e-ISSN 2353-0758

MODERN | MANAGEMENT | REVIEW |

Quarterly, Volume 27
(July-September)
Research Journal
No. 3(2022)

Volume Editor
Tomasz Sierotowicz

MMR Journal indexed, among others, on the basis of the reference of the Minister of Science and Higher Education in DOAJ, EBSCO, ERIH PLUS, NSD and Index Copernicus Journal Master List 2020

Issued with the consent of the Rector

The electronic version of the Journal is the final, binding version.

e-ISSN 2353-0758

Publisher: Publishing House of Rzeszow University of Technology
12 Powstańców Warszawy Ave., 35-959 Rzeszow (e-mail: oficyna@prz.edu.pl), http://oficyna.prz.edu.pl

Editorial Office: Rzeszow University of Technology, The Faculty of Management,
10 Powstańców Warszawy Ave., 35-959 Rzeszów, phone: +48 17 8651383, e-mail: kwart_wz@prz.edu.pl
http://mmr.prz.edu.pl/

Additional information and an imprint – p. 69

CONTENTS

From the Editorial Committee

We are giving you the next Vol. 27, No. 3(2022) issue of the Quarterly of the Faculty of Management of the Rzeszow University of Technology entitled “Modern Management Review”.

The primary objective of the Quarterly is to promote publishing of the results of scientific research within economic and social issues in economics, law, finance, management, marketing, logistics, as well as politics, corporate history and social sciences.

Our aim is also to raise the merits and the international position of the Quarterly published by our Faculty. That is why we provided foreign Scientific Council, as well as an international team of Reviewers to increase the value of the scientific publications.

The works placed in this issue include many assumptions and decisions, theoretical solutions as well as research results, analyses, comparisons and reflections of the Authors.

We would like to thank all those who contributed to the issue of the Quarterly and we hope that you will enjoy reading this issue.

With compliments
Editorial Committee

MODERN MANAGEMENT REVIEW **2022**
MMR, Vol. 27, No. 3(2022), pp 7-21 **July-September**

Anna KONYEV[1]
Olena DOLGALOVA[2]

CURRENT TRENDS IN PERSONNEL DEVELOPMENT MANAGEMENT IN THE FIELD OF HOUSING AND COMMUNAL SERVICES IN A CHANGING VUCA ENVIRONMENT

The article considers the main trends in the management of personnel development in the sphere of housing and communal services in the changing VUCA environment in Ukraine and developed European countries. The article analyzes the main reasons for changes occurring in the practice of personnel management in the sphere of housing and communal services. The article considers models of human resource management in the conditions of transition to the principles of "lean management" in the sphere of housing and communal services. Modern and rational lean-technologies are analyzed and a functional model of personnel development and training under the conditions of "lean management" in the field of housing and communal services is developed. As a result, project proposals for the rationalization of staff activities in the implementation of "lean management" in a volatile VUCA environment in the field of housing and communal services are presented.

Keywords: housing and communal services, VUCA-environment, personnel management model, lean management, lean-technology.

1. INTRODUCTION

Under the conditions of fierce competition, variability of technological and information markets, housing and utilities organizations are forced to constantly review and optimize their processes to optimize costs and increase their efficiency. However, many make the typical mistake: they try to implement organizational changes without first having developed, first a strategic action plan for human resource management, and secondly, without having prepared a comprehensive plan for overcoming personnel resistance to organizational change.

Changeability is an integral part of existence in conditions of constant economy of HR-resources. One of the main tactical tasks of modern organizations of housing and

[1] Anna Konyev, candidate of sciences in public administration, Heilbronn University, Reinhold Würth University, Campus Künzelsau, Institute for Digitalization and Electric Drives (IDA), Institute Assistant; e-mail: ganna.konyeva@gmail.com (corresponding author). ORCID: 0000--0002-8851-8765.

[2] Olena Dolgalova, doctor of Public Administration, Professor, Head of the Management Department, Donbas National Academy of Civil Engineering and Architecture, Ukraine; e-mail: elena. dolgaleva21@gmail.com. ORCID: 0000-0002-7281-2046.

communal services, is to improve the system of development and use of personnel in conditions of VUCA environment and the transition to the principles of "lean management" in the sphere of housing and communal services.

The VUCA environment is: V → Volatility; U → Uncertainty; C → Complexity; A → Ambiguity (Chuhno, 2016).

Production resources of organizations of the housing and utilities sector, especially in the regions, are limited – capital, technology, materials, time. But at the same time any utility company, regardless of its status, has one almost unlimited and very mobile resource – the intellectual potential (capital) of its employees. Sustainability of enterprises of the housing and utilities sector in a constantly changing VUCA environment depends on the ability of top management to motivate, develop, and apply this potential for the benefit of the organization and the employees themselves.

The development of "lean management" in accordance with the orientation on the innovative type is characterized by strengthening the role of scientific knowledge, innovation, information technology and the presence of "lean infrastructure" aimed at the creation and distribution of new mobile knowledge. Assessment of the level and dynamics of innovation activity within individual organizations of the housing and utilities sector makes it possible to determine the real state, trends of change and the level of differentiation of the development of "lean management" technologies in the housing and utilities sector in the changing VUCA-environment. The aim of the research work is to develop a functional model of management system of personnel development, in the sphere of housing and communal services, considering the specifics of human resource management of organizations, in the conditions of "lean management". To recommend project proposals on rationalization of personnel activity when implementing "lean management" in the conditions of a changeable VUCA environment of housing and communal services organizations.

The effectiveness of lean technologies used in the management of housing and utilities organizations is characterized by several common indicators such as, first, the level of innovative activity of institutions and, criteria of "lean organizations" in the sphere of housing and utilities. During the analytical part of the study the level of differentiation, as well as the dynamics of these indicators and their sustainability were studied. The methodological basis of the study was based on the construction of trends in dynamic series, as well as methods of structural and comparative analysis. During the development and justification of the model of management of the system of development and personnel training in the housing and utilities sector in the conditions of "lean management" comparative analysis and expert assessment were used.

2. STATEMENT OF THE PROBLEM

Until now in scientific circles the problem of studying the world experience of effective management of enterprises of housing and communal services considering the specifics of personnel management of organizations, in conditions of VUCA-environment and its adaptation to the current economic and political conditions in Ukraine remains relevant. Currently, personnel problems are not given proper attention. To solve these problems, it is necessary to use non-standard approaches. And one of such approaches is "lean management". The problems of reformation of the sector of housing and communal services, management of enterprises at the market of housing and communal services,

regulation of relations between the enterprises of housing and communal services and personnel training have long been studied by Ukrainian and foreign scientists, among which it is necessary to mention the following works: J.C. Collins, J.P. Womack, D.T. Jones, L.V. Bezzubko, L.A. Tretyakova, T.V. Tselyutina, M. Friedman etc.

Overcoming of the inadequacy of mental models allows increasing the efficiency of analytical activity, relieving the researcher from the false restrictions which do not allow to go beyond the developed representations, or on the contrary will not allow conducting the research based on unreasonable assumptions and postulates. Many famous scientists, including Nobel laureates, have devoted their work to the study of unsubstantiated mental models. For example, in 1979 there was a famous article *Theory of Perspectives: Analysis of Decision-Making under Conditions of Risk* written by D. Kahneman (Nobel Prize winner). D. Kahneman (Nobel Prize in Economics 2002) in co-authorship with a professor of psychology A. Tversky. The authors of this article, which marked the beginning of the so-called behavioral economics, presented the results of experiments in which people were asked to choose between different alternatives.

These experiments proved that people cannot rationally estimate either the magnitude of expected benefits or losses, or their probabilities. The works of the following authors are devoted to the problems of rational decision-making: M. Allais (rational human behavior under conditions of risk), J. von Neumann (utility theory, game theory, and economic behavior), R. Ackoff (decision-making, goal-oriented systems), P. Senge (systems thinking), D. Dörner (system dynamic analysis of social systems) etc. Thus, the problem which arises during the formation of competencies necessary for the analytical activity of participants of housing and communal services was defined. As formulated by K. Argyris, the problem is that “people do not always act in accordance with the theories they express, but they always act in accordance with the theories (intellectual models) they use”. About analytical activity, the problem is transformed and revived by the fact that mental models are actionable-they shape our actions, influencing the decisions we make.

3. MAIN RESULTS

The importance of personnel management problems in the sphere of housing and communal services is undeniable, since it is the quality of services provided and the level of satisfaction of the population that depends on the workers. In modern systems of personnel management, an employee is considered the main and most important resource and value of an enterprise. That is why it is necessary to develop fundamentally new approaches to HR management in the sphere of housing and communal services in a constantly changing VUCA-environment. Proper personnel management in the sphere of housing and communal services is undeniable because it is the quality of services provided, as well as the degree of satisfaction of the population depends on the personnel. At present the problems of management of personnel development in the sphere of housing and communal services in the conditions of changeable VUCA-environment are not given proper attention. To solve these problems, it is necessary to develop proposals for the rationalization of personnel activities in the implementation of “lean management” in a volatile VUCA environment in the sphere of housing and communal services.

The concept of management and behavior of personnel is based on the unwavering desire to eliminate all types of losses (Tretyakova, Tselyutina, Trembach, Govorukha, 2015); (Womack, Jones, Roos, 2007) The analysis of concepts of application of

technologies of “lean management” has allowed the authors to develop recommendations on strengthening of organizational behavior, communication and information channels between management links and development of delegation skills for HR-managers in the sphere of housing and communal services which also include possibilities of transition to principles of “lean management” of all categories of personnel in VUCA-environment.

The new model of development of modern management became the concept of VUCA. This term was proposed by N. Bennett and J. Lemoine as an acronym of the English word’s volatility, uncertainty, complexity, and ambiguity. Indeed, throughout the world there are now several notable trends: an increase in the speed with which changes occur; acceleration of transactions; acceleration of all activities; frequent changes in social interaction strategies and political orientations; constant change; turbulence of current processes in all spheres of activity. (Hodgson, 2003) A comparison of the “old” (20th century) and “new” (21st century) model of the business environment is presented in Table 1.

Table 1. Features of business environment models

SPOD-world	VUCA-world
Steady	Volatility
Predictable	Uncertainty
Ordinary	Complexity
Definite	Ambiguity

Source: personal contribution of the authors.

Thus, the VUCA model accurately describes the state of permanent instability, chaos, volatility, and anxiety that is characteristic of the modern economy. Moreover, all these phenomena have become the “new norm” in describing modern management realities.

In the VUCA world, economic actors (executives and managers of companies) find it difficult to make decisions, and forecasting tasks are difficult to implement. Any decisions must be made as quickly as possible, otherwise the decision taken not in time will not meet the requirements of the changed external and internal environment of the organization. In addition, the instability, uncertainty, and complexity of the environment greatly increases the risk of obtaining unreliable information or obtaining information not in full. As a result, according to Horney, Posmore and O'Shea (2010), the authors of a popular work in the West, Dynamic Leadership: The Requirement for Business in a VUCA World, in today's world, to succeed, “managers must constantly change people, processes, technologies and structures. This requires flexibility and quick decision making.” Accordingly, the VUCA world places new demands on organizations, HR systems and HR managers. The emphasis is on building “smart”, evolving management systems. (Best practice in business advisory, counselling and information services, 2002). There is currently a further shift in the management paradigm worldwide. It is no longer just a transition from the concept of personnel management to the concept of human resources management (HRM), but its transformation into the concept of human capital management (HCM) and human management, which, on the one hand, is aimed at active search and development of talents, on the other – focuses on the humanization of HR-practices and care for the employee of the organization. One of the principles of corporate culture formation within the new managerial paradigm is the concept of “company as a family”. The starting point of this approach is the phrase: “a good employee is a healthy and happy employee”. The

implementation of the "company – family" approach emphasizes paternalism, commonality of group interests of employees, consideration of "life peaks" of employees, care about health and lifestyle of employees, as well as increasing time for interaction of employees with their families. The change of a management paradigm assumes strengthening of attention to development of behaviorist technologies of management of the personnel, individualization and "point adjustment" of most tools of management of the personnel. Also, this factor assumes increased attention of company management to development of new tools and methods of personnel training (Anderson, Galinsky, 2006).

Globalization of economy, knowledge and technology, internationalization of business reduce the importance of state borders as barriers to the movement of goods, services, capital, and labor and increase international business activity and mobility of modern workers. The needs of the workforce to the conditions and content of work change the holistic perception of labor activity: autonomy and flexibility of work become a priority, especially for young people (Friedman, 1953). This factor increases attention to the creation of a variety of employee mobility programs (from the development of a system of mobile workplaces and special training programs for employees to programs of international internships). An example of the increased attention of personnel management specialists to the development of mobility programs can be the introduction in many foreign companies of a special position – international employee mobility specialist, international diversity management specialist or mobility consultant.

The VUCA world leads to the formation of new types of organizations. There is a transition from the classical model of the company to the model of the "liberated" company. The classical model of the company assumes, firstly, the division into hierarchical levels with concentration of all information at the head, secondly, the formation of a system of departments and divisions, employees of which unite knowledge in a certain area. That is, employees involved in the production of products receive minimal access to information and are subordinate to the decisions made "at the top". In contrast to this type of company, the "liberated company" model assumes that all employees, including those at the lowest levels of the management hierarchy and those engaged in physical labor, can propose decisions and projects for the entire company. In such companies, authoritarianism is virtually absent, and all decisions are made collectively. Employees in a "liberated company" are free and responsible for all actions that they believe will be necessary and best for the development of their organization. In liberated companies, self-organization and employee self-development occurs. On the other hand, the new business environment involves more active formation of a network of cross-functional teams.

A cross-functional team is a group of employees from different functional departments of a company focused on solving a specific problem and working as a team to improve system innovation, solve important problems, and create synergies in management. In cross-functional teams, there is a transparent exchange of information and a transition from team to team depending on the problem to be solved. In such teams, people are rewarded for their skills, not their positions (Becchetti, Di Giacomo, Pinnacchio, 2008). The advantages and disadvantages of cross-functional interaction are presented in Table 2. The cross-functional approach changes traditional ideas about the role and direction of an HR specialist.

Table 2. Advantages and disadvantages of transition to cross-functional teams in organizations of housing and communal services

Advantages	Disadvantages
Flexibility and adaptability to the VUCA environment	The chaos and discontent caused by the double-subordination system
Efficient use of resources	The complexity of practical implementation and implementation
Sharing knowledge and experience	Possibility of contradictions and conflicts between groups of employees
Overcoming intra-organizational barriers	Difficulties with the effective use of qualified and promising professionals
Ease of development and unified organizational policy	Cognitive overload (increased communication channels, emails, meetings)

Source: personal contribution of the authors.

So, because of these reasons, the managers of many companies are increasingly faced with the fact that the usual approaches and technologies of personnel management no longer demonstrate the expected effectiveness. Under these conditions, increasing the efficiency of company functioning requires both the development and implementation of new personnel-oriented approaches to personnel management, new technologies and tools, and the modernization and adaptation of the already used tools for making and implementing managerial decisions. Results of management of innovation potential in many respects depend on efficiency of managerial activity which should be correctly modeled and provide formation and realization of the best variant of its development and competitive advantages. Among the directions of increasing the effectiveness of management of the development of personnel in the sphere of housing and communal services, based on the application of low-cost measures, should be noted the optimization of the system of administrative management through the standardization and integration of management systems, the application of a progressive model of competencies of employees of the management level to form a system of management of organizational behavior (Tretyakova, Tselyutina, Trembach, Govorukha, 2015; Kaplan, Norton & others, 2005).

Lean philosophy of continuous improvement offers an alternative to large, long-term, developed and conducted "from above" reorganizations – less global, but continuous improvements which not only change the situation for the better, but also transfer the opportunity to positively influence conditions and results of their work to employees themselves, turning them from passive performers into active participants (generators of ideas and rational proposals) of management processes (Anderson, Galinsky, 2006; Von Krogh, Ichijo, Nonaka & others, 2000). In article authors define the basic directions – from start of the project to formation of lean-culture:

The first direction is people development: social responsibility, leadership, teamwork, leadership standardization, visualization, system of continuous improvement, training system, identifying, and solving problems, mutual trust and respect, safety, and labor (Grossman, 2000), culture of intra-organizational communication, delegation of authority, holding meetings and many others. When solving the problem of increasing the efficiency and competitiveness of their development, housing and utilities organizations need to focus

on the following basic elements (effective personnel management), while maintaining the importance of the fundamental, strategic basis – personnel (Figure 1.)

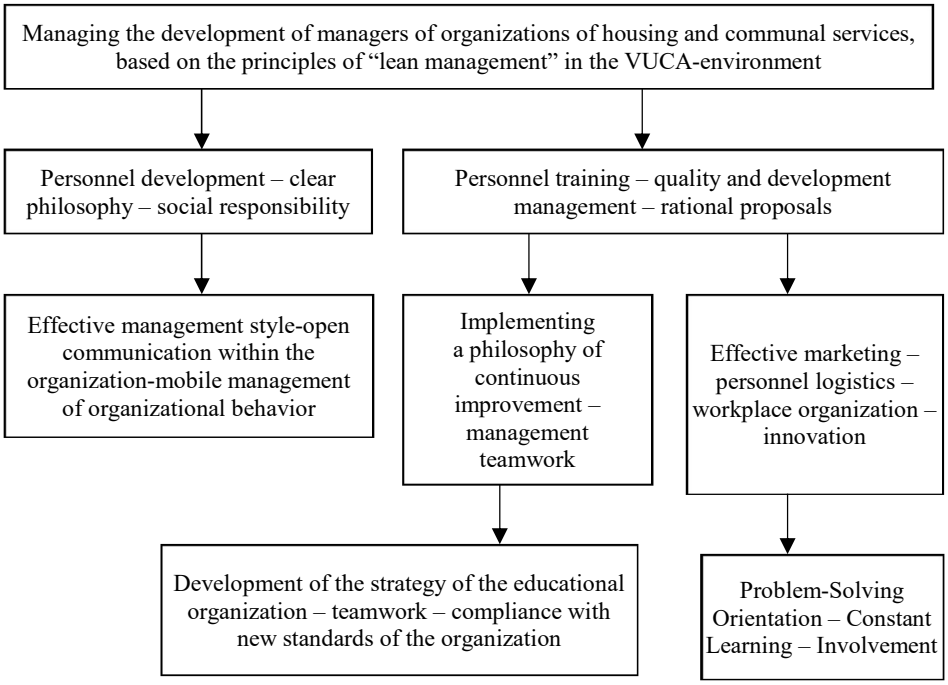

Figure 1. The model of management of development of housing and utilities personnel in the conditions of "lean management" in VUCA – environment

Source: personal contribution of the authors.

