is the predominant predictor of the purchase decision, with the beta coefficient ($\beta = 0.44$, $p < 0.01$). The result implies that a unit increase in the product brand will cause a 0.44 increase in the consumer's decision to purchase washing machines. The overall quality of a product in terms of its functionality, reliability, durability, ease of use and the emotional benefits of having it in one's possession and using it are very important determinants of consumer behavior. Therefore, the hypothesis one (H1) is supported by this finding. According to S. S. Alam, C-Y. Lin, M. Ahmad, N. A. Omar & M. H. Ali (2019), the probability that household energy efficient products of good performance and of a good quality will be bought by consumers is greater. The consumers who are satisfied/dissatisfied with the purchase are likely to inform their friends and acquaintances about

their experiences through the word-of-mouth, which may lead to a repeated purchase or to brand hate. This finding is consistent with the report of S. A. Parbadiya (2018), who found that brand quality was a stimulator of the brand preference and the purchase decision for washing machines in rural India. E. T. Mashao and N. Sukdeo (2018) also posited that the product quality was an important determinant of the purchase decision for household products such as refrigerators and television sets among consumers in the Kempton Park Region in South Africa. Nevertheless, R. A. Momani (2015) found no significant influence of brand quality on the purchase decision made by Jordanian consumers for shopping goods.

The influence of the positive consumption emotions is positive and significant ($\beta = 0.338$, $p < 0.01$), whereas the negative emotions set had an inverse and significant ($\beta = -0.058$, $p < 0.05$) impact on the consumers' purchase decision for washing machines. The results imply that a percentage increase in positive emotions will cause a 0.34 rise in the consumer's purchase decision for washing machines. As users' feelings of fulfilment and joy aroused by their use of a product increase, their decision to purchase the product again in the future is bound to increase as well. This result supports the hypothesis two (H2). A positive consumption emotion is the second most important predictor of the purchase decision in this study, after brand quality. Positive emotions increase the consumer's purchase intention (Tang, Hsieh & Chiu, 2017) and can create positive attitudes in the consumer's mind towards the brand when they buy using hedonic value, which can shorten the purchase decision-making process (Wu, Tipgomut, Chung & Chu, 2019). Therefore, marketers should explore how to stimulate consumers' affective shopping experiences through the consumer-brand relationship in order to influence their positive shopping outcomes. Therefore, the effects of positive emotions on the purchase intention and the purchase decision were studied in the marketing literature on emotional branding. According to T. Curtis, A. Arnaud and B. P. Waguespack (2017), the relationship between consumers' emotions and the purchase decision is affected by an individual's judgement and the fact that a positive emotional reaction is directly and positively related to the purchase intention. S. S. Shariff (2014) also reported that one of the trilogies of emotion (affection) significantly influenced a future purchase decision. Therefore, enhancing the conditions whereby consumers have good thoughts of and feelings for a product has the propensity to stimulate the purchase decision, particularly that of high-involvement consumer products.

The negative consumption emotions s*et al*so significantly ($\beta = -0.058$, $p < 0.05$) affected the purchase decision for washing machines in the study location, although their effect is quite opposite. Based on the beta value, a 1 percentage increase in the expression of the negative emotions showed a -0.058 depressing effect on the purchase decision for home appliances. When consumers buy a product for the first time, their purchase decision is based on the expectation created by the brand, the product design, the price or the consumer's prior experience of the relevant product. Therefore, the hypothesis three (H3) is supported by the obtained result. However, the feelings of sadness and discontentment arising from a product failure based on personal experiences or a negative word-of-mouth from acquaintances with regard to a brand of home appliances might lead to complaining, a negative word-of-mouth, and consequently brand switching (Romani, Grappi & Dalli, 2012). Such a disconfirmation of an expectation will ultimately reduce the purchase decision and will considerably stifle the repurchase intention and customer loyalty. This result is supported by the findings of N. Abdullah and H. Sharareh (2018) in Iran, who reported that negative emotions led to customers' discontentment and that such a negative emotion had significant negative effects on customer satisfaction and the repurchase decision.

CONCLUSION

The effects of the socioeconomic factors, brand quality and the competitive price as the determinants of the consumer's purchase decision with respect to shopping products has been well researched in the marketing literature. However, given the convergence of technological know-how amongst manufacturers and marketers of household electrical appliances,

and relatively insignificant differences in the prices of similar products, manufacturers are exploring customer relationship management as a strategy to apply in order to maintain a competitive advantage in the marketplace. Thanks to the emotions which the usage of or experience with home appliances may evoke, the impact of the product quality and specified consumption emotions on the consumer's purchase decision for washing machines is examined in this study.