The second direction is process development: diagnostics, visual management and workplace organization, standardized work, building quality into the process, statistical methods (Hambleton, 2007), efficient logistics, efficiency calculation (Mayo, 2016). The authors characterized the main elements of the developed model for improving the effectiveness of managers of housing and communal services organizations based on the principles of "lean management", consulting seminars and trainings (Table 3.).

The basic element of the modern model of development of organizations of housing and communal services should become "lean management". According to the authors, all business processes and key performance indicators should be formalized, a risk-based development strategy and motivation system for senior management should be prescribed, as well as other structural provisions governing the development and strengthening of organizational behavior management subsystems. "Lean management" affects not only the administration of all business processes, but also business document management ("lean office") (Kaplan, Norton & others, 2005; Collins, Porras, 2005). It should be noted that "lean management" is, first, "lean staff self-organization", based on "lean thinking", which relates to the culture and mentality of all employees of the housing and utilities organization.

Table 3. The model of training of managers of organizations of housing and communal services, based on the principles of "lean management" in VUCA-environment

Development of lean management processes		
Project consulting (achieving the goal within the agreed timeline and budget).	Sustainability certification for managers and professionals.	Remote leader (supervisor). Targeted corporate sustainability program through tiered action learning and project office.
Expert consulting (process analysis).	Development of a motivation system based on the principles of lean production. Testing of managers and specialists.	Remote support for projects. Distance learning. Corporate trainings.
Expertise and development of documents and methodological materials.	Self-evaluation of the level of development of the production system and managers. Program monitoring.	Methodological literature. Corporate seminars and conferences.
Personnel development, career modeling, talent management, self-study.		

Source: personal contribution of the authors.

Despite the functional diversity of the idea of "lean", a significant role in its implementation is played by employees as a strategic resource for the effective development of the organization. The concept of "lean management" is focused on the importance of respectful attitude to employees and creation of ways to allow the staff to think and offer improvements (Kaplan, Norton & others, 2005). The manager will be able to achieve the goal of joint activity since will multiply their physical and intellectual forces at the expense of the collective forces of subordinates and purposefully use them. This is the task of a manager of any managerial level. The inability to build interpersonal relations, dislike of their partners and themselves give rise to lack of initiative, indifference, and a feeling of permissiveness. Awareness of the need to urgently address the problem of improving the behavior of employees of housing and utilities organizations is the basis for the optimization of corporate culture in the organization and strengthening loyalty. Recently it became actual and prestigious to speak about formation of loyalty of employees to the organization and development of strategic methods of retention of valuable employees (Becchetti, Di Giacomo, Pinnacchio, 2008). The authors present the optimal managerial competences for managers of housing and utilities organizations, which are actualized in the most popular competence models (Figure 2.).

Assessment and development of manager's professional competences is a guarantee of effective work and labor activity of employees. The growth rate of the new complex regional economy, trends of labor market changes are determined by the natural and resource and human potential, and, above all, by the competence profile of managers, executives, top managers.

Social processes (change of management models in educational organizations, transition to lean production principles, change of consumer preferences), technological innovations (introduction of information and communication technologies, automation, emergence of new technologies), dynamics of organizational changes focused on transformation of labor activity, cardinal changes in development, production, management and service practices,

workplace – all this entails structural – functional changes in the content and format of competence training (Madden, Duchon, Madden, Plowman, 2012; Ohnos, 2021). Therefore, a modern manager, HR-manager of the new generation, needs to add to his "portfolio" of management technologies and methods, in addition to professional skills and abilities, additional competencies.

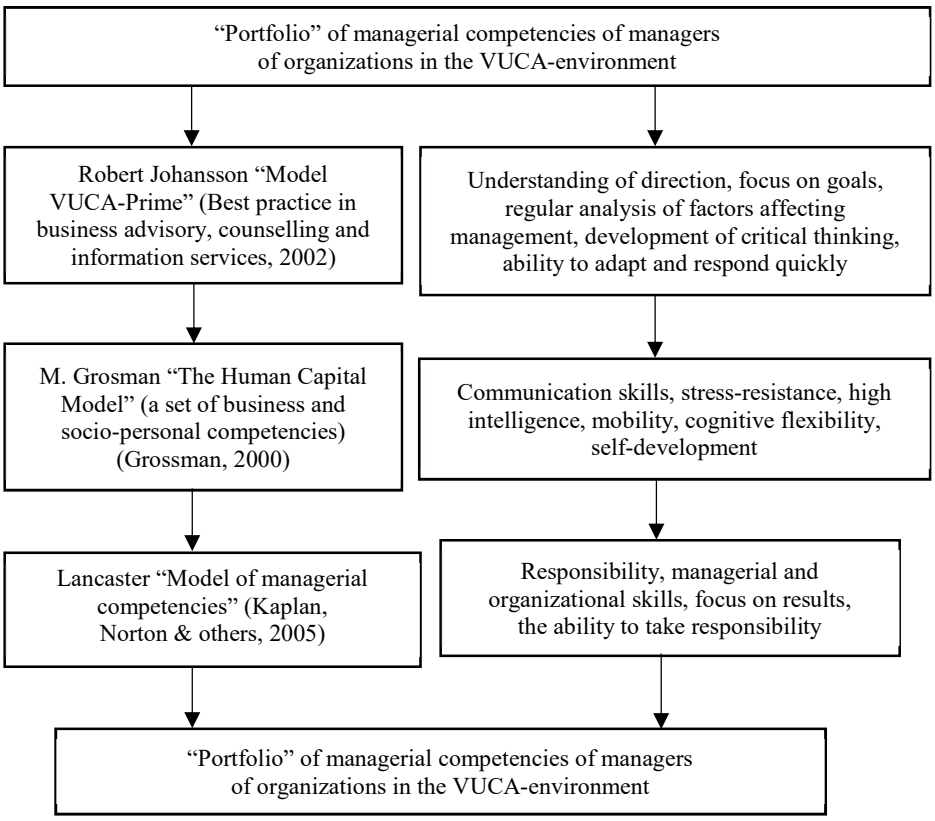

Figure 2. "Portfolio" of managerial competencies of managers of housing and communal services organizations based on the principles of "lean management" in VUCA environment

Source: personal contribution of the authors.

4. PROPOSALS TO IDENTIFY CURRENT TRENDS IN HR MANAGEMENT OF HOUSING AND UTILITIES ORGANIZATIONS, BASED ON THE PRINCIPLES OF "LEAN MANAGEMENT" IN THE VUCA ENVIRONMENT

In determining the key trends in human resource management of organizations of housing and communal services, currently spread, the following fundamental changes in the field of management can be identified as the basis:

1. *Shaping the workforce ecosystem: managing workers outside the enterprise.* For several years now, "alternative ways of employment", such as project work, part-time work, or hygienic work, have become increasingly common. Experts estimate that by 2022, more

than 40% of workers in the U.S. will be employed in “alternative ways”. The traditional employee-employer relationship is now being replaced by “an entire 'workforce ecosystem', represented by a diverse set of employees, talent networks, gig workers, and service providers that provides employers with the flexibility, opportunity, and potential to explore different economic models in their search for talent (Deloitte, 2018). The ecosystem includes both full-time and part-time employees (full-time and part-time) as well as contract workers, remote workers, partners, agents, gig workers, and workers focused on a variety of projects and individual tasks. Typically, “alternative workers” have little interest in the organization's overall strategy and do not seek to understand it. Among the problems faced by HR managers are the lack of HR software and effective tools to help employers manage such non-traditional workers, as well as the lack of a system of training and performance evaluation of such employees. In Ukraine there is no clear idea of the mechanisms of personnel ecosystem management, and almost 40% of HR managers are hampered by organizational risks, the problem of confidentiality of commercial and technological information, lack of confidence in the stability of attracting such personnel.

2. *Increased attention to corporate social responsibility.* In EU countries the following criteria are widespread for assessing the level of development of corporate social responsibility in the organization: the absence of discrimination in the selection of personnel; the level of integration of employees; the degree of integration of employees with disabilities into the team; the presence of a system of support for employees employed in “critical positions” and their retraining; compliance with the correct working conditions.

3. *Active introduction of new work methods and new places to work.* The aim of the development and implementation of new methods, technologies of work and the revision of physical workspaces and approaches to the management of employees is, on the one hand, to ensure an increase in productivity, and on the other hand, to avoid overburdening the employee. It is possible to distinguish the main directions within this trend:

- *the formation of hyperconnected workplaces.* The reason for this is the development of interesting new communication media and tools. The habits and tools of communication that people use in their personal lives have begun to be applied to everyday work life as well. Today's work environment is characterized by a variety of ways to communicate. And physical meetings (face-to-face and telephone communication) are giving way to virtual collaboration, and collaboration platforms are actively developing. As a result of the development of hyperconnected workplaces, the classically accepted notion of “working time” is becoming increasingly blurred, and its boundaries are expanding. The adoption of laws in some EU countries to protect the “right to be unconnected outside of working hours” is a response to the increased need for employees to be constantly “in touch” both during and often outside of working hours;
- *formation of flexible and adaptive workspaces.* Along with the traditional “corridor--cabinet” system of workplaces, the open office concept, aimed at improving employee communication within the company's structural subdivisions, and the flex--office system are becoming increasingly widespread. The introduction of flexible office system is advisable for those companies that employ many employees working remotely or have free time. Within the framework of flexible office system several work areas are allocated, determined by specifics and direction of activity, duration, and complexity of the work, individual or collective decision making etc. For

example: a free desk (any employee at a convenient time), a desk reserved for a certain time, a standing place for operational work, a room for confidential negotiations, conferences or webinars, a room for quick negotiations, a room for meetings using a virtual screen;

- *implementation of Agile and Scrum approach.* One of the main principles of managing people and projects now has become the development of agile approaches to the process of setting and solving tasks and getting instant and high-quality feedback. Developed originally for the IT-sphere Agile-manifesto has spread its values and principles to other areas of activity. Its mission can be formulated as follows: we are constantly discovering better and more attractive methods of work and help other people to do it.

The following principles acquire a special value in Agile HR: transparency is more important than secrecy; adaptation is more important than constancy; inspiration and participation are more important than management and retention; internal motivation is more important than external rewards; ambition is more important than responsibilities; work teams must constantly improve; an indicator of competent leadership is simplifying processes and minimizing unnecessary work. Agile methods are thus based, firstly, on the principles of face-to-face communication of employees, and secondly, assume that task setting, search for solutions and evaluation of results are focused on short-term perspective and mini projects (Zarri, 2010).

The Scrum methodology is based on the simple idea of "test and adapt". When developing a project, according to its author J. Sutherland, it is necessary to systematically check the progress of the work and answer the questions: whether the movement is in the right direction; what the customer really wants to get; whether there are ways to improve the methods of development and execution of work; how to do the work better and faster; whether there are factors that hinder your tasks (Tomer, 2007). Scrum stand-up meeting involves answering the questions: what did you do yesterday; what you are going to do today; what your problems are. In fact, the concept of Scrum can be seen as a platform that combines such well-known approaches as the philosophy of continuous improvement, lean "production" technology and "just-in-time" system. Thus, the cooperation of HR-specialists, IT-sector employees and representatives of the business sector creates the conditions for the formation of a flexible, customizable integrated working environment.

4. *Digitalization of recruitment technologies.* The key trends in this area are the automation of the screening and hiring process. The main tools of digital recruiting are:

- A recruiter robot, which can communicate with applicants via audio or video calls, conduct dialogs according to a pre-designed algorithm, and record applicants' answers;
- Chatbots, which perform both search for information about job applicants and administrative work (scheduling meetings, generating detailed candidate profiles, maintaining lists of applicants). In foreign countries chatbots of such technology developers as Mya, XOR, Wade&Wendy and TalkPush are the most popular;
- Predictive analytics and work with big data;
- aggregation and uberization (employer interaction with third-party recruiters whose portfolios are assembled on digital platforms). In the West, Indeed.com, StepStone are the most popular platforms for aggregating job seekers who have posted resumes

on job search sites and job seekers who have profiles on social networks or professional communities;

- Cognitive recruitment (Design Thinking), which manifests itself in an increased focus on social networks, referral systems and the internal labor market. The trend is the emergence of highly specialized recruiters with a deeper expert knowledge of each direction and segment of the labor market (Vatn, 2012).

5. *Formation of holistic, flexible, and personalized reward systems.* Compared to other functional areas of personnel management, changes in the system of employee motivation are not of a radical nature. Nevertheless, a relatively new phenomenon in this area is the introduction, already at the stage of employment, of the practice of selecting remuneration options for new employees, for example, higher pay or additional vacation days; a slight increase in the base salary rate or payment of a higher bonus based on the employee's results, etc. In addition, advanced foreign companies have begun to implement the practice of studying employee ratings and performance reviews several times a year, the consequence of which is an equally frequent change in the remuneration system (Etzioni, 2010)

6. *Digital transformation of employee training*. Its main features can be considered*:* firstly, the constant exchange of experience and knowledge, learning while working on real work processes; secondly, the formation of personalized digital learning content; thirdly, providing access to training programs at any time, in any place and with any type of devices (the introduction of mobile learning and cross-platform solutions); fourthly, the formation of a system of electronic distance learning: mass open online course, corporate open online course, webinars; fifthly, creation of virtual platforms for training (solving cases and exercises in a virtual environment, creating virtual simulations); sixthly, ensuring the possibility of instant feedback (automated verification of work using Big Data technology, implementation of microlearning technology with time-distributed assessment of granular knowledge, skills and abilities) (Chuhno, 2016).

Now, many VUCA organizations are changing their requirements for the “entry” knowledge, skills, and abilities of future employees. Many managers emphasize that today it is much more important to be sure not whether employees have the necessary skills, but how quickly they adapt to the new situation in the VUCA world, whether they have decision-making skills under uncertainty, what tools they use to process and analyze information, whether they have systemic thinking, whether they are focused on continuous learning and development. In management literature these skills and abilities of employees were called potential and began to be evaluated by employers together with the performance of employees.

So, we can offer the following vision of an effective manager: it is an innovative, adaptive, responsible, and benevolent specialist who:

- inspires, leads by example and energizes – team leader;
- creates an atmosphere of trust, positive and friendly attitude in the team;
- provides opportunities for team members to work independently and accepts their possible mistakes;
- knows each of the team members personally, adapts their roles and functions individually depending on each person's sources of motivation;
- conveys a clear vision and sense of purpose to his team, its role in the overall development strategy of the company and the role of each employee;

- clearly sets goals and objectives for each team member and understands the need for each employee to understand the objectives.

On this basis, we can offer the following rules of conduct for the "new" HR specialist:

- delegation of those functions to their subordinates that can be performed by them independently;
- transparency in communicating with their team and sharing any important information;
- trust in each member of the team;
- clear and understandable formulation of the tasks for the employees;
- regular feedback to the employees;
- regular team meetings to maintain team cohesion;
- if possible, personal meetings with each member of the team;
- development of a team project in which all team members can participate;
- avoiding (if possible) giving ready-made solutions to the employees and guiding them to find their own solutions by means of questions.

It should be emphasized that the competencies of the future and the actual competencies of an HR manager today will be very different. Therefore, the task of the manager in the VUCA world is to prepare employees for the transformation of "professions" and competencies in the future.

5. CONCLUSIONS

Thus, we can conclude that HR specialists need to modernize management tools in such a way that they, on the one hand, correspond as much as possible to the expectations and preferences of employees, on the other hand, correspond to the goals, attitudes, and capabilities of the company, and on the third – the realities of the new business environment and the technological way of life. These conditions impose new requirements for the job and professional skills of managers in the housing and utilities sector who are charged with the task of coordinating the interests of all the subjects of social and labor relations both inside and outside the organization. Consequently, the expansion of spheres of activity of a personnel specialist and increasing attention to the development of "smart" management systems cause the need to expand the manager's competencies in the VUCA world.

Accordingly, the authors have identified the following competencies that an effective and competitive human resource manager in an ever-changing VUCA environment should possess, as follows: 1) comprehensive vision and problem solving; 2) critical thinking; 3) creativity; 4) people management skills; 5) cooperation; 6) emotional intelligence; 7) decision making and evaluation skills; 8) high quality service; 9) negotiation skills; 10) cognitive flexibility.

At the same time, the need to develop "lean management" becomes especially important in the context of the transition of the Ukrainian economy to an innovative path of development. Therefore, for the rational use and application of tools of lean management in practice, heads of organizations of housing and communal services need to develop a strategy for the development of the organization, which should include:

- a system of measures for streamlining and efficiency of employees' work activities;
- progressive competence model for talented employees;
- a program to reduce emotional burnout and psychological tension of the team;

- program of corporate culture and organizational behavior management based on "lean management" development.

The proposed measures for the development of "lean management" will ensure the realization of the potential of housing and utilities organizations to improve the competitiveness of both services (products) and personnel, create conditions to attract and retain high-potential employees, and accumulate the mechanism of teamwork and organize work to reduce losses and effectively manage labor resources.

REFERENCES

Anderson, C., Galinsky, A.D. (2006). *Power, optimism, and risk-taking.* „*European journal of social psychology", 36*.

Becchetti, L., Di Giacomo, S., Pinnacchio, D. (2008). *Corporate social responsibility and corporate performance: evidence from a panel of US listed companies.* „*Applied Economics", 40*.

Best practice in business advisory, counselling and information services. (September 2002). Access on the internet: http://digitallibrary.un.org/record/477326 abgerufen

Chuhno, Y. (2016). *Managing change in the VUCA world: how to engage people and helpthem become leaders of new solutions*.

Collins, J.C., Porras, J. (2005). *Built to last: Successful habits of visionary companies.* Random House.

Deloitte. (2018). Global Human Capital Trends 2018. Access on the internet: https://hctrendsapp.deloitte.com

Etzioni, A. (2010). *Behavioral economics: A methodological note.* „*Journal of Economic Psychology", 31*.

Friedman, M. (1953). *Essays in positive economics.* University of Chicago press.

Grossman, M. (2000). *The human capital model, in handbook of health economics*, A.J. Culyer, J.P. Newhouse (eds.), Vol. 1A. *The human capital model, in handbook of health economics,* AJ Culyer, JP Newhouse (eds.), Vol. 1A. Elsevier, New York.

Hambleton, L. (2007). *Treasure Chest of Six Sigma Growth Methods, Tools, and BestPractices (Adobe Reader): TREAS CHEST SIX SIGMA.* Pearson Education.

Hodgson, G.M. (2003). *The hidden persuaders: institutions and individuals in economic theory.* „*Cambridge journal of economics", 27*.

Kaplan, R.S., Norton, D.P. & others (2005). *The balanced scorecard: measures thatdrive performance. „Harvard business review", 83*.

Madden, L.T., Duchon, D., Madden, T.M., Plowman, D.A. (2012). *Emergent organizational capacity for compassion.* „*Academy of Management Review", 37*.

Mayo, A. (2016). *Human resources or human capital?: Managing people as assets.* Routledge.

Ohnos, T. (2021). *Taiichi Ohnos Workplace Management.* McGraw-Hill Education.

Tomer, J.F. (2007). *What is behavioral economics?* „*The Journal of Socio-Economics", 36*.

Tretyakova, L.A., Tselyutina, T.V., Trembach, I.V., Govorukha, N.S. (2015). *Function representation of the civil society institutions within the transforming sustainability of the regional development.* „*International Business Management", 9*.

Vatn, A. (2012). *Cooperative behaviour and institutions.* „*Sustainability Analysis"*. Springer.

Von Krogh, G., Ichijo, K., Nonaka, I. & others (2000). *Enabling knowledge creation: How to unlock the mystery of tacit knowledge and release the power of innovation.* Oxford University Press on Demand.

Womack, J.P., Jones, D.T., Roos, D. (2007). *The machine that changed the world: The story of lean production – Toyota's secret weapon in the global car wars that is now revolutionizing world industry.* Simon and Schuster.

Zarri, L. (2010). *Behavioral economics has two 'souls': Do they both depart from economic rationality? „The Journal of Socio-Economics", 39.*

DOI: 10.7862/rz.2022.mmr.13

The text was submitted to the editorial office: March 2022.
The text was accepted for publication: September 2022.

MODERN MANAGEMENT REVIEW **2022**
MMR, Vol. 27, No. 3(2022), pp 23-37 **July-September**

Patrick K.A. LADIPO[1]
Ekpenyong Ekpenyong UDOFIA[2]
Ayodele ONIKU[3]
Jonathan Ehimen EKPUDU[4]

SUPPLIER COLLABORATION PRACTICES AND PRODUCT INNOVATION MANAGEMENT

The study assessed the effect of supplier collaboration on product innovation. In addition, most studies that examine the relationship fail to highlight the effect of the individual practices of supplier collaboration on product innovation, and are on developed nations. A descriptive research design and a cross-sectional survey approach was adopted to distribute questionnaire copies to the respondents. A sample of 29 firms was selected from a population of thirty-eight 38 big manufacturing firms and the analysis was done using descriptive statistics and structural equation model. The results reveal that product innovation is greatly influenced by supplier collaboration, however, only incremental product innovation is influenced. Radical product innovation is not influenced by supplier collaboration, though resource sharing practice influenced it exclusively. The study reveals the effect of exclusive supplier collaboration practices on product innovation and the model could be replicated in other developing nations to see if the outcome will be similar.

Keywords: supplier, supplier collaboration, product, product innovation, manufacturing.

1. INTRODUCTION

There is a growing conversation around product management, specifically in the facet of product innovation management. In an era with reduced product development spans and continued change in preference of the consumer, there a growing need to understanding how to deliver the best product to customers and in record timing. This drives the conversation of product innovation management and its enabling strategies. The world is a global village, competition is higher, technological needs are so dynamic and we are in the era of disruptive technology. Because of the immense pressure from customers to design, develop and launch new innovative products into the market, there is need for

[1] Patrick K.A. Ladipo, PhD, Associate Professor of the Department of Business Administration, Faculty of Management Sciences, University of Lagos, Nigeria, e-mail: pkaladipo@gmail.com.
[2] Ekpenyong Ekpenyong Udofia, M.Sc., PhD student, Department of Business Administration, Faculty of Management Science, University of Lagos, Nigeria, e-mail: solokoko2003@yahoo.com, ORCID: 0000-0001-9154-1483 (corresponding author).
[3] Ayodele Oniku, PhD, Senior Lecturer in the Department of Business Administration, University of Lagos, Nigeria, e-mail: ooniku@unilag.edu.ng, ORCID: 0000-0001-8456-6738.
[4] Jonathan Ehimen Ekpudu, PhD, Senior Lecturer in the Department of Business Administration, University of Lagos, Lagos, Nigeria, e-mail: jekpudu@unilag.edu.ng.

collaboration to meet these ever-demanding needs of the customers. Literature opines that manufacturing organisations rarely innovate exclusively (Luzzini, Amann, Caniato, Essig, Ronchi, 2015), instead, it is powered by a carefully tethered web of committed partners from the supply end to the focal firms.

For a long time in research, the drivers and effect of innovation in product has been debated, raising concerns on how much impact product innovation has on the overall performance (Kim, Kumar, Kumar, 2012). While some researchers believe that product innovation has the capacity to proffer new frontiers for organisations (Teece, 2000; Hurmelinna-Laukkanen, Sainio, Jauhiainen, 2008), others believe the alternative cost of product innovation is steep (Prajogo, Sohal, 2003). The forgone alternatives as cited in literature includes quality and productivity. Prajogo and Sohal (2003) argue that firms in pursuit of being lead innovators are never quality leaders. In addition, there is a debate on how the management of product innovation is hampered by supplier collaboration (Fawcett, Magnan, 2002; Frishammar, Horte, 2005; Antonio, Lau, Richard, 2010). Studies like Fawcett and Magnan (2002) and Antonio et al., (2010) argue that supplier collaboration (SC) is a limitation to innovation because suppliers are usually adamant to change and prefers the status quo to optimise productivity.

There are several conflicts in supplier-buyer relationships (in the manufacturing sphere) that limit their ability to collaborate properly, which includes design disagreements, profit sharing issue, and more commonly, intellectual theft of ideas of the focal firm by collaborating firms (Razmi, Haghighi, 2014). All these bring undesirable outcomes in collaboration. Literature also reveal that supplier collaboration is hard to accomplish in the cases of product innovation for several reasons (Smals, Smits, 2012; Luzzini et al., 2015). Therefore, it is imperative to investigate this relationship in other business environments, such as the Nigerian business environment. Based on the literature above, this study's objective was to explore the role supplier collaboration in product innovation of manufacturing firms in Nigeria.

2. LITERATURE REVIEW

2.1. Theoretical review

2.1.1. Resource Dependence Theory

The origin of the Resource Dependence Theory (RDT) is traced back to the business consultant Jeffrey Pfeffer and Gerald Salancik of the America's prestigious Stanford University in the late 1970s (Pfeffer, Salancik, 1978). The pioneer introduction of the organisational theory to aid the understanding of organisations was seen in the textbook publication by both authors titled "The external control of organisations: A resource dependence perspective" published in 1978. The inspiration for the theory was drawn from earlier works of Emerson (1962) titled power dependence relations. As well as that of Blau (1964) and Jacobs (1974) whose works further focused on inter-firm relationships and control.

The resource dependence theory focuses on posing the organisation as a living organism that feeds to stay alive. While some things are good for consumption, others are of necessity to the organism. This analogy best captures resource dependence theory as the theory says the level of necessity for the resource determines what the firm would do to get and keep such resource, hence, resource-dependence. In other words, the most pivotal resources for survival of the firm have the most influence on the behaviour of the firm. Incorporation of

the business environment was a critical ingredient of the resource dependence theory, as it generally criticizes prior theories that failed to capture the relevance of the external environment and its forces on business outcomes. The notion of the resource dependence theory is that the business environment holds the key to success of the organisation. That is, the environment has the resources needed for survival of the organisation, and the level of need for the resource, decides what the organisation would be willing to part with. The resource dependence theory says that the resources in the environment usually presents itself as the capacity of another firm, and the ability to draw from these other firms influences the survival of the business. Therefore, firms must understand that the environment contains what they need, and an intentional scanning must be done to identify these firms with the resources to create an alliance for survival.

This theory is particularly relevant to this study because supplier collaboration is anchored on the idea of mutual gains through exploitation of the combined resources of partner firm. This is a direct implementation of the concept of resource dependence theory which believes in tapping from the resources in the environment, which is inclusive of other businesses with capacities that complement the business core competences.

2.2. Conceptual Review

2.2.1. Supplier collaboration

Collaboration between and among firms can be seen as an intentional division of responsibilities between firms to meet a goal for the focal firm. These responsibilities are in different capacities, from designing to component subset creation, or even marketing. It is the unification of the competencies of partner firms that would otherwise erode them. In the contemporary business environment, to further foster quality and delivery, many firms; specifically, manufacturers are increasingly letting go of non-core activities in their process to suppliers to handle. The goal is to capitalise on the technology, expertise and competence of the partner firm to reduce inefficiency and sub-standard delivery (Ekpudu, Aigbepue, Olabisi, 2013). As literature posit, competitive advantage is beyond the firm (Puche, Ponte, Costas, Pino, Fuente, 2016), supply chain and the collaboration of suppliers play a vital role in making sure that the chain is competitive. For the purpose of this study, supplier collaboration was measured by the information sharing, joint decision making, joint planning and resource sharing to reflect the most established supplier collaboration practices in industry practice (Kumar, Banerjee, 2012).

2.2.2. Product innovation

The innovation of product is largely referred to as changes in the offering of any product (De Propris, 2002). Product innovation is either incremental or totally radical (Reichstein, Salter, 2006; Kim et al., 2012). Product innovation was assessed by incremental and radical product approaches because they constitute the most widely accepted measurement parameters for product innovation management in contemporary literature (Kim et al., 2012; El Manzani, Sidmou, Cagarra, 2019). Incremental implies that it is improving on what is existing. An incrementally innovative product builds on the existing template of the existing product, it is usually expressed in added features of the product, and in some cases mere aesthetic design may constitute incremental innovation in product. Incremental product innovation seeks to improve the status quo for the benefit and satisfaction of the customers (Chandy, Tellis, 1998; Valle, Vázquez-Bustelo, 2009). While radical product innovation considers the creation of what is not known to the target market, neither is it in

any way similar to the existing products of the brand or industry competitors. It is shrouded in uncertainty of whether the market will accept it or not (Moguilnaia, Vershinin, Sweet, Spulber, De Souza, Narayanan, 2005). That said, when successful, it can be very rewarding.

2.2.3. Supplier Collaboration and Product Innovation

Valk and Wynstra (2005) focused on supplier involvement and product development in the food and beverage industry. The study revealed that supplier involvement does have significant impact on product development in the food and beverage industry in Dutch firms. The study called for more empirical studies into the supplier-product innovation relationship. McIvor, Humphreys, and Cadden (2006) studied the involvement of suppliers into the creation of innovation in products and revealed several impediments that make it rarely functional. In other words, the product innovation management was not improved by supplier collaboration practices. According to Kähkönen, Lintukangas, Ritala, and Hallikas (2017), though there are some studies that attempt to understand product innovation, very limited studies have attempted testing the relationship between collaborative practices and the extent to which it could assist in the management of innovativeness in products. The study of Kähkönen et al. (2017) equally revealed that not all collaboration practices influence product innovation in manufacturing firms. It is interesting to replicate the SC and product innovation relationship test in a developing business environment. Perhaps, the contrast of McIvor et al. (2006) and Kähkönen et al. (2017) is anchored on the changes in business environment and industry focus. It is the interest of this study to investigate this relationship across multiple industries and in a different business environment, other than the previous studies. Luzzini et al. (2015) investigated the relationship between supplier collaboration and product innovation performance and the test proved significant and positive. The study did not isolate the various practices of supplier collaboration to emphasise their independent impact on product innovation. It will be of equal interest to highlight the effect of supplier collaboration and product innovation, while highlighting the effect of the individual supplier collaboration practices from the Nigerian business environment context. Literature reveals that most innovative products fail when introduced into the market, which is an indication that the innovation was not rightly done. Fifty percent of new products fail and seventy percent of those that eventually survive introduction fail in sales (Yuan, Zelong, 2009). Also highlighted by Luzzini et al. (2015) is that most of the studies on supplier collaboration are domiciled in big firms and the results are contradictory.

2.3. Conceptual model

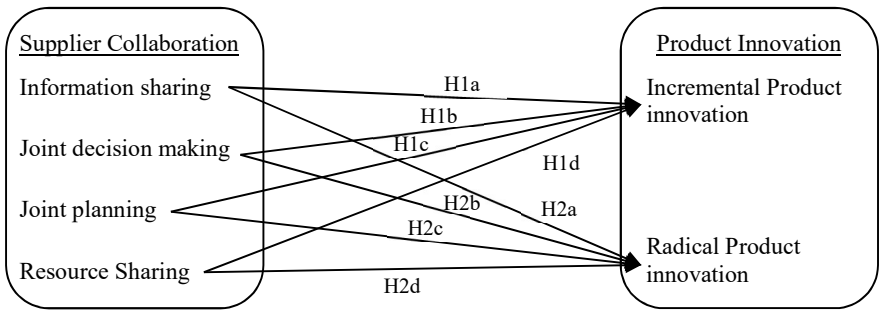

Figure 1. The relationship between supplier collaboration and product innovation
Source: Authors, 2022.

2.4. Empirical review

Lau, Tang, and Richard (2010) studied supplier-buyer integration and product innovation in Hong Kong firms. Using the survey of two hundred and fifty-one (251) firms in Hong Kong, it revealed a significantly positive relationship. McIvor et al. (2006) examined supplier collaboration and product innovation with a focus on the electronics industry in Asia. The result of their study proves that supplier collaboration does have an effect on the development of innovative products in the electronics industry in Asia. Jajja, Brah, Hassan, and Kannan (2014) tested the collaboration of supplier and buyers and how much capacity it had to influence the outcomes in the management of product innovation in manufacturing firms in Pakistan. Using one hundred and ninety-one (191) manufacturing firms for the survey, the study revealed that buyer-supplier collaboration had the capacity to influence product innovation in manufacturing firms in Pakistan. Among others tested by Luzzini et al. (2015), supplier collaboration and innovation revealed a significantly positive relationship. Kähkönen et al. (2017) equally investigated SC and innovation. The study was anchored on the Finnish manufacturing sector involving one hundred and sixty--five (165) firms. The result revealed that some practices including green supply chain practice and systemic purchasing had a positive and significant effect on innovation. Other practices including earlier supplier involvement as well as inter-firm learning did not significantly impact innovation. Patrucco, Luzzini, and Ronchi (2017) assessed the relationship between supplier collaboration and innovation in products on an international scale. Consisting of five hundred and twenty-four (524) manufacturing firms spread across developed nation of Europe and North America, the study result shows that product innovation was positively and significantly predicted by supplier collaboration

3. METHODOLOGY

3.1. Research Design, Sampling Technique and Sample Size

This study adopts a descriptive research design, specifically, the cross-sectional survey method was employed to capture respondents' opinions on the variables under study. Data were obtained from manufacturing firms domiciled in Lagos, Nigeria. A questionnaire developed using existing scales from Cao et al. (2010), Kumar and Banerjee (2012), Simatupang and Sridharan (2004) and Kim et al. (2012) was administered on employees of selected manufacturing firms in Lagos. The population of the study was made up of all thirty-eight (38) big (above 149 employees) manufacturing firms in Nigeria. The firms were selected from the Nigerian Exchange Group (formerly Nigerian Stock Exchange) database. Twenty-nine (29) Lagos based big manufacturing firms made the sample of the study using stratified sampling to isolate Lagos based firms for their accessibility for data collection. An initial pilot study was conducted on the research instrument via the distribution of twenty-five copies to professionals to assess its language clarity. Modifications were recommended, and they were implemented accordingly. The Cronbach Alpha reliability score of the instrument was .81, which confirmed the reliability of the study instrument.

The study had a total sample of twenty-nine manufacturing firms. Employing a stratified sampling procedure, the sampling was limited to only managers, assistant managers and two supervisors of the operations, marketing, production, and supply chain departments of the chosen firms (considering their expertise and their privilege to information other members of the department are not privy to). This means that each firm had sixteen (16)

respondents, leading to four hundred and sixty-four (464) respondents. The study's questionnaire copies were administered on the 464 respondents. It had a return rate of 53.66%, that is, 249 questionnaire copies returned in usable form. The data were analysed using descriptive statistics (frequency) and structural equation model (SEM).

3.2. Hypotheses

Following the discussion in the literature review section, the following hypotheses were formulated in the null form and tested.

H1: Supplier collaboration has no significant effect on incremental product innovation

H2: Supplier collaboration has no significant effect on radical product innovation

3.3. Measurement Items for Supplier Collaboration and Product Innovation

Table 1. Measurement items

SUPPLY COLLABORATION DIMENSIONS	
Information sharing (IS)	
IS1 My company and its supply partners exchange relevant and timely information	Cao et al. (2010)
IS2 My company and its supply partners exchange accurate and complete information	Cao et al. (2010)
IS3 My company and its supply partners exchange information on inventory levels, delivery schedules, and cost of inventory warehousing	Kumar, Banerjee (2012)
IS4My company and its supply partners exchange information on users' feedback on products and services	Kumar, Banerjee (2012)
Joint decision making (JDM)	
JDM1 Joint decision on optimal order quantity	Simatupang, Sridharan (2004)
JDM2 Joint decision on product quality and market segmentation	Simatupang, Sridharan (2004)
JDM3 Joint decision in resolving production related problems	Simatupang, Sridharan (2004)
JDM4 Joint decision on goals, objectives, and reward for good performance	Kumar, Banerjee (2012)
Joint planning (JP)	
JP1 My company makes plan to purchase raw materials and other required goods with good quality, and maintain relationships with suppliers.	Kumar, Banerjee (2012)
JP2 New Product Development in my company integrates suppliers into its planning	Kumar, Banerjee (2012)
JP3 My company jointly plan demand forecasts with its suppliers	Kumar, Banerjee (2012)
JP4 My company develops promotional and advertising strategies of product lines in conjunction with suppliers	Kumar, Banerjee (2012)

Table 1 (cont.). Measurement items

SUPPLY COLLABORATION DIMENSIONS	
Resource Sharing (RS)	
RS1 We have shared all required technology and machinery with our partners	Kumar, Banerjee (2012)
RS2 Use cross-organisational teams frequently for process design and improvement	Cao et al. (2010)
RS3 We offer technical support to our suppliers	Cao et al. (2010)
RS4 We offer financial and non-financial resources to supply partners to enable them meet deliveries.	Cao et al. (2010)
PRODUCT INNOVATION DIMENSIONS	
Incremental product innovation	
IPI1 Our supply chain members have the information for monitoring and changing operations strategy	Kim et al. (2012).
IPI2 Our supply chain members have access to inventory, order status information for forecasting	Kim et al. (2012).
IPI3 Our supply chain members have the necessary information system for tracking goods	Kim et al. (2012).
IPI4 We get information from various sources to understand the changing market conditions	Kim et al., (2012).
Radical product innovation	
RPI1 Our new products differ substantially from our existing products	Kim et al. (2012).
RPI2 Our percentage of radical product innovations in the product range is significantly higher compared to the competition	Kim et al. (2012).
RPI3 We are well known by our customers for radical product innovations	Kim et al. (2012).
RPI4 We introduce radical product innovations into the market more frequently than our competitors	Kim et al. (2012).