According to the obtained results, brand quality is the dominant predictor of the purchase decision, whereas income is the most important socioeconomic variable affecting the consumer's buying behavior with respect to the purchase of washing machines. Apart from brand quality, a positive emotion is the second most significant determinant of the purchase decision. Given the intense competition on household goods market, marketers are presently paying in-depth attention to the hedonic value of their products as a means of facilitating a closer bond between consumers and their products. Since emotions drive our behavior, many manufacturers of home appliances have realized the need to understand the key emotions that make consumers connect with their products and brands. Therefore, in order to promote emotional brand attachment on the customers' part, manufacturers have to ensure that their products are comparable in terms of their quality and elicit positive emotions in functionality, coupled with a reliable after-sales service. Furthermore, marketers must deploy adequate resources to nurture and manage the relationship built with consumers over the time, because the service failure may quickly lead to a behavior implying making complaints, a negative word-of-mouth and brand switching, with considerable consequences on the market share and revenue.

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APPENDIX

The research questionnaire

SECTION A: The demographic characteristics

Instruction: Please tick [√] where applicable.

1. Sex: (a) Male [ ] (b) Female [ ]

2. Age (years): (a) 18 - 25 [ ] (b) 26 - 33 [ ] (c) 34 - 41 [ ] (d) 42 - 49 [ ] (e) 50 - 57 [ ] (f) 58 - 65 [ ]

3. Marital Status: (a) Single [ ] (b) Married [ ] (c) Divorced [ ] (d) Widowed [ ] (e) Widower [ ]

4. Educational Qualification (a) Primary [ ] (b) SSCE/GCE [ ] (c) OND/NCE [ ] (d) HND/B.Sc. [ ] (e) M.Sc./M.A [ ] (f) MBA/Professional Certificate [ ] (g) Ph.D. [ ]

5. Employment (a) Artisan [ ] (b) Trader [ ] (c) Civil Servant [ ] (d) Self-employed [ ] (e) Retiree [ ] (f) Teacher [ ] (g) Private sector employee [ ]

6. Average monthly income (N) (a) 10000 - 40000 [ ] (b) 40001 - 70001 [ ] (c) 70002 - 100002 [ ] (d) 100003 - 130003 [ ] (e) 130004 - 160004 [ ] (f) 160005 - 190005 [ ] (g) 190006 - 220006 [ ] (h) 220007 - 250007 [ ]

SECTION B: The overall product performance

Please tick [√] the box that represents your experience of the listed brands of the WASHING MACHINES that you are using/used.

S/No.	Brands of washing machines	Very bad (1)	Bad (2)	Average (3)	Good (4)	Very good (5)
1	HAIER THERMOCOL					
2	SAMSUNG					
3	LG					
4	SCANFROST					
5	NEXUS					
6	HISENSE					
7	IGNIS					

SECTION C: The consumption emotions set (CES)

Please indicate how intensely you have experienced the listed emotions for the washing machine(s) you ticked in Section B above by ticking [√] the appropriate box.

S/No.	Consumption emotions set	None (1)	Somewhat (2)	Average (3)	Much (4)	Very Much (5)
Positive emotions						
1	Contentment					
2	Joy					
3	Peacefulness					
4	Surprise					
5	Eagerness					
6	Love					
7	Pride					
8	Relief					
9	Optimism					
10	Excitement					
Negative emotions						
11	Discontent					
12	Guilt					
13	Anger					
14	Envy					
15	Sadness					
16	Worry					
17	Shame					
18	Fear					

SECTION D: Brand quality

S/No	Construct statements	Strongly disagree (1)	Disagreed (2)	Undecided (3)	Agree (4)	Strongly agree (5)
1	The performance of my brand of washing machines exceeds my expectations in most cases					
2	My washing machine possesses all the supplemental features required for it to effectively work					
3	My brand of washing machines is reliable and consistently works					
4	The washing machine conforms to the standard specifications					
5	This product brand is quite durable; I have used/have been using it for many years and its performance has not decreased over the time					
6	The washing machine is quite serviceable and easy to maintain and repair, unlike some other brands					
7	The aesthetic designs of the product are very appealing to me and influence my choice					
8	I perceive this product brand as high-quality based on its name and other consumers' experiences					
9	This product has the overall best quality due to its consistent performance					
10	The popularity of this product brand among consumers in this region suggests its high quality					