Source: Literature Review, 2022.

The measurement scales of the research instrument were all adapted from existing literature. The study had two main variables (supplier collaboration and product innovation). Supplier collaboration was measured by information sharing, joint decision making, joint planning and resource sharing. Items for information sharing were adapted from Cao, Vonderembse, Zhang, and Ragu-Nathan (2010) and Kumar and Banerjee (2012). Items for joint decision making were adapted from Simatupang and Sridharan (2004) and Kumar and Banerjee (2012). Items for joint planning were adapted from Kumar and Banerjee (2012). Items for resource sharing were adapted from Kumar and Banerjee (2012) and Cao et al. (2010). Product innovation management was measured by incremental product innovation and radical product innovation. Items for both incremental product innovation and radical product innovation were adapted from Kim et al. (2012).

4. DATA ANALYSIS AND RESULTS

4.1. Measurement model

For the measurement model to be certified as fit, a few tests were conducted on the measurement model. These included multivariate normality, multicollinearity, unidimensionality, reliability, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). Multivariate normality was satisfied by conducting a Mahalanobis test to reveal a Mahalanobis range of 11.843-121.140. The critical value was calculated to be 67.32, thus, eliminating 9 respondents from the survey because their Mahalanobis values were higher than the critical value. Unidimensionality was tested to examine the factor loadings of the items of the major constructs. While constraining the highest factor loading of the measurement items to 1, the loadings were good, as revealed in Table 2. The reliability assessment of major constructs was conducted and all constructs had values above .70 (see Table 2.), thereby, acceptable (Fornell, Larcker, 1981). Multicollinearity was assessed through the Tolerance and VIF figures of the items. The items had Tolerance values above 2 and VIF values below 5.

Table 2. Construct assessment

Construct	items	Factor loading	CFI	RFI	RMR	NFI	*p*	Cronbach α	AVE	CR
Information Sharing	IS1	.901	.912	.971	.031	.922	.047	.888	.801	.900
	IS2	.896								
	IS3	.832								
	IS4	.890								
Joint Decision Making	JDM1	.956	.988	.961	.021	.987	.110	.813	.825	.879
	JDM2	.848								
	JDM3	.971								
	JDM4	.921								
Joint Planning	JP1	.720	.997	.985	.010	.995	.050	.853	.812	.890
	JP2	.815								
	JP3	.837								
	JP4	.818								
Resource Sharing	RS1	.901	.994	.980	.033	.993	.002	.875	.890	.948
	RS2	.923								
	RS3	.944								
	RS4	.941								
Incremental Product innovation	IPI1	.981	.937	.813	.110	.905	.021	.901	.823	.911
	IPI2	.974								
	IPI3	.912								
	IPI4	.923								
Radical Product innovation	RPI1	.720	.899	.827	.035	.931	.051	.881	.813	.897
	RPI2	.870								
	RPI3	.923								
	RPI4	.889								

Source: Field Survey, 2022.

Table 2 highlights the factor loadings of the items adapted for this study, as well as the model fit for the independent sub variables of the of the study. Supplier collaboration was measured by information sharing, joint decision making, joint planning and resource sharing. The model fit for each of these exclusive sub variables of supplier collaboration are highlighted in Table 2. It reveals that beyond the major variables having model fit, the sub variables all have good model fit going by the CFI, RFI, RMR, and NFI values of the measurement constructs. In addition, product innovation was measured by incremental and radical product innovation. Both measurement constructs had good model fit going the observed values. Table 2. also reveals that no item was dropped because the factor loadings were good for all items used in the research instrument.

Table 3. Correlation of major constructs and squared AVE values for Discriminant Validity

Constructs	Mean	SD	IS	JDM	JP	RS	IPI	RPI
Information Sharing	4.23	.37	***.895***					
Joint Decision Making	4.11	.63	.554**	***.908***				
Joint Planning	3.95	.32	.392**	.713**	***.901***			
Resource Sharing	4.10	.61	.593**	.720**	.619**	***.943***		
Incremental Product Innovation	3.98	.21	.619**	.612**	.632**	.611**	***.907***	
Radical Product Innovation	4.07	.59	.129*	.396**	.329*	.134*	.324**	***.902***

Source: Field Survey, 2022.

The EFA was conducted to examine if there is a violation of the assumption of positive definiteness. EFA was conducted with factor extraction set at 7 to reflect the number of major constructs, while varimax rotation was employed and coefficients suppressed was set at 0.3. Positive definiteness was confirmed since 1.140 was the determinant value which is above 0 (Lowry, Gaskin, 2014). In addition, Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity (BTS) values were within desired range, that is 0.872 and .003 respectively. KMO value above 0.5 is considered good and indicates an adequate sample size (Hair, Anderson, Tatham, Black, 1998). The test of CFA through convergent validity and discriminant validity was done. The AVE values for each construct were above 0.50; revealing a presence of convergent validity (Fornell, Larcker, 1981; Flynn, Huo, Zhao, 2010). The CR values of each construct were above 0.70, this further emphasises the presence of convergent validity (Fornell, Larcker, 1981; Dubey, Gunasekaran, Childe, Wamba, Roubaud, Foropon, 2021). The discriminant validity of the construct was assessed via a comparison of the squared root AVE values and the squared correlation values of all major constructs. When the Squared AVE value is higher than all squared correlation values, it supports the existence of discriminant validity (Fornell, Larcker, 1981).

Table 4. presents the analysis of the respondents' social demographic characteristics' data. It shows that the male respondents of the study were one hundred and ninety-three (193) while female were fifty-six (56), constituting 77.5 percent and 22.5 percent respectively. Staff positions analysis revealed that forty-three (43) respondents were managers (representing 17.3 percent), while ninety-six (96) respondents were assistant managers (representing 38.6 percent). Supervisors in the study were one hundred and ten (110) and they constitute a 44.1 percent of the respondents. Finally, the bio data revealed that eighty-two (82) respondents were from the production unit, respondents from the marketing unit were forty-seven (47), forty-nine (49) respondents belong to the supply chain

unit, and seventy-one (71) respondents belong to the operations unit. These constitute 32.9, 18.9, 19.7 and 28.5 percent respectively.

Table 4. Description of respondents' bio-data

		Frequency	Valid Percent	Cumulative %
Gender	Male	193	77.5	77.5
	Female	56	22.5	100
	Total	249	100	
Staff position	Manager	43	17.3	17.3
	Ass. Manager	96	38.6	55.9
	Supervisor	110	44.1	100
	Total	249	100	
Department	Production	82	32.9	32.9
	Marketing	47	18.9	51.8
	Supply chain	49	19.7	71.5
	Operations	71	28.5	100
	Total	249	100	

Source: Field Survey, 2022.

4.2. Hypotheses Testing

The recommendations for model fit includes CFI ≥ .90, NFI ≥ .90 IFI ≥ .90, RFI ≥ .90, RMSEA ≤ .08 and x^2/df ≤ 5 (Ahmadi, 2019; Bagozzi, Yi, 1988; Guimaraes et al., 2016). These thresholds were not violated because the model fitness of the model (Figure 2.) was CFI = .932, NFI = .899, IFI = .962, RFI = .922, RMSEA = .023, and x^2/df = 4.213.

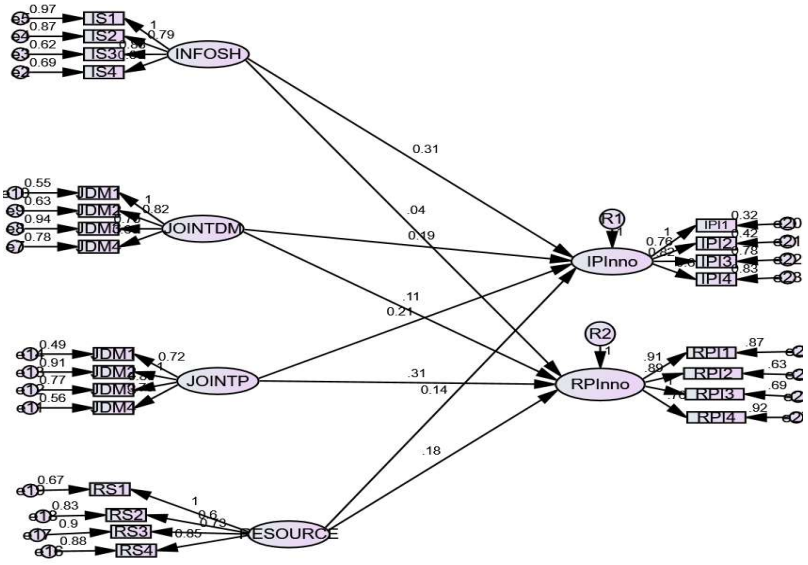

Figure 2. SEM Result

Source: Field Survey, 2022.

Table 5. Results of Hypotheses tested

Hypothesis	Path	Standardised Coefficient	t-values	Result
H1	SC ⟶ IPI	.423*		Supported
H1a	IS ⟶ IPI	.313**	3.105	Supported
H1b	JDM ⟶ IPI	.190*	4.235	Supported
H1c	JP ⟶ IPI	.210**	6.173	Supported
H1d	RS ⟶ IPI	.140**	2.735	Supported
H2	SC ⟶ RPI	$.218^{ns}$		Not Supported
H2a	IS ⟶ RPI	$.042^{ns}$	6.121	Not Supported
H2b	JDM ⟶ RPI	$.112^{ns}$	5.127	Not Supported
H2c	JP ⟶ RPI	$.310^{ns}$	4.874	Not Supported
H2d	RS ⟶ RPI	.181**	2.315	Supported

Source: Field Survey, 2022.

The study tested two hypotheses. It focused on the effect of supplier collaboration on incremental product innovation and its effect on supplier collaboration on radical product innovation. The result of the study shows that on overall supplier collaboration had a positive and significant effect on incremental product innovation. The study showed that 42.3 percent of the variation in incremental product innovation was predicted by supplier collaboration. Specifically, the exclusive practices of supplier collaboration also proved to have had positive and significant effect on incremental product innovation. The test revealed that information sharing had a positive effect on incremental product innovation, predicting 31.3 percent of the change in incremental product innovation; joint decision--making practice had a 19 percent effect on the change in incremental product innovation. Joint planning exclusively had a 21 percent effect on incremental product innovation; the relationship was a positive and significant one; while resource sharing had a significant and positive effect on incremental product innovation, as it influences 14 percent of the outcome in incremental product innovation.

However, the result revealed that supplier collaboration had no significant relationship with radical product innovation. Analysing the exclusive practices of supplier collaboration on radical product innovation revealed that individual practices of supplier collaboration equally had a non-significant relationship resource sharing influenced 18.1 percent of the outcome in radical product innovation.

4.3. Discussion of Findings

The study tested two hypotheses; supplier collaboration on incremental product innovation and supplier collaboration on radical product innovation. The first hypothesis proved positive and significant, aligning with McIvor et al. (2006) and Lau et al. (2010), as both studies opine that supplier collaboration has the capacity to influence significant positive change in product innovation. The similar findings may be explained by the similarity in the practices employed in measuring the independent variable (collaboration) in the studies. Putting spotlight on the individual practices, it showed that information sharing had the most impact on incremental product innovation management. This therefore implies that information sharing should be taken more seriously for the achievement of effective product innovation management. Though other practices had good effect on incremental product innovation, deliberate investments should be channeled to creating

a comprehensive information system with the capacity to incorporate suppliers to improve innovation.

The result of supplier collaboration and radical product innovation proved insignificant. This further validates the claim of Kähkönen et al. (2017) that supplier collaboration practices do not always deliver any sort of innovation improvement. As seen in this study, three practices adopted to test supplier collaboration and radical product innovation management had no significant effect on product innovation management, while one of the practices of supplier collaboration had a significant effect on product innovation management. The similarity in the non-significant relationship between supplier collaboration and radical product innovation in this study and Kähkönen et al. (2017) is possibly embodied in their methodology similarity. This stems from the fact that both studies selected only big firms in their respective business environments. This finding however negates Jajja et al. (2014) whose study claimed that supplier collaboration had the potency to manage and improve product innovation in manufacturing firms. The study also disagrees with the finding of Patrucco et al. (2017) because their finding revealed that supplier collaboration intensity positively influences product innovation. The study could record contrast in findings with these studies because of some fundamental differences. For instance, Jajja et al. (2014) conducted their study across all manufacturing firms in their business environment. Thus, examining these different firm sizes together can mask the relationship between one size (for instance big firms) and product innovation tendencies. On the other hand, Patrucco et al. (2017) conducted a study spanning several European and North American nations. Having such a wide data collection span can alter the overall relationship effect. In addition, the study was also not concerned about a particular cadre in size, it covered all firms in the manufacturing sectors of the multiple countries.

5. CONCLUSION AND RECOMMENDATION

Supplier collaboration and product innovation within big manufacturing firms in Nigeria has been tested in this study. Two hypotheses were tested and one was supported while the other was not. From the findings of this study, it concludes that supplier collaboration had an effect on incremental product innovation. All four measurement constructs of supplier collaboration (information sharing, joint decision making, joint planning and resource sharing) have significant effects on incremental product innovation exclusively. It also concludes that supplier collaboration has no effect on radical product innovation. That said, resource sharing practice exclusively had a significant effect on radical product innovation.

The study therefore recommends that firms pursuing incremental product innovation should invest in supplier collaboration to achieve their goal. However, other strategies should be implemented to achieve radical product innovation. To the industry practitioners, the study suggests a model to delivering improvements in incremental product innovation in developing nations. Specifically, results reveal that investments must be made intentionally in establishing robust comprehensive information system, incorporating strategic suppliers to reap the most benefit from it. This is a response to information sharing having the most effect on product innovation on an incremental basis. Finally, managers of manufacturing firms in developing nations might consider pursuing incremental product innovation strategy rather than radical, as the model supports achieving incremental product innovation through supplier collaboration strengthening.

Significant contribution to the literature on supplier collaboration and product innovation was presented by the study. Specifically, the study adds a conceptual model explicitly highlighting the relationship between individual practices of supplier collaboration on product innovation. The study adds to the limited literature on supplier collaboration and production innovation from a developing nation in the Sub-Saharan African business environment, as well as strategies to deliver product innovation in the Sub-Saharan region of Africa. While the study aligns with some prior studies on the subject, it also contrasts the findings of some studies, thus, creating a platform for more studies to explore clarity on the role of supplier collaboration in the attainment and management of product innovation. The study suggests that further investigations be made into the relationship between supplier collaboration and product innovation as contrasting views on its effect continue to exist. The study also had the limitation of being focused on big manufacturing firms domiciled in Lagos. Further studies should consider expanding the study's focus to all tiers of manufacturing firms in Lagos, or perhaps all of Nigeria to give the study's findings more credibility of generalisation.

REFERENCES

Ahmadi, A. (2019). *Thai airways: Key influencing factors on customers' word of mouth. "International Journal of Quality and Reliability Management"*, *36*(1). DOI: 10.1108/IJQRM-02-2018-0024.

Bagozzi, R.P., Yi, Y. (1988). *On the evaluation of structural equation model. "Journal of the Academy of Marketing Science", 16*(1).

Blau, P.M. (1964). *Exchange and power in social life.* New York, NY: Wiley.

Cao, M., Vonderembse, M., Zhang, Q., Ragu-Nathan, T.S. (2010). *Supply chain collaboration: Conceptualisation and instrument development.* "*International Journal of Production Research", 48*(22).

Chandy, R.K., & Tellis, G.J. (1998). Organizing for radical product innovation: the overlooked role of willingness to cannibalize. "*Journal of Marketing Research", 35*(4).

De Propris, L. (2002). *Types of innovation and inter-firm co-operation. "Entrepreneurship & Regional Development", 14*(4).

Dubey, R., Gunasekaran, A., Childe, S.J., Wamba, S.F., Roubaud, D., Foropon, C. (2021). *Empirical investigation of data analytics capability and organizational flexibility as complements to supply chain resilience. "International Journal of Production Research"*, *59*(1). DOI: 10.1080/00207543.2019.1582820.

Ekpudu, J.E., Aigbepue, S., Olabisi, J.O. (2013). *Appraisal of strategic alliances and corporate effectiveness. "African Research Review", 7*(1).

El Manzani, Y., Sidmou, M.L., Cagarra, J. (2019). *Does IS0 9001 quality management system support product innovation? An analysis from the sociotechnical systems theory.* "*International Journal of Quality & Reliability Management", 36*(6). DOI: 10.1108/ IJQRM-09-2017-0174.

Emerson, R.M. (1962). *Power-dependence relations. "American Sociological Review", 27*(1).

Fawcett, S.E., Magnan, G.M. (2002). *The rhetoric and reality of supply chain integration.* "*International Journal of Physical Distribution & Logistics Management", 32*(5).

Flynn, B.B., Huo, B., Zhao, X. (2010). *The impact of supply chain integration on performance: A contingency and configuration approach. "Journal of Operations Management", 28*(1).

Fornell, C., Larcker, D.F. (1981). *Evaluating structural equation models with unobservable variables and measurement error. "Journal of Marketing Research", 18*(1).

Frishammar, J., Horte, S.A. (2005). *Managing external information in manufacturing firms: The impact on innovation performance. "Journal of Product Innovation Management", 22*(3).

Guimaraes, J.C.F., Severo, E.A., Dorion, E.C.H., Coallier, F., Olea, P.M. (2016). *The use of organisational resource for product innovation and organisational performance: A survey of the Brazilian furniture. "International Journal Production Economics"*, *180* (October).

Hair, J.F., Anderson, R.E., Tatham, R.L., Black, W.C. (1998). *Multivariate data analysis* (5th ed.). Englewood Cliffs, NJ: Prentice-Hall.

Herrmann, A., Gassmann, O., Eisert, U. (2007). *An empirical study of the antecedents for radical product innovations and capabilities for transformation*. *"Journal of Engineering and Technology Management", 24*(1–2).

Hurmelinna-Laukkanen, P., Sainio, L.M., Jauhiainen, T. (2008). *Appropriability regime for radical and incremental innovations. "R&D Management", 38*(3).

Jacobs, D. (1974). *Dependency and vulnerability: An exchange approach to the control of organizations. "Administrative Science Quarterly", 19*(1).

Jajja, M.S.S., Brah, S.A., Hassan, S.Z., Kannan, V.R. (2014). *An examination of product innovation and buyer-supplier relationship in Pakistani firms. "International Journal of Productivity and Performance Management", 63*(8).

Kähkönen, A., Lintukangas, K., Ritala, P., Hallikas, J. (2017). *Supplier collaboration practices: Implications for focal firm innovation performance. "European Business Review", 29*(4).

Kim, D., Kumar, V., Kumar, U. (2012). *Relationship between quality management practices and innovation. "Journal of Operations Management", 30*(4).

Kumar, G., Banerjee, R.N. (2012). *Collaboration in supply chain: An assessment of hierarchical model using partial least squares (PLS). "International Journal of Productivity and Performance Management", 61*(8).

Lau, A.K.W., Tang. E., Richard C.M.Y. (2010). *Effects of supplier and customer integration on product innovation and performance: empirical evidence in Hong Kong manufacturers. "Journal of Product Innovation Management", 27*(5).

Lowry, P.B., Gaskin, J. (2014). *Partial least squares (PLS) structural equation modeling (SEM) for building and testing behavioral causal theory: When to choose it and how to use it*. *"IEEE TPC", 57*(2).

Luzzini, D., Amann, M., Caniato, F., Essig, M., Ronchi, S. (2015). *The path of innovation: purchasing and supplier involvement into new product development. "Industrial Marketing Management", 47*(May). DOI: 10.1016/j.indmarman.2015.02.034.

McIvor, R., Humphreys, P., Cadden, T. (2006). *Supplier involvement in product development in the electronics industry: A case study. "Journal of Engineering and Technology Management", 23*(4).

Moguilnaia, N.A., Vershinin, K.V., Sweet, M.R., Spulber, O.I., De Souza, M.M., Narayanan, E.M.S. (2005). *Innovation in power semiconductor industry: Past and future. "IEEE Transactions on Engineering Management", 52*(4).

Patrucco, A.S., Luzzini, D., Ronchi, S. (2017). *Achieving innovation through supplier collaboration: The role of the purchasing interface.* "*Business Process Management Journal", 23*(6).

Pfeffer, J., Salancik, G.R. (1978). *The external control of organizations: A resource dependence perspective*. New York, NY: Harper & Row.

Prajogo, D.I., Sohal, A.S. (2003). *The relationship between TQM practices, quality performance, and innovation performance.* "*International Journal of Quality and Reliability Management", 20*(8).

Puche, J., Ponte, B., Costas, J., Pino, R., Fuente, D. (2016). *Systemic approach to supply chain management through the viable system model and the theory of constraints*. "*Production Planning and Control", 27*(5).

Razmi, J., Haghighi, D. (2014). *Identifying buyer-supplier conflict in collaborative process new product development.* "*International Journal of Research in Industrial Engineering", 3*(2).

Reichstein, T., Salter, A. (2006). *Investigating the sources of process innovation among UK manufacturing firms.* "*Industrial and Corporate Change", 15*(4).

Simatupang, T.M., Sridharan, R. (2004). *Benchmarking supply chain collaboration. An empirical study.* "*Benchmarking: An International Journal", 11*(5).

Teece, D.J. (2000). *Managing intellectual capital.* Oxford: Oxford University Press.

Valk, W.V.D., Wynstra, F. (2005). *Supplier involvement in new product development in the food industry. "Industrial Marketing Management", 34*(7).

Valle, S., Vázquez-Bustelo, D. (2009). *Concurrent engineering performance: Incremental versus radical innovation. "International Journal of Production Economics", 119*(1).

Yuan, L.L., Zelong, W. (2009). *How organizational flexibility affects new product development in an uncertain environment: Evidence from China.* "*International Journal Production Economics"*, *120*(1).

DOI: 10.7862/rz.2022.mmr.14

The text was submitted to the editorial office: May 2022.
The text was accepted for publication: September 2022.

MODERN MANAGEMENT REVIEW **2022**
MMR, Vol. 27, No. 3(2022), pp 39-48 **July-September**

Michael Segun OGUNMUYIWA[1]
Sarat Ololade ONANUGA[2]

THE NEXUS BETWEEN ENTREPRENEURIAL MARKETING AND MICRO SCALE BUSINESS PERFORMANCE IN OGUN STATE, NIGERIA

The study investigated the relationship between entrepreneurial marketing dimensions and performance of micro scale businesses in Ogun East Senatorial District in Ogun Stae, Nigeria. The survey research design was employed and purposive sampling technique was used to select a sample of 259 out of the 270 copies of the structured questionnaire administered to owners and managers of micro scale businesses in all the Nine (9) Local Government Areas in the study area. Employing regression analysis technique, empirical findings revealed that all the entrepreneurial marketing dimensions (innovativeness, proactiveness, risk-taking, resources leveraging and value creation) except innovativeness are positively and significantly related to micro scale business performance. The study recommends that micro scale businesses as well as government and non-governmental organizations should incorporate and practice the five major constructs of entrepreneurial marketing dimensions in order to achieve the desired results and enhance micro scale business performance in Nigeria.

Keywords: Entrepreneurship, Marketing, Entrepreneurial Marketing, Micro Scale Business, Performance.

1. INTRODUCTION

Entrepreneurial Marketing (EM) is an interface of marketing and entrepreneurship which is orientated towards entrepreneurship and innovation. Entrepreneurship and Marketing has no widely acceptable definition, the concept of Entrepreneurship and Marketing has been viewed and defined from different perspectives from different scholars in different fields of studies. Marketing viewed by some means advertising, to some selling while to some trading or even branding. Advertising, selling and trading are just an aspect of marketing; they do not reflect or explain the concept of marketing. Marketing is a process by which companies create value for customers and build strong customer relationships in order to capture value from customers in return (Kotler, Armstrong, 2016). Entrepreneurship deals with creativity, innovation and invention. It also deals with the process of creating value by bringing together a unique package of resources to exploit an

[1] Michael Segun Ogunmuyiwa, PhD, Senior Lecturer in the Department of Business Administration, Olabisi Onabanjo University, Ago-Iwoye, Ogun State. Nigeria; e-mail: msogunmuyiwa@gmail. com (corresponding author). ORCID: 0000-0002-5966-9345.
[2] Sarat Ololade Onanuga, M.Sc candidate in the Department of Business Administration, Olabisi Onabanjo University, Ago-Iwoye, Ogun State. Nigeria; e-mail: sunkanmi.amida@gmail.com.

opportunity, define a business concept, assess the needed resources, acquire those resources, and manage and harvest the venture (Ogunnode, Abereola, Oloyede, 2020).

EM as an interface between entrepreneurship and marketing serves as a means for entrepreneurs to bridge the gap of inculcating marketing into entrepreneurship for sustainable development of their enterprise. One most widely used definition of EM was propounded by Morris, Schindehutte and Laforge (2002), they defined entrepreneurial marketing as the proactive identification and exploitation of opportunities for acquiring and retaining profitable customers through innovative approaches to risk management, resource leveraging and value creation. EM is the advertisement, branding, gaining customers loyalty and making a marketing strategy for businesses (Robert, Veland, 2018). Entrepreneurial marketing represents an opportunistic strategy, wherein entrepreneurs proactively seek novel ways to create value for desired customer and build customer equity (Mokejeh, Ekene, Okwuraiwe, 2018). Entrepreneurial Marketing is a blend of organizational functions and a set of processes for creating, communicating and delivering value to customers and for managing customer relationship in ways that benefits the organization and its stakeholders.

Micro scale businesses as the name implies differs in nature and operation across one country to another but serve as a catalyst for growth and development of any nation. In Nigeria, micro scale enterprises are the most common businesses across every nook and cranny of the country aimed at reducing poverty and to fight hunger among people. Micro enterprises are defined with employment capacity of not more than 10 persons with known asset value that is less than 13,000 US dollars exclusive of land and buildings (Ogunmuyiwa, Sofoluwe, 2019). Micro scale businesses are independently owned organizations that require less capital and less workforce and less or no machinery. In Nigeria and most developing nations, micro scale businesses include automobile repairs and servicing, boutiques, provision stores, barbing and hairdressing salon, catering services, bookshops, estate agents, plumbing, carpentry and woodwork, blacksmithing, tailoring and fashion designing etc.

According to Morris, Schindehutte and Laforge (2002) there are seven dimensions that characterized entrepreneurial marketing, viz; proactiveness, risk management, innovativeness, opportunity driven, resource leveraging, customer intensity and value creation. Proactiveness, risk taking, innovativeness and opportunity are derived from entrepreneurial orientation while resource leveraging, customer intensity and value creation dimensions capture market orientation of the firm (Mokejeh, Ekene, Okwuraiwe, 2018).

Empirical studies on Micro Scale Businesses (MSBs) in relation to entrepreneurial marketing dimensions are not new in the literature. However, findings have shown different variations in the contributions of the key components of entrepreneurial marketing dimension to Micro Scale Businesses. Some scholars found significant relationship, while others found otherwise. For instance, Innocent, Paul, and Amaka (2018); Adefulu, Asikhia, and Aroyeun (2018); Johnmark, Munene and Balunywa (2016); found significant positive effects. However, Moreno and Casillas (2008): Musthofa, Sugeng, Nailiand and Ngatno (2017), Kumarpeli and Semasingbe (2015) amongst others revealed no significant effect. A study in Nigeria by Micheal, Nwokolie and Okwuraiwe, (2018) found out that some aspects of entrepreneurial marketing dimensions show significant effect with Micro Scale Businesses performance while other aspect shows no significant effect.

There is however paucity of research in this area using Micro Scale Businesses in Ogun State as a case study. This of course is the gap this study intends to fill. Thus, the objective

of this study is to investigate the relationship between entrepreneurial marketing dimensions (innovativeness, proactiveness, risk taking, resource leveraging and value creation) and performance of micro scale businesses in Ogun East Senatorial District in Ogun Stae, Nigeria. The rest of the paper is divided into three (3) sections. Section II focuses on the literature review and section three III is on the methodology and empirical results while section IV concludes the study.

2. REVIEW OF EMPIRICAL STUDIES

Entrepreneurial marketing (EM) is the merging of the two disciplines-marketing and entrepreneurship. Entrepreneurial marketing is a concept that focuses on the identification and exploitation of opportunities to attract and retain customers (Kucterz, Berger, 2017). Entrepreneurial Marketing is defined as a proactive identification and exploitation of opportunities for acquiring and retaining profitable customers through innovative approaches to risk management, resource leveraging and value creation (Morris et al., 2002).

Entrepreneurial marketing is an organizational function and a set of processes for creating, communicating and delivering value to customers and for managing customer relationships in ways that benefit the organization and its stakeholders, and that is characterized by innovativeness, risk-taking, proactiveness, and may be performed without resources currently controlled (Kraus, Harms, Fink, 2010). Morris, Schindehutte & LaForge (2002) developed seven dimensions that characterize entrepreneurial marketing, which clearly differentiate entrepreneurial from conventional marketing. The seven dimensions are; proactiveness, risk taking, innovativeness, opportunity driven, resource leveraging, customer intensity and value creation.

Micro scale business has no widely accepted definition as its structure varies from one country to another. According to Ogunmuyiwa, Aladegoroye and Abosede (2019), micro scale businesses are those enterprises dominated by wholesale and retail trade, manufacturing and vehicle repair/servicing, barbing salon, hairdressing salon, provision stores, welding enterprises and so on. They presumed that most of the micro scale enterprises are informal, family-owned business with low productivity value and low technological skills.

According to the Bank of Industry, a micro scale business are the businesses with less than or equal to ten employees (≤10), a total assets of less than or equal to five million naira (≤#5 million) and an annual turnover or less than or equal to twenty million naira (≤#20 million). In Nigeria, over 41.5 million MSME businesses operate in the country, according to a survey conducted by the National Bureau of Statistics and the SME Development Agency of Nigeria (SMEDAN) in 2017 out of which 41,469,947 are micro businesses and Ogun state has a total of 2,465 million. MSBs contribute 76.5% of the national workforce in Nigeria.

Mohammad and Rizwan (2021) examined the effect of entrepreneurial marketing dimensions on SMEs' Innovation Performance in Britain. The study was conducted among seventy six (76) SME owners through the use of structured and validated questionnaire. Data collected were analyzed using descriptive statistics and linear regression analysis at 5% significant level. The findings show that entrepreneurial marketing dimensions significantly impacts on innovative performance. In a nutshell, the four dimension of entrepreneurial marketing which include: innovativeness, proactiveness, risk-taking, and

autonomy have a significant positive impact on micro scale business. On the other hand, the other dimension which is competitiveness does not significantly influence innovation performance.

Kalaichelv and Suganthi (2020) studied entrepreneurial marketing performance and SMEs in Tamilnadu, China. Descriptive survey research through simple random sampling technique was adopted for data collection. The study population was 400 in which 224 were selected and 202 were retrieved. Seven dimensions used in this study include: Innovativeness, calculated risk-taking, opportunity focus, resource leveraging, costumer intensity, and value creation. The data collected were measured via Structural Equation Modeling (MSEM). It was gathered that innovativeness, opportunity driven, proactiveness are working together and significantly influence the marketing performance.

Ding and Cao (2019) explored the relationship between entrepreneurial marketing orientation and firm performance in China using strategic flexibility as the mediating variable. In the study 386 samples of entrepreneurial SMEs was used for data collection. Descriptive survey research was adopted through the use of validated structured questionnaire. Findings from the result collected showed that entrepreneurial orientation and strategic flexibility are positively related to firm performance. In essence, both resource flexibility and capability flexibility play a partial mediating role in the relationship while the mediating effect of capacity flexibility is far greater than resource flexibility.

Fauzul and Takenouchi (2016) established the relationship between Entrepreneurial Orientation (EO) and business performance of small and medium scale enterprises in Japan. In the study, three main dimensions of innovativeness, proactiveness, and risk taking were applied for EO while sales growth, employment growth, market share growth, and profit growth were used to predict SMEs performance. The result indicated that proactiveness, innovativeness, risk taking and overall EO have significant positive relationship with market share growth proxy while positive significant relationship was shown between risk taking and employment growth.

Abdul (2020) investigated the rewards and challenges of entrepreneurial marketing in SMEs in Britain. The findings showed that entrepreneurial marketing enables entrepreneurs to think strategically and contributes positively to the success of their enterprises. The study also revealed that entrepreneurial marketing dimensions; innovativeness, proactiveness, risk taking, resource leveraging and value creation positively impact SMEs' overall performance.

Fatoki (2019) assessed the relationship between entrepreneurial marketing dimensions and performance of SMEs in South Africa The descriptive survey research makes use of the cross-sectional survey method through self-administered questionnaire. The respondents were selected through convenience and snowball methods of sampling. Data collected was analyzed using descriptive statistics and multiple regression analysis. It was gathered that a significant positive relationship exist between entrepreneurial marketing dimensions and SMEs performance. Specifically, Innovativeness, value creation and resource leveraging exert positive significant relationship with performance while proactiveness exhibit positive but insignificant relationship with SMEs performance.

Dushi, Dana and Ramadani (2019) examined the impact of entrepreneurial marketing dimensions on small and medium-sized enterprises in Kosovo. Descriptive survey research was adopted where 250 questionnaires was randomly distributed to selected SMEs in the study area. Primary data collected were analyzed using mean for central tendency and standard deviations for variability as descriptive statistics and the Pearson's test, ANOVA,

and regression for inferential statistics. Findings revealed that respondents tend to be highly opportunity focused and understand the importance of resource leveraging. While value creation is seen as a very important entrepreneurial marketing dimension, respondents are reserved with respect to taking risks; furthermore, they do not tend to be proactive, innovative nor customer oriented.

Nuryakin, Aryanto and Setiawan (2018) investigated the mediating effect of value creation in the association connecting relational capabilities on business performance in Indonesia. The researchers collected primary data from 305 exported-furniture SME respondents in Central Java Indonesia. Data collected were analyzed using Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM). It was gathered that a significant positive relationship exist between business performance and value creation.

In a similar study by Sadiku-Dushi, Dana and Bamadani (2019) conducted on the influence of entrepreneurial marketing dimensions on SMEs performance in Kosovo. The researchers adopted survey research design and make use of questionnaire as instrument for data collection. 250 questionnaires were distributed only 245 were retrieved. Data collected were analyzed using descriptive statistics, correlation and regression analysis. Findings thus inferred that value creation is seen to be a paramount entrepreneurial marketing dimension. Nevertheless, most entrepreneurs were reserved with respect to taking risks. In addition, majority do not tend to be proactive, innovative nor customer tilting.

In Nigeria, Adegbuyi, Oladele, Iyiola, Ogunnaike, Ibidunni and Fadeyi (2018) investigated the effect of entrepreneurial orientation on the performance of small and medium scale enterprises using descriptive survey research design. Four hundred and thirty six (436) owner-managers of registered SMEs were selected from the Nigerian Corporate Affairs Commission. Questionnaire was the only instrument used for data collection in the study. The administered questionnaire was analyzed using structural equation modeling. Result gathered showed that there is a significant influence of entrepreneurial marketing dimension on SMEs performance. Adefulu, Asikhia and Aroyeun (2018) investigated the influence of pro-activeness on SMEs growth in Ogun State, Nigeria. The researchers employed simple random sampling techniques in selecting 386 firms across Ogun State based on size and growth. Structured and validated questionnaire was analyzed using descriptive and inferential statistics. It was gathered that pro-activeness positively and significantly influence SMEs growth in Ogun state at $P < 0.05$.

Similarly, Mokejeh et al. (2018) assessed the impact of entrepreneurial marketing on SMEs performance in Enugu State, Nigeria. In the study, Innovativeness, Resource Leveraging, Proactiveness, Calculated risk taking, Customer Intensity, Value creation, Opportunity Focus were used as the dimensions of the independent variable for the study against the performance of the selected SMEs. Descriptive survey research design was adopted in the study and questionnaire was used as instrument for data collection. Fifteen (15) SMEs were selected in the study area and 405 copies of questionnaire were distributed where only 370 were retrieved. The administered questionnaires were analyzed using multiple regression analysis. It was gathered that entrepreneurial innovativeness and proactiveness, have positive significant influences on the performance of the selected SMEs. On the other hand, other variables showed no significant effect.

Stephen, Irenus, and Moses (2019) looked at entrepreneurial marketing practices and competitive advantage of small and medium size enterprises in Nigeria. The sample size comprised of 356 owners/managers of small and medium-sized enterprises in Enugu State, Nigeria. Questionnaire was used as instrument for data collection which was analyzed using

simple percentages, means, standard deviation and regression analysis at 0.05 level. Findings showed that Proactiveness, Risk- taking, Customer intensity and Resource leveraging have no significant relationship with competitive advantage. On the other hand, Innovativeness, Value creation and opportunity focused have statistically significant relationship with competitive advantage. Nwakwio and Kanyangale (2020) assessed the relationship between entrepreneurial orientation and the survival of SMEs in Nigeria. The study was carried out in south-east geo-political zone of Nigeria where 364 owner-managers of manufacturing SMEs was selected randomly to participate in the study using structural equation modeling. Findings indicated that the dimensions of entrepreneurial orientation such as proactiveness, innovativeness, resource leveraging have significantly contributed to the survival of SMEs in Nigeria.

Also, Ogunode, Abereola, and Oloyede (2020) looked at the relationship between entrepreneurship marketing and SMEs performance in Nigeria. Descriptive survey research design was adopted in the study and questionnaire was the only instrument used for data collection. Three hundred and forty five (345) registered SMEs in Delta state, Nigeria form the population for the study where 120 were selected through simple random sampling techniques. Data collected through questionnaire was analyzed using linear regressions analysis. Invariably, the findings showed that entrepreneurial marketing impacts SMEs performance. All the explanatory variables; innovativeness, proactiveness, resource leveraging, value creation, customers intensity among others exert significant influence on the performance of SMEs in Delta State, Nigeria.

3. METHODOLOGY AND EMPIRICAL RESULTS

The research design for the study is the survey research design and the study population is made of micro scale business owners within Ogun East Senatorial District of Ogun State. Purposive sampling technique was employed to select Ninety (90) micro business outlets across nine (09) Local Government Areas that make up the study area. The nine Local Government Areas are: Ijebu-Ode, Ijebu North, Sagamu, Remo North, Odogbolu, Ijebu East, Ogun, Ikenne, Waterside and Ijebu North East. Thereafter, three (3) respondents were picked from each of the Ten (10) micro business outlets in each of the Nine (09) Local Government Areas in Ogun East Senatorial Districts to have a total of Two Hundred and Seventy (270) respondents.

A Four (4) point Likert rating scale questionnaire ranging from Strongly agree (4 point), Agree (3 point), Disagree (2 point) to Strongly Disagree (1 point) was administered to the 270 respondents across the local government areas. Out of the 270 copies of the questionnaire, a total of Two Hundred and Fifty Nine (259) properly filled and usable copies were used for the study and this makes up the sample size for the study. The reliability of the instrument was achieved through a test-re-retest reliability with a Crombach Alpha of 0.82.

3.1. The Model

Arising from the research problem and the research objective is the test of hypothesis of ‘no significant relationship between entrepreneurial marketing dimensions (innovativeness, proactiveness, risk taking, resource leveraging and value creation) and micro scale business performance’. To test the null hypothesis with a view to achieving the stated objective, a behavioural equation is stated thus

$$MSBP = \alpha_o + \beta_1 INN + \beta_2 PR + \beta_3 VC + \beta_4 RL + \beta_5 RT + u \quad (1)$$

Where: MSBP = Micro Scale business performance
PR = Proactiveness
INN = Innovativeness
VC = Value Creation
RL = Resource Leveraging
RT = Risk taking
U = Stochastic or the error term

In a-priori terms, the theoretical expectation is a positive relationship between the dependent and the independent variables in term of their parameters to be estimated. For example, β_1 which is the coefficient of entrepreneurial innovativeness is expected to be positive. This is because an increase in innovation in business will lead to a significant increase in micro scale businesses and vice versa. The same trend goes for proactiveness, risk taking, value creation and leveraging.

$$\text{Thus, } \beta_1, \beta_2, \beta_3, \beta_4, \beta_5 > 0 \quad (2)$$

3.2. Empirical Results

H0: Innovativeness, Proactiveness, Risk taking, Resource leveraging and Value creation has no significant combine influence on the performance of Micro Scale Businesses in Ogun State, Nigeria.

Table 1. Linear regression analysis showing combine influence of Innovativeness, Proactiveness, Risk taking, Resource leveraging and Value creation on Micro Scale Business Performance

Variables		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	3.035	10.655		.285	.776
	Innovativeness	.584	.505	.072	1.158	.248
	Proactiveness	.756	.137	.280	5.500	.000
	Risk taking	.683	.139	.310	4.906	.000
	Value Creation	1.033	.521	.109	1.982	.049
	Resource Leveraging	1.717	.584	.193	2.943	.004
$R= .613$; $R^2 = .376$; Adj $R^2 = .363$; $F = 30.450$; $P = 0.000$						

Dependent Variable: Micro Scale Business Performance

Source: Author's computation, 2021.

Results in table 1 show the combine influence of innovativeness, proactiveness, risk taking, resource leveraging and value creation on Micro Scale Business Performance in Ogun State, Nigeria. Findings show that proactiveness, risk taking, resource leveraging and value creation have a significant positive influence on Micro Scale Business Performance

in Ogun State, Nigeria. The β values are .756, .683, 1.717, and 1.033; t = 5.500, 4.906, 2.943 and 1.982 and their respective p values are .000, .000, .004 and .049 respectively. However, innovativeness was found to have a positive but insignificant contribution to Micro Scale Business Performance in Ogun State, Nigeria. The β values is .584; t = 1.158 and p value is .248. The above findings further revealed that taking other independent variable to be zero, an increase in any of this explanatory variable will lead to a significant increase in MSBs performance.

3.3. Discussion of Findings

Notably, this study showed that entrepreneurial marketing dimensions have significant, direct and positive effect on Micro Scale Business Performance in Ogun State, Nigeria. This is evident in the test statistics of five entrepreneurial marketing dimensions namely; innovativeness, proactiveness, risk-taking, resources leveraging and value creation that are used in the measurement of entrepreneurial marketing dimensions.

Our findings are in accordance with that of Ogunode, Abereola and Oloyede (2020) who affirmed that innovativeness, proactiveness, resource leveraging, value creation, customers intensity among others exert significant influence on the performance of SMEs in Delta State, Nigeria. In addition, findings above correlate with that of Nuryakin, Aryanto and Setiawan (2018). According to them, value creation has a significant influence on the performance of micro scale business. Similarly, our findings are also in line with that of Sadiku-Dushi, Dana and Bamadani (2019) who inferred that value creation is seen to be a paramount entrepreneurial marketing dimension towards micro scale business performance. However, findings above negate that of Fatoki (2019) who found a non-significant relationship between proactiveness and micro scale business performance.

4. CONCLUSION AND RECOMMENDATIONS

The study investigated the relationship between entrepreneurial marketing dimensions and performance of micro scale businesses in Ogun East Senatorial District in Ogun Stae, Nigeria. Empirical findings revealed that all the entrepreneurial marketing dimensions except innovativeness are positively and significantly related to micro scale business performance. Innovativeness, albeit positively related but was insignificant at the 5 per cent level. From the empirical findings above, the five (5) entrepreneurial marketing dimensions (innovativeness, proactiveness, risk-taking, resources leveraging and value creation) are the critical elements driving the performance of micro scale enterprises in Ogun East Senatorial District in Ogun State, Nigeria.

The study thus recommends that; (i) micro Scale Businesses in Ogun State, Nigeria should incorporate and practice the five major constructs of entrepreneurial marketing dimensio in order to achieve the desired results (ii) government and non-governmental organizations in Ogun State and Nigeria as a whole should support micro scale businesses towards the inclusion of entrepreneurial marketing in their programmes with a view to enhancing micro scale business performance in Nigeria.

REFERENCES

Adefulu, A.D., Asikhia, O.U., Aroyeun, T.F. (2018). *The Effect of Pro-Activeness on Growth of Selected Small and Medium Scale Enterprises in Ogun State, Nigeria. "Journal of Business and Management", 20*(12).

Adegbuyi, A.A., Oladele, O.P., Iyiola, O.O., Adegbuyi, O.A., Ogunnaike, O.O., Ibidunni, A.S., Fadeyi, O.O. (2018). *Assessing the influence of entrepreneurial orientation on small and medium enterprises performance. "International Journal of Entrepreneurship", 22*(4).

Ding, D., Cao, L., (2019). Entrepreneurial Orientation and Firm Performance: The Mediating Effect of Strategic Flexibility. China: School of Management, University of Science and Technology of China, Hefei 230026.

Fatoki, O. (2019*). Entrepreneurial Marketing and Performance of Small and Medium Enterprises in South Africa.* "*Journal of Reviews on Global Economics", 8.*

Innocent, D., Paul, E., Chijioke A.J. (2018). *Role of entrepreneurial orientation in the performance of small and medium enterprises: Asian Journal of Economics. "Business and Accounting", 6*(2).

Johnmark, D.R., Munene, J.C., Balunywa W. (2016). *Robustness of personal initiative in moderating entrepreneurial intentions and actions of disabled students. "Cogent Business& Management, Taylor & Francis Journals", 3*(1).

Kalaichelv, K., Suganthi, U. (2020), *Study of entrepreneurial marketing performance small and medium enterprises in Tamilnadu. "High Technology Letters", 26*(6)

Kotler, P., Armstrong, G. (2016), *Principles of marketing*, 16th Global Edition. Boston, MA: Pearson.

Kuckertz, A., Berger, E.S. (2017). *Entrepreneurial opportunities and entrepreneurial marketing*. Germany: University of Hohenheim Entrepreneurship Research.

Kumarpeli, K.I., Semasinghe, D.M. (2015). *The impact of entrepreneurial orientation on the growth of SMEs in Sri Lanka*. International Conference on Business, Marketing and Information System Management (BMISM).

Micheal, O., Nwokolie, C., Okwuraiwe, F. (2018*). Entrepreneurial Marketing and the Performance of the Selected Small and Medium Scale Enterprises in Nigeria. "Scholars Journal of Economics, Business and Management" 5*(10).

Mohammed, T., Rizwan, W. (2021), *The effect of entrepreneurial marketing dimensions on SMEs' Innovation Performance in Britain. "Journal of Public Economics", 95*(3–4).

Mokejeh, M.O., Ekene, N.C., Okwuraiwe, F.E. (2018). *Entrepreneurial marketing and the performance of the selected small and medium scale enterprises in Nigeria.* "*Scholars journals of Economics, Business and Management", 5*(10).

Moreno, A.M., Casillas, J.C., (2020) *Entrepreneurial Orientation and Growth of SMEs: A Causal Model. Entrepreneurship Theory and Practice. "Journal of Modern Economy"*, *32*.

Morris, H.M., Schindehutte, M., Laforge, R. (2002). *Entrepreneurial marketing: A construct for integrating emerging entrepreneurship and marketing perspectives. "Journal of arketing Theory and Practices", 1*(4).

Musthafa, M., Sugeng, W., Naili F., Ngatno N., (2017). *Effect of Entrepreneurial Orientation on Business Performance. "International Journal of Civil Engineering and Technology"*, *8*(9).

Nuryakin, O., Aryanto, V., Setiawan, M. (2018). *Mediating effect of value creation in the relationship between relational capabilities on business performance. "Contaduríay Administración", 63*(1).

Nwankwo, C., Kanyangale, M. (2020*). Entrepreneurial orientation and survival of small and medium enterprises in Nigeria: an examination of the integrative entrepreneurial marketing model. "International Journal of Entrepreneurship", 24*(2).

Ogunmuyiwa M.S., Sofoluwe N.A. (2019), *Cooperative financing of micro scale entreprises in Nigeria. "Izvestiya. Journal of Varna University of Economics", 2*.

Ogunmuyiwa, M.S., Aladegoroye, O.R., Abosede A.J. (2020), *Funding of Micro Scale Enterprises: Is Cooperative Financing Helpful?, Izvestiya. "Journal of Varna University of Economics", 64*(4).

Ogunode, P.O., Abereola, S.N., Oloyede, A.O. (2020). *Entrepreneurship marketing and performance of SMES in Nigeria. "International Journal of Small Business and Entrepreneurship Research", 8*(1).

Robert, D.H., Veland R. (2018), *Entrepreneurial marketing: Entrepreneurship and marketing interface, entrepreneurial marketing: A practical managerial approach*. Chapter 1.

Sadiku Dushi, N., Dana, L., Ramadani, V. (2019). *Entrepreneurial marketing dimensions and SMEs performance. "Journal of Business Research", 77*.

Sadiku-Dushi, Nora-Dana, Léo-Paul, Ramadani, Veland (2019). *Entrepreneurial marketing dimensions and SMEs performance.* "*Journal of Business Research Elsevier", 100*.

Stephen, O., Irenus, N., Moses, O. (2019)**.** *Entrepreneurial marketing practices and competitive advantage of small and medium size enterprises in Enugu, Nigeria. "European Journal of Business and Innovation Research", 7*(3).

DOI: 10.7862/rz2022.mmr.15

The text was submitted to the editorial office: April 2022.
The text was accepted for publication: September 2022.

MODERN MANAGEMENT REVIEW **2022**
MMR, Vol. 27, No. 3(2022), pp 49-57 **July-September**

Dominika SIWIEC[1]
Michalene Eva GREBSKI[2]

METHOD OF PROCESSING CUSTOMERS' EXPECTATIONS TO IMPROVE THE QUALITY OF PRODUCTS

Obtaining and processing customers' expectations for products is a problem in view of the dynamic changes of these expectations. It refers to precisely determining the most important requirements of customers to improve the product in a standardized way. The purpose of the article was to develop a method to process customers' expectations to improve the quality of products. The motivation for developing this method was to reduce uncertainty in expressing customer expectations. Using the SMART(-ER) method, the goal of the analysis was determined. Then, during brainstorming (BM), the product and the analysis criteria were selected. Next, by using a survey with the Likert scale, the customer expectations were obtained. Later, these expectations were processed by the fuzzy analytic hierarchy process (FAHP). Based on processed weights, the choice of important criteria was compiled. The choice was made according to the Pareto-Lorenz Rule. The originality of the article is based on a method, which simultaneously combines quality management tools with the method in a fuzzy decision environment. This method can be used to verify customers' expectations for any product.

Keywords: multi-criteria decision making; quality; production engineering; FAHP method; mechanical engineering.

1. INTRODUCTION

Improving a product is a challenge. Organizations obtain customers' expectations, but it is still a problem to process them in a precise way (Ostasz, Siwiec, Pacana, 2022; Pacana, Siwiec, 2021). It results from changes in these requirements over time and from the subjective character of these expectations (Siwiec, Pacana, 2021). After obtaining expectations, it is necessary to use the methods, which allow one to reduce this subjective approach. The most often used is the fuzzy multi-criteria decision method (FMCDM) and the relatively frequently used method is the Fuzzy Analytic Hierarchy Process/FAHP (Laarhoven, Pedrycz, 1983). The FMCDM method is used to determine the relative weights of criteria (Torfi, Farahani, Rezapour, 2010) and the FAHP (Saad, Kunhu, Mohamed, 2015)

[1] Dominika Siwiec, Master of Science, Rzeszow University of Technology, Rzeszów, Aleja Powstańców Warszawy 12, 35-959 Rzeszów; e-mail: d.siwiec@prz.edu.pl (corresponding author). ORCID: 0000-0002-6663-6621.
[2] Michalene Eva Grebski, PhD, Colorado Mesa University, 1100 North Avenue, Grand Junction, CO 81504 USA; e-mail: mgrebski@coloradomesa.edu. ORCID: 0000-0002-3487-4473.

which was used to verify orders in the automotive industry. The main idea was to determine the order for using the different methods. The next example is an article (Putra, Andryana, Gunaryati, 2018), in which the quality of gems was analyzed. The FAHP method was used to choose and assess the quality of gems. Additionally, an analysis of the effectiveness of this method was performed in the work of Lima-Junior, Carpinetti (2019). As a result, it was concluded that this method can be used as an effective tool to eliminate the zero weight of criteria and points of the alternative without impact on coherent results. The next examples of the application of these methods were in the analysis of the future sea sector including criteria such as human factors, management and environmental aspects (Ozdemir, Altinpinar, Demirel, 2018) as well as political issues taking into account , political, economic and social criteria (Oguztimur, 2011), or verification of car parts (Shukla, Garg, Agarwal, 2014). In addition, Siwiec and Pacana (2021), developed a model supporting making decisions in the development of a product considering sustainable development. The model was based on combined decision methods, i.e., FAHP and the fuzzy technique for order of preference by similarity to the ideal solution (FTOPSIS). Ulewicz, Siwiec, Pacana, Tutak, Brodny (2021) developed a method to verify renewable energy sources (RES). The method was combined FAHP, TOPSIS, and qualitative-cost analysis (AKJ).

After reviewing the selected works, the authors tried to reduce the uncertainty of the customer' expectations. The fuzzy multi-criteria decision method (FMCDM) was used for that purpose. This method was combined with other techniques, for example, the FTOPSIS method. However, this method was not combined with quality management tools to improve the quality of the product when considering customer expectations. Hence, it was concluded that the right approach is to develop a method to process customers' expectations as part of the FAHP method and quality management tools. The concept was to reduce uncertainty in determining customer expectations while improving the quality of the product. The purpose of the article was to develop a method for processing customer's' expectations to improve the quality of products. The method was used for the development of a more customer-friendly vacuum cleaner.

2. METHOD

The proposed method was developed using integrated quality management tools and the fuzzy multi-criteria decision method. Those methods included SMART(-ER) method, brainstorming (BM), survey on the Likert scale, FAHP method, and Pareto-Lorenz analysis (rule 20/80). The general scheme of the stages of the method is shown in Figure 1.

Figure 1. Scheme of integrated stages of the proposed method to process customers' expectations

Source: Own study.

A short description of the proposed method is shown in the next part of the study.

Stage 1. Determining the purpose of the analysis

The purpose is determined by the entity using the proposed method. To determine the desired outcome, it is adequate to use the SMART(-ER) method (Lawlor, Hornyak, 2012). It was assumed that the purpose is to determine the precise criteria for the product. This precise criterion is what is important for the customers.

Stage 2. Choice of product for verification

The choice is done by the entity applying proposed method. In this approach, this refers to the choice the product we are planning to improve. It results from the concept of method, where in the first order we are making improvement decisions for important criteria. Therefore, it can be a product in the maturity phase or the declining phase.

Stage 3. Determining product criteria

Step 3 refers to the determination of criteria for which importance (weights) will be calculated. Therefore, it should be a criterion that generates a quality product. Mainly, there are technical criteria, so-called quantitative (measurable) criteria. Therefore, it is preferred to determine criteria in this category group. It is necessary to determine from fourteen to twenty-five criteria (Hansen, Bush, 1999; Huang, 1999; Roder, Heidl, Birkhofer, 2013). In the proposed approach, the criteria are defined by a team of experts brainstorming (BM) according to the product catalog (specification). The criteria are defined for the product selected in Step 2 of the method.

Stage 4. Obtaining customer expectations

The purpose is to obtain assessments of importance of criteria according to customer expectations. To obtain customers' expectations, it is proposed to use the popular tool, survey with the Likert scale (Alexandrov, 2010), where 1 = practically irrelevant criterion to 5 = the most important criterion. The survey considers all criteria specified in the third stage of the method. The method presented in the paper (Siwiec, Pacana, 2021) is used to estimate the required number of customers from whom expectations will be obtained.

Stage 5. Determining the weights of the criteria

The idea of Stage 5 is to process all assessments of criteria weights (from the fourth stage) into precision estimated weights of criteria. It means to reduce inconsistencies and uncertainties in the assessments of weights of criteria determined by customers. It was assumed that it is effective to use the FAHP method. Initially, the processing of assessment of weights from the Likert scale into the fuzzy Saaty scale is done. This means replacing grades on the traditional five-point scale with grades on a fuzzy scale, as shown in Table 1.

Table 1. Processing assessments in the Likert scale into a fuzzy Saaty assessment

Description Assessments of Importance	Assessments in the Likert Scale	Fuzzy Assessment in Likert Scale
Practically unimportant	1	1; 1; 1
Not important	2	1,5; 2; 2,5
Important	3	2,5; 3; 3,5
Very important	4	3,5; 4; 4,5
Absolutely the most important	5	4,5; 5; 5,5

Source: Own study based on (Siwiec, Pacana, 2021).

After processing the assessments, it is necessary to develop a combined fuzzy decision matrix as shown in Formula 1 (Ulewicz et. al., 2021).

$$\tilde{x}_{ij}=\left(a_{ij}, b_{ij}, c_{ij}\right)$$
$$where: \quad a_{ij} = \min_{k}\{a_{ij}^{k}\}, \quad b_{ij} = \frac{1}{K}\sum_{k=1}^{K} b_{ij}^{k}, \quad c_{ij} = \max_{k}\{c_{ij}^{k}\}, \tag{1}$$

where: a – fuzzy rating, left, b – fuzzy middle rating, c – fuzzy rating on the right, K – customer, i, j = 1, 2, …, n.

Then, it is necessary to follow the FAHP method, as is shown in the literature on the subject (Oguztimur, 2011; Ozdemir et al., 2018; Ulewicz et al., 2021; Shukla et al., 2014; Siwiec, Pacana, 2021).

Stage 6. Choice of the importance of criteria

At this stage, it is necessary to determine the criteria that are important to customers.

The choice is made based on weights of criteria in the fifth stage. In the proposed approach, the Pareto-Lorenz analysis was used (Hoła, Sawicki, Szóstak, 2018). As a result, 20% of the weight of criteria are the most important criteria for customers. For these criteria, improvement actions should be taken in the first place. After their introduction, customer satisfaction should be verified, and the next criteria should be improved.

3. RESULTS

A test of the proposed integrated method was carried out for a domestic vacuum cleaner. This product was manufactured in a Polish company located in Podkarpacie.

In the first stage, the purpose of the analysis was determined. In this approach, the purpose was to precisely determine the criteria for the product that were important to the customers.

In the second stage, the product for verification was selected. As part of the method test, the vacuum cleaner was the choice. The choice resulted from the preferences of the entity in which the analysis was performed. The verification product was in the maturity phase. It was subjected to improvement activities by changing the design of the vacuum cleaner. However, there was still a search for a way to increase customer satisfaction with this product. Therefore, it was considered justified to analyze it.

As part of the third stage of the method, the criteria for the vacuum cleaner were determined. Based on the assumptions, these criteria were determined during brainstorming (BM). There were fourteen technical criteria, which were selected based on the catalog (specification) of the vacuum cleaner, i.e.: motor power, cable length, winding system, dimensions, weight, filter type, width of the suction hose, length of the suction hose, possibility of vacuum control, type of road wheels, on / off type, electric brush socket, number of accessories in the set, and rubber protectors to protect against bumping.

During the fourth stage of the method, the customers' expectations were obtained. As part of the pilot research carried out in 2020, the expectations of twenty-four customers were obtained. A survey based on Likert Scale was used to obtain assessments of the weights of criteria for the vacuum cleaner. All fourteen vacuum cleaner criteria that were

identified in Step Three of the method were considered in the survey. The weights of the criteria weights were processed in the next step by the weightings of the vacuum cleaner criteria.

At the fifth stage of the method, the weights of the criteria were calculated.

According to the proposed approach, the FAHP method was used for that. Initially, customers' expectations were processed from the Likert scale into the fuzzy Saaty scale. Then the combined matrix was created. The results are shown in Table 2.

Table 2. Fragment of a combination of assessments of vacuum cleaner criteria

Criteria	Mark	a	b	c
Vacuum cleaner motor power	C1	2,5	3,72	5,5
Length of the power cord	C2	1,5	3,8	5,5
Power cord winding system	C3	1	3,04	5,5
Dimensions of the vacuum cleaner	C4	1	2,72	5,5
Weight of the vacuum cleaner	C5	1	2,64	5,5
Type of vacuum cleaner dust filter	C6	1	2,84	5,5
…				
Rubber protectors to protect furniture against knocking	C14	1	3,08	5,5

Source: Own study.

Then a pairwise comparison matrix was developed. The matrix was developed according to the ratings of the connected customers. A fragment of the results of comparisons with pairs of criteria is presented in the Table 3.

Table 3. Fragment of results of comparison by pairs of criteria

M_{ij}	C1	C2	C3	C4	C5	C6
C1	1,00;1,00;1,00	1,67;0,98;1,00	2,50;1,22;1,00	2,50;1,37;1,00	2,50;1,41;1,00	2,50;1,31;1,00
C2	0,60;1,02;1,00	1,00;1,00;1,00	1,50;1,25;1,00	1,50;1,40;1,00	1,50;1,44;1,00	1,50;1,34;1,00
C3	0,40;0,82;1,00	0,67;0,80;1,00	1,00;1,00;1,00	1,00;1,12;1,00	1,00;1,15;1,00	1,00;1,07;1,00
C4	0,40;0,73;1,00	0,67;0,72;1,00	1,00;0,89;1,00	1,00;1,00;1,00	1,00;1,03;1,00	1,00;0,96;1,00
C5	0,40;0,71;1,00	0,67;0,69;1,00	1,00;0,87;1,00	1,00;0,97;1,00	1,00;1,00;1,00	1,00;0,93;1,00
C6	0,40;0,76;1,00	0,67;0,75;1,00	1,00;1,00;0,93	1,00;1,04;1,00	1,00;1,08;1,00	1,00;1,00;1,00
where: C1 – motor power, C2 – length of the power cord, C3 – power cord winding system, C4 – dimensions, C5 – weight, C6 – type of vacuum cleaner dust filter						

Source: Own study.

A fuzzy geometric average value for each criterion, fuzzy weights, and weights in terms of decimals were calculated and are shown in Table 4. (Oguztimur, 2011; Ozdemir et al., 2018; Ulewicz et al., 2021; Shukla et al., 2014; Siwiec, Pacana, 2021).

The sum of weights for all criteria was equal to 1. Therefore, the correctness of the calculations was confirmed.

As part of the sixth stage of the method, the most important criteria were selected. The choice was made according to the weights of the criteria and by using the Pareto-Lorenz analysis (Table 5.).

Table 4. Results from the FAHP method

Criteria	Mark	Fuzzy Geometric Average Value	Fuzzy Weight	Weight
Vacuum cleaner motor power	C1	2,21;1,33;1,03	0,16;0,09;0,07	0,11
Length of the power cord	C2	1,33;1,36;1,03	0,09;0,10;0,07	0,09
Power cord winding system	C3	0,88;1,09;1,03	0,06;0,09;0,07	0,07
Dimensions of the vacuum cleaner	C4	0,88;0,86;1,03	0,06;0,07;0,07	0,07
Weight of the vacuum cleaner	C5	0,88;0,94;1,03	0,06;0,07;0,07	0,07
Type of vacuum cleaner dust filter	C6	0,88;1,02;1,03	0,06;0,07;0,07	0,07
Suction hose width	C7	0,88;0,77;1,03	0,06;0,05;0,07	0,06
Length of the suction pipe (suction pipe)	C8	0,88;0,99;1,03	0,06;0,07;0,07	0,07
Possibility to control the vacuum of the vacuum cleaner in the working handle	C9	0,88;0,87;1,03	0,06;0,07;0,07	0,07
Type of road wheels of the vacuum cleaner	C10	0,88;0,86;1,03	0,06;0,06;0,07	0,06
Type of vacuum cleaner on / off	C11	0,88;0,76;0,84	0,06;0,05;0,06	0,06
Electric brush socket	C12	0,88;0,92;1,01	0,06;0,07;0,07	0,07
Number of accessories included with the vacuum cleaner (suction tubes and nozzles)	C13	1,33;1,10;0,84	0,09;0,08;0,06	0,08
Rubber protectors to protect furniture against knocking	C14	0,83;1,09;1,03	0,06;0,08;0,07	0,07

Source: Own study.

Table 5. Pareto-Lorenz analysis to select important criteria

Criteria	Mark	Weight	Cumulative Value	Cumulative Value [%]
Vacuum cleaner motor power	C1	0,11	0,11	10,74
Length of the power cord	C2	0,09	0,19	19,45
Number of accessories included with the vacuum cleaner	C13	0,08	0,27	27,12
(suction tubes and nozzles)	C3	0,07	0,34	34,14
Power cord winding system	C14	0,07	0,41	41,02
Rubber protectors to protect furniture against knocking	C6	0,07	0,48	47,87
Type of vacuum cleaner dust filter	C8	0,07	0,55	54,65
Length of the suction pipe (suction pipe)	C4	0,07	0,61	61,40
Dimensions of the vacuum cleaner	C9	0,07	0,68	68,15
Possibility to control the vacuum of the vacuum cleaner	C5	0,07	0,75	74,83
in the workholding	C12	0,07	0,81	81,43
Weight of the vacuum cleaner	C10	0,06	0,88	87,91
Electric brush socket	C7	0,06	0,94	94,18
Type of road wheels of the vacuum cleaner	C11	0,06	1,00	100,00

Source: Own study.

It was concluded that the criteria, i.e., the power of the vacuum cleaner motor and the length of the power cord, constitute 20% of the most important criteria. For these criteria, improvement actions were given the highest priority. After their implementation, customer satisfaction should be verified, and the next criteria should be considered.

4. DISCUSSION AND CONCLUSION

Customers' expectations are necessary considerations during the improvement of the quality of products. Therefore, the adequate obtaining of data and processing the improvement of products are problems. There are different methods supporting this process. However, it is still difficult to avoid changing these requirements in time to reduce the uncertainty and concerns of customers. Therefore, the method to support this process was proposed. The purpose of the article was to develop a method to process customer expectations to improve the quality of the products. The method was integrated with methods of quality management tools and fuzzy multi-criteria decision method, i.e.: SMART(-ER) method, brainstorming (BM), survey with the Likert scale, FAHP method, and Pareto-Lorenz analysis. As part of the method test, a household vacuum cleaner was selected. As part of the SMART(-ER) method, the objective was determined as well as precise criteria of the product, which will be important to customers. During brainstorming (BM), fourteen criteria were determined. For these criteria, a Likert scale-based survey was developed. With its use, the expectations of twenty-four customers were met. These expectations were related to the validity of the product criteria. Criteria weighting assessments were processed using the FAHP method. Then, using the Pareto-Lorenz method, important criteria were selected, i.e., motor power and cable length. It was decided that for these criteria and improvement actions should be performed first.

It was considered that benefits of the proposed method are, e.g.: obtaining customers' expectations as part of the popular Likert scale, and then processing these expectations in a fuzzy decision environment. It reduced the subjective assessments by customers and uncertainty during their determination. Additionally, the originality of the method combines quality management tools with the FMCDM method to sequentially improve the quality of the product.

A limitation of this research is a lack of information about requirements because of changes in the product. Therefore, future research will be referred to extensions of the proposed method about additional elements to help identify the necessary changes to important product criteria.

The proposed method can be used for any product. The method can assist the entity (e.g., a manufacturing company) in determining the order of criteria to be changed and considering customer expectations. Therefore, it can be a useful tool to process customer expectations as part of product quality improvement sometimes known as continuous quality improvement (CQI).

REFERENCES

Alexandrov, A. (2010). *Characteristics of Single-Item Measures in Likert Scale Format. "The Electronic Journal of Business Research Methods", 8*(1).

Hansen, E., Bush, R.J. (1999). *Understanding customer quality requirements – Model and application. Ind. Mark. Manag., 28.*

Hoła, A., Sawicki, M., Szóstak, M. (2018). *Methodology of Classifying the Causes of Occupational Accidents Involving Construction Scaffolding Using Pareto-Lorenz Analysis. "Appl. Sci.", 8*, 48. DOI: 10.3390/app8010048.

Huang, Y.M. (1999). *On the general evaluation of customer requirements during conceptual design. "J. Mech. Des.", 121*.

Laarhoven, P.J.M., Pedrycz, W. (1983). *A fuzzy extension of Saaty's priority theory. "Fuzzy Sets and Systems", 11*(1–3). DOI: 10.1016/S0165-0114(83)80082-7.

Lawlor, K.B., Hornyak, M.J. (2012). *Smart Goals: How the Application of Smart Goals Can Contribute to Achievement of Student Learning Outcomes. "Dev. Bus. Simul. Exp. Learn.", 39*.

Lima-Junior, F., Carpinetti, L. (2019). *Dealing with the problem of null weights and scores in Fuzzy Analytic Hierarchy Process.* Soft Computing. DOI: 10.1007/s00500-019-04464-8(0123456789.

Oguztimur, S. (2011). *Why Fuzzy Analytic Hierarchy Process Approach for Transport Problems?* CORE – Research Papiers in Economics.

Ostasz, G., Siwiec, D., Pacana, A. (2022). *Universal Model to Predict Expected Direction of Products Quality Improvement. "Energies", 15*. DOI: 10.3390/en15051751.

Ozdemir, U., Altinpinar, I., Demirel, F.B. (2018). *A MCDM Approach with Fuzzy AHP Method for Occupational Accidents on Board. "The International Journal on Marine Navigation and Safety of Sea Transportation", 12*(1). DOI: 10.12716/1001.12.01.10.

Pacana, A., Siwiec, D. (2021). *Universal Model to Support the Quality Improvement of Industrial Products.* "Materials", 14. DOI: 10.3390/ma14247872.

Putra, M., Andryana, S., Gunaryati, A. (2018). *Fuzzy Analytical Hierarchy Process Method to Determine the Quality of Gemstones. "Advances in Fuzzy Systems",* Vol. 2018, Article ID 9094380, 6 pages. DOI: 10.1155/2018/9094380

Roder, B., Heidl, M.J., Birkhofer, H. (2013). *Pre-Acquisition Clustering of Requirements – Helping Customers to Realize What They Want. "Des. Harmon.", 7*.

Saad, S.K., Mohamed, A. (2015). *A fuzzy-AHP multi-criteria decision-making model for procurement process. "International Journal of Logistics Systems and Management (IJLSM)", 23*(1).

Shukla, R., Garg, D., Agarwal, A. (2014). *An integrated approach of Fuzzy AHP and Fuzzy TOPSIS in modelling supply chain coordination. "Production & Manufacturing Research: An Open Access Journal", 2*(1). DOI: 10.1080/21693277.2014.919886.

Siwiec, D., Pacana, A. (2021). *A Pro-Environmental Method of Sample Size Determination to Predict the Quality Level of Products Considering Current Customers' Expectations. "Sustainability", 13*. DOI: 10.3390/su13105542.

Siwiec, D., Pacana, A. (2021). *Model Supporting Development Decisions by Considering Qualitative–Environmental Aspects. "Sustainability", 13*. DOI: 10.3390/su13169067.

Torfi, F., Farahani, R., Rezapour, S. (2010). *Fuzzy AHP to determine the relative weights of evaluation criteria and Fuzzy TOPSIS to rank the alternatives. "Applied Soft Computing", 10*(2). DOI: 10.1016/j.asoc.2009.08.021.

Ulewicz, R., Siwiec, D., Pacana, A., Tutak, M., Brodny, J. (2021). *Multi-Criteria Method for the Selection of Renewable Energy Sources in the Polish Industrial Sector. "Energies", 14*. DOI: 10.3390/en14092386.

DOI: 10.7862/rz.2022.mmr.16

The text was submitted to the editorial office: April 2022.
The text was accepted for publication: September 2022.

MODERN MANAGEMENT REVIEW **2022**
MMR, Vol. 27, No. 3(2022), pp 59-68 **July-September**

Zuzana ŠIMKOVÁ[1]
Lucia BEDNÁROVÁ[2]

MUNICIPAL WASTE IN SLOVAKIA AS A POTENTIAL FOR THE CIRCULAR ECONOMY[3]

Abstract – If we talk about municipal waste in connection with circular economy, each European produces about 500 kg/year of waste. Less than half of it is 46% recycled, 27% is incinerated and 24% is landfilled. However, if we talk about the Slovak Republic, in 2019, 1 person produced an average of 421 kg/year of waste, and this indicator has a significantly rising character. In the context of the circular economy, an interesting indicator is precisely the rate of waste recycling, which is at the level of 38.5% in Slovakia. A similar analysis of municipal waste generation in selected EU countries was carried out in 2019, with the aim of identifying the potential for residual municipal waste generation, taking into account historical data, EU targets and existing residual waste treatment capacities. The results of this assessment for the Slovak Republic are discussed in article, which indicate a lack of processing capacity for non-recyclable waste.

Keywords: municipal waste, Slovakia, circular economy.

1. INTRODUCTION

There is pressure from all sides to reduce the amount of municipal waste production, to increase the rate of sorting and recycling, or to reduce the share of landfills (Taušová, Mihaliková, Čulková, Stehlíková, Tauš, Kudelas, Štrba, Domaracká, 2020). These trends are noticeable in all Member States, and of course they are gradually being reflected in Slovak legislation (Castillo-Giménez, Montañés, Picazo-Tadeo, 2019). However, the legislation also pushes us into price increases under the influence of waste treatment obligations, or the management of biodegradable waste or kitchen waste. This is clearly not liked by local governments and residents, who will feel the rising costs of waste management in the near future (Ukkonen, Sahimaa, 2021). The upward trend in energy prices, the current geopolitical tensions in the world and the ever-increasing prices of emission allowances oscillating above EUR 80/ton of CO_2 emitted from fossil fuels are a natural outcome of the penetration of waste management and energy into one functional

[1] Zuzana Šimková, Ing., PhD., Associate Prof., Technical University of Košice, Faculty of Mining, Ecology, Process Control and Geotechnologies, Letná 9, 04001 Košice; e-mail: zuzana.simkova@tuke.sk (corresponding author). ORCID 0000-0001-8721-9424.
[2] Lucia Bednárová, Ing., PhD., Associate Prof., Technical University of Košice, Faculty of Mining, Ecology, Process Control and Geotechnologies, Letná 9, 04001 Košice; e-mail: lucia.bednarova@tuke.sk. ORCID: 0000-0002-8582-0643.
[3] This work was supported by the Slovak Research and Development Agency under the Contract no. APVV–20–0076.

unit (Hubatka, Theisen, 2021). It is the energy recovery of waste in Waste-to-energy plants that solves several of the mentioned goals or price problems. Despite the fact that waste management is currently increasingly regulated, monitored and evaluated by the EU, landfilling still prevails in Slovakia, with up to half of municipal waste ending in landfills (Taušová, Mihaliková, Čulková, Stehlíková, Tauš, Kudelas, Štrba, 2019). Equally unflattering is the indicator of waste production *per capita*, which is increasing from year to year in EU countries, but also in Slovakia. However, this could be seen as an opportunity in the context of the circular economy and the present. It is the knowledge of the production of "own" waste in own country in detail determines its efficient use, which from the point of view of the circular economy (Circular Economy), as one of the youngest interdisciplinary industries, has become increasingly important in recent years (Lacy, Long, Spindler, 2020). Especially in the current geopolitically uncertain times, when it is absolutely necessary to looking for new alternatives of many sources of minerals. In this context, waste is a treasure that has a lot of untapped potential, which increases raw material and energy security (Domaracká, Taušová, Čulková, Pavolová, Bakalár, Seňová, Shejbalová-Muchová, Teplická, Kowal, 2020).

In 2020, the share of landfilling in the Slovak Republic was 48%, the share of recycling, including backfilling was 44% and the energy recovery of waste was 8%. Due to the influence of European legislation, this trend must change by 2035 when landfilling to max. 10%, recycling min. 65%, the rest could be used for energy recovery. The application of material and energy recovery of waste results in the absolute minimization of waste generation. Another positive is the recovery of electricity, heat, as well as the return of materials back to the life cycle in the form of secondary raw materials, where primary raw materials and energy resources are saved. In European countries, energy recovery is an integral complement to waste management as well as energetics. At the same time, it is an essential part of the waste hierarchy, because not producing any waste is an impossible fiction. If we talk about the circular economy in terms of municipal waste, each European produces about 500 kg of waste per year. Less than half of it is 46% recycled, 27% is incinerated and 24% is landfilled (Cehlár, Tauš, Šimková, Taušová, Šimko, 2022).

2. CURRENT SITUATION IN THE FIELD OF WASTE IN SLOVAKIA

If we talk about the Slovak Republic, in 2020, 1 person produced an average of 446 kg of waste in 1 year, and this indicator has a significantly rising character. In 2019 it was an average of 421 kg of waste per 1 year person (Valenčíková, 2021), for comparison, in 2001 it was 239 kg of waste/person/year and compared to 2018 it is an increase of 7 kg/person / year, compared to 2017 up to 43 kg/person/year. The largest production of municipal waste *per capita* was achieved in the Trnava region (555.8 kg/inhabitant), which is directly proportional to the economic strength of the region. The smallest municipal waste production *per capita* was recorded in the Košice region (328.8 kg/capita) (https://ec. europa.eu, 2022).

The production of municipal waste on the territory of the Slovak Republic in the years 2011–2020 showed a fluctuating development trend with an average year-on-year increase of 66,705 t / year and significant regional disparities (see Figure 1). At the same time, it can be stated that the Bratislava region had the highest production in the given period with an average annual production of 300,827 t/year (except in 2018 and 2019, when the highest production was recorded in the Nitra region). On the contrary, the lowest production was

recorded in the Banská Bystrica region with an average annual production of 207,557 t/year until 2017, when the lowest production was recorded in the Trenčín region (http://statdat.statistics.sk, 2022).

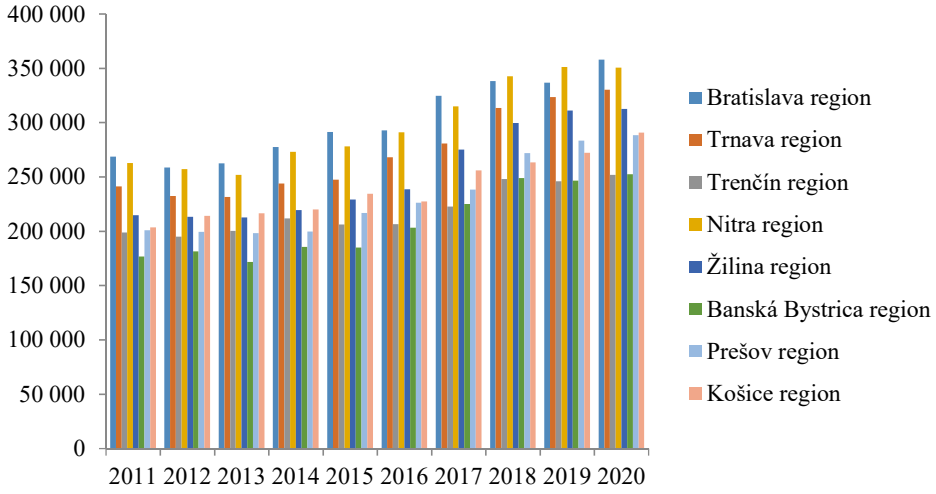

Figure 1. Development of municipal waste production in the regions of the Slovak Republic [t/year]

Source: own processing based on http://statdat.statistics.sk

A detailed analysis of year-on-year movements in municipal waste production revealed that the highest year-on-year average increase in the observed period was recorded in the Žilina region with 9,780 t/year and the lowest year-on-year average municipal waste in the Trenčín region with 5,315 t/year (http://statdat.statistics.sk). The data were analyzed with respect to year-on-year changes in municipal waste production in individual regions of the Slovak Republic with respect to the 10-year average (some years also showed negative values). Regarding the material recovery of municipal waste, based on a detailed analysis, it can be stated that in 2011–2020 the Žilina region had the highest average quantities of material recovery of municipal waste with an average annual material recovery of 38,542 t/year. However, the highest average year-on-year increases were recorded in the Bratislava region at 10,639 t/year (see Figure 2.).

A different development was recorded in the lowest values of material recovery of municipal waste, while it was found that:

- in 2011, 2013, 2014 and 2015, the least municipal waste was recovered in the Bratislava region,
- the lowest year-on-year average value in the years 2011–2020 was reported by the Trenčín, Banská Bystrica and Prešov regions,
- the highest year-on-year average value in the years 2011–2020 was reported by the Žilina, Trnava and Košice regions,
- The Bratislava region has almost doubled its material recovery of municipal waste in the last two years (2019–2020) almost twice (http://statdat.statistics.sk, 2022).

It follows from the above that the highest share of material recovery of municipal waste was recorded in the Bratislava and Košice regions at almost the same level of 27% per year and the lowest in the Trenčín region at 21% per year (http://statdat.statistics.sk, 2022).

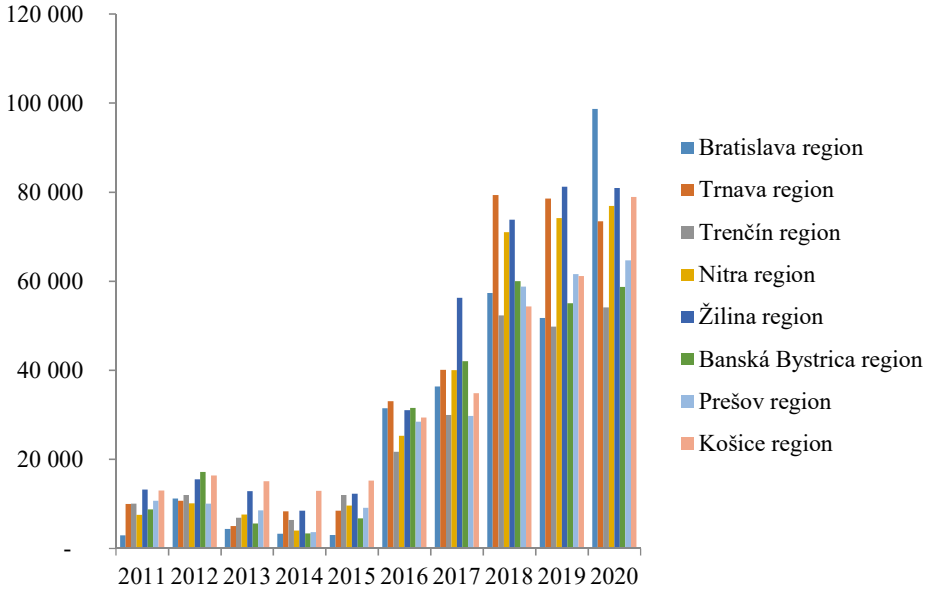

Figure 2. Development of the amount of material recovery of municipal waste in the regions of the Slovak Republic [t/year]

Source: own processing based on http://statdat.statistics.sk

As can be seen from the graph (see Figure 2.), the Košice and Bratislava regions have the highest share of material recovery of municipal waste (data are applied from http://datacube.statistics.sk/). The Košice region has few landfills, as well as low currently allowed free landfill capacities. The largest capacities are available in the Banská Bystrica and Trnava regions, and the Prešov and Trenčín regions are relatively in the middle of this division. The most landfilled waste is in the Trnava region, which reflects the presence of the highest rate of waste generation, as well as the high concentration of industry in the west of the Slovak Republic.

The dependence between the existence of the Waste-to-energy plant, the lower weights of waste that ends up in landfills and the fact that the Košice and Bratislava regions are making more material use is probably reaffirmed. It should be noted that this is not just a landfill for municipal waste, because in the context of landfilling individual regions in the regions, it was not possible to separate industrial and municipal waste on the basis of the data provided.

2.1. Energy recovery in Slovakia and the impact on landfilling

Energy recovery of waste is carried out only in the Bratislava and Košice regions. Statistics for 2020 show energy recovery for individual facilities in the total amount of

187,795 tons of municipal waste. However, it must be said that Bratislava recovers only municipal waste from Bratislava to the maximum extent possible. In Košice, municipal waste from the city of Košice, part of Prešov, individual municipalities of the adjacent region, as well as industrial waste from certain areas of Slovakia is recovered (see Figure 3.).

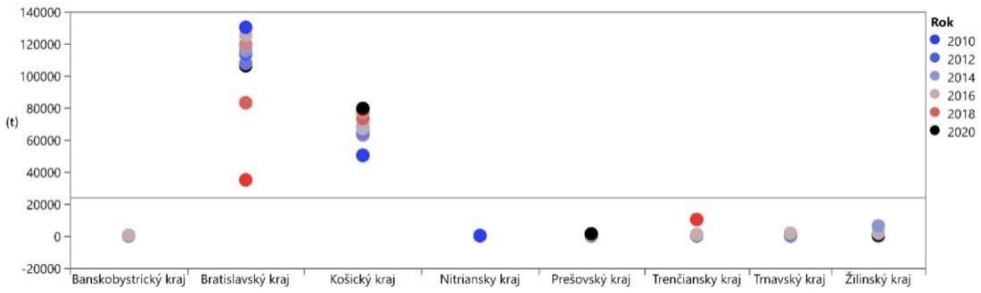

Figure 3. Energy recovery waste in the Slovak Republic

Source: own processing by authors of the waste study TUKE based on http://statdat.statistics.sk

The graphs, the source of which is data from the Statistical Office, relate to municipal waste management for 2020 and support the same hypothesis as in the case of analyzes from EU countries. Namely that the rate of energy recovery of waste has a direct impact not only on the reduction of landfilled waste, but also on the rate of waste sorting and recycling. In the case of Slovakia, this is confirmed by the development of the amount of energy recovered waste, recycled municipal waste and landfilled municipal waste in the Bratislava and Košice regions (see Figure 4.). The unevenness of the amount of energy recovered waste in individual years corresponds to all the above indicators.

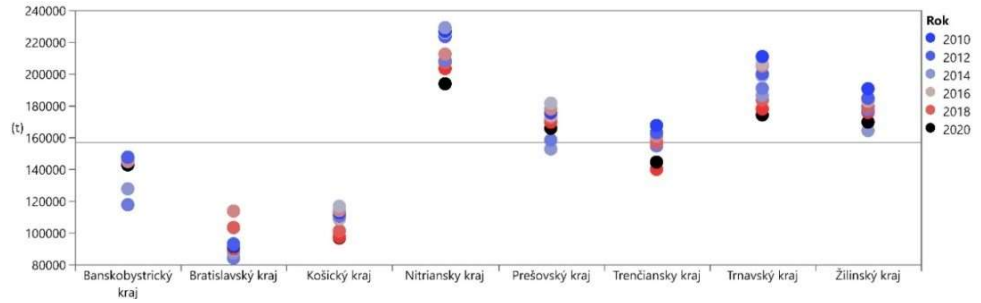

Figure 4. Amount of landfilled waste in the regions of the Slovak Republic

Source: own processing by authors of the waste study TUKE based on http://statdat.statistics.sk

From the above analyzes, it can be deduced that increasing the share of energy recovery has an impact on the increased rate of waste sorting and subsequent recycling. It is not

directly energy recovery, but probably the culture that energy recovery facilities as such bring to the region.

The set of waste management measures in a given country, we can call it the "evolution of waste management" has the need to reduce the share of landfill, increase the share of energy recovery, thus a natural need to push much more the topic of waste separation at source, followed by more successful recycling of materials (which goes hand in hand). They are also building capacities for material recovery of municipal waste) and awareness-raising in this topic to society as another environmental step towards fulfilling today's popular "zero waste" principle.

Thus, the synergistic effects of diversion from landfilling, by building capacity for energy recovery, demonstrably lead to the building of recycling capacities and to the fulfillment of the principles of the circular economy into the waste management of individual EU countries.

3. PRINCIPLES FOR THE FUTURE DEVELOPMENT OF ENERGY EVALUATION

According to data from the Statistical Office in 2020, approximately 80,000 tons of waste in the Košice region are energy recovered, what is a share of 27%. Given the amount of landfilled waste with a share of 33% disposal, the potential for more than double the needs of energy recovery is already created today, while achieving an almost minimal share of landfilling, the so-called "Zero waste to landfill" approach. Over the last 10 years, waste

Table 1. Development of production and potential of energy recovery in the current and with the "zero waste to landfill" approach

Region	**Prešov**	**Košice**	
Year 2020/tons	**288 350**	**290 727**	
Year	**Potential**	**Waste to energy plant Košice**	**Potential**
2021	168 915	82 218	170 308
2022	158 839	77 108	160 148
2023	151 514	77 879	155 759
2024	144 028	75 633	148 240
2025	136 376	70 278	137 501
2026	134 679	74 067	135 789
2027	132 934	77 925	134 030
2028	131 141	78 704	132 222
2029	129 299	79 491	130 365
2030	127 407	80 286	128 457
2031	125 464	81 089	126 498
2032	123 469	81 900	124 487
2033	121 422	82 719	122 423
2034	119 322	83 546	120 306
2035	117 168	84 381	118 134
Together	**2 021 979**	**1 187 222**	**2 044 669**
Sum	**2 021 979**	**3 231 891**	

Source: own processing.

generation in the Slovak Republic has increased unevenly on average by about 3.5% year-on-year. Waste generation by 2035 was considered at a level of 1% year-on-year growth each year, given the economic potential and the strategy to reduce waste generation (see Table 1.). After recalculations, the production of municipal waste in the Košice region for 2035 was modeled at the level of 337 thousand tons. The recycling rate was indicated to meet the needs by 2035 (also according to Green Deal) to the level of 65%, landfilling minimized to max. 10%. The potential for energy recovery of municipal waste by 2035 has climbed to almost 120 thousand tons per year, which cumulatively means at today's loading ratio of 1.2 resp. at the so-called "Zero waste to landfill" approach approx. 2 mil. tons of non-landfilled waste.

In terms of adjacent production possibilities, it is also possible to consider the production of the Prešov region, where the potential is already today for almost 170 thousand tons of municipal waste per year, by 2035 for about 120 thousand tons, while maintaining a recycling rate (65%) and a landfill ratio (10%). Cumulatively, there is potential for another 2 mil. tons (see Table 1.).

3.1. Waste energy potential

Based on the current and future production of waste in individual regions, it is clear that hundreds of thousands of tons of waste have considerable energy potential (see Table 2.).

Table 2. Potential for energy production from 1 ton of mixed municipal waste (MMW)

Region	**Prešov**		**Košice**			
Energy production	Heat production MWh	Electricity generation MWh	Heat production MWh	Electricity generation MWh	Heat production MWh	Electricity generation MWh
From 1t of MMW	**2,68**	**0,85**	**2,68**	**0,85**	**2,68**	**0,85**
Year	**Potential**	**Potential**	**Waste to energy plant Košice**	**Waste to energy plant Košice**	**Potential**	**Potential**
2021	**452 693**	**143 578**	220 343	69 885	456 425	144 762
2022	**425 687**	**135 013**	206 650	65 542	429 197	136 126
2023	**406 058**	**128 787**	208 717	66 197	417 434	132 395
2024	**385 994**	**122 424**	202 696	64 288	397 284	126 004
2025	**365 488**	**115 920**	188 345	59 736	368 501	116 875
2026	**360 940**	**114 477**	198 499	62 957	363 916	115 421
2027	**356 264**	**112 994**	208 838	66 236	359 201	113 926
2028	**351 459**	**111 470**	210 926	66 898	354 356	112 389
2029	**346 522**	**109 904**	213 036	67 567	349 378	110 810
2030	**341 451**	**108 296**	215 166	68 243	344 266	109 189
2031	**336 243**	**106 644**	217 318	68 925	339 016	107 524
2032	**330 898**	**104 949**	219 491	69 615	333 626	105 814
2033	**325 412**	**103 209**	221 686	70 311	328 095	104 060
2034	**319 783**	**101 424**	223 903	71 014	322 420	102 260
2035	**314 010**	**99 593**	226 142	71 724	316 598	100 414
Together	**5 418 903**	**1 718 682**	**3 181 755**	**1 009 139**	**5 479 713**	**1 737 969**

Source: own processing by authors of the waste study TUKE.

The advantage of mixed municipal waste is its calorific value, which is at the calorific value level of brown coal until recently mined in the conditions of the Slovak Republic. The right combination of types and amounts of waste ensures smooth combustion without the need to add fossil fuels. The table below shows the calculation of energy gains from energy recovery of waste in individual years related to the expected production of waste.

In the green columns is the recalculation to the potential of the current share of energy recovery for the Košice region. In recent years, Waste-to-energy plant in Košice produced an average of approximately 48,000 MWh of electricity, as the existence of only 1 turbine producing electricity does not use all the potential of waste for production.

As energy production from waste has not yet been included in the emissions trading scheme at European level, it is a resource that is not subject to additional charges as in the production of energy from fossil fuels, which means further savings in terms of the producer price of energy. This is mainly due to the presence of a biological component in the waste, which originates in the component of biomass, animal fraction and the nature of municipal waste.

3.2. Benefits of a "zero waste to landfill" approach

Expected amounts of potentially energy-recovered waste in the Košice region, resp. in eastern Slovakia mean