SECTION E: The purchase decision

Please indicate the extent to which you agree or disagree with the statements below by ticking [√] the appropriate boxes opposite them;

S/No	Construct statements	Strongly disagree (1)	Disagreed (2)	Undecided (3)	Agree (4)	Strongly agree (5)
1	A washing machine is very important to me in my daily life					
2	The brand name of the washing machine influences my choice of the product I purchase					
3	The value I receive from the product influences my purchase and repurchase decisions					
4	The perceived quality of this brand is the key determinant in my making my purchase decision					
5	The reliability and durability of the washing machine influences my decision to purchase the product					
6	This brand of the washing machine is of a high quality					
7	The innovative design and aesthetics of the washing machine affect my decision to buy					
8	I feel satisfied with my decision to purchase this brand of the washing machine					
9	Generally, this brand of the washing machine has the best overall quality					
10	I have never regretted buying this brand of the washing machine					
11	I will definitely recommend this brand of the washing machine to other people					
12	If I were to purchase another washing machine, I would definitely purchase any model of this brand					

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Conference announcement

CONTEMPORARY ISSUES IN ECONOMICS, BUSINESS AND MANAGEMENT - EBM 2022

November 04-05, 2022, Faculty of Economics, University of Kragujevac, Kragujevac, the Republic of Serbia

Gordana Radosavljevic*

The Faculty of Economics of the University of Kragujevac will organize the Seventh International Scientific Conference entitled *Contemporary Issues in Economics, Business and Management - EBM 2022*, on November 4th and 5th, 2022. The conference has been held since 2010 and is dedicated to the current topics in economics, business and management. As was the case with the previous conference, this year's conference is expected to be an opportunity for both domestic and foreign researchers to confront different theoretical and empirical views, which will lead to the expansion of the existing knowledge and to gaining new knowledge of the relevant aspects of economics, business and management.

Modern organizations and national economies are currently being faced with numerous challenges and problems, which imposes the need for an appropriate theoretical and methodological response. Hence, it can be noticed that there are new concepts being applied in the field of economics and management, as well as new methodologies, methods, models and techniques. In an effort to adequately respond to the various challenges of the business environment, this year's Conference is an opportunity for researchers from different fields of economics, business economics and management to present the latest results of their research, exchange their ideas, knowledge and experiences, and verify their results through appropriate publications.

A large number of researchers from the country and from abroad are expected to participate. Apart from the participants from Poland and Italy, the participants from Slovenia, Croatia, Bosnia and Herzegovina, Great Britain and numerous researchers from the universities of the Republic of Serbia and those in the neighboring countries with which the Faculty has had long-term cooperation are expected to take part.

Based on the characteristics of the modern business environment, the following four thematic areas are defined:

- Globalization and regionalization,
- Key problems and challenges in management and marketing,

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- Accounting and business finance, and
- The application of IT and quantitative methods in economics and management.

Within the framework of each thematic area, there is a variety of subtopics, so that each of the participants can find something inside the narrow area of their respective interest.

The papers will be subject to double anonymous peer review and all such positively peer-reviewed papers will be published in the Proceedings after the Conference. The collection of the accepted abstracts and the participation certificate will be distributed to the participants on the same day of the Conference.

The authors of the selected quality papers will have the opportunity to publish their papers in the renowned scientific journal of the Faculty of Economics of University of Kragujevac - *Economic Horizons*, which is indexed in several relevant journal databases, namely in Scopus, ProQuest/ ABI/INFORM, Cabell's Directories, Index Copernicus Journals Master List, EconLit, EBSCO, Ulrich'sWeb.

The following schedule is relevant for the potential participants at the Conference:

- May 30th, 2022
  the submission of the abstracts
- June 15th, 2022
  the acceptance of the abstracts
- September 30th, 2022
  the submission of the papers
- October 15th, 2022
  the acceptance of the papers
- 4th-5th November 2022
  the EBM Conference

Gordana Radosavljevic is a full professor at the Faculty of Economics of the University of Kragujevac. She holds a PhD from the Faculty of Economics of the University of Belgrade in the field of business economics. The key areas of her research are marketing and management in tourism and trade.

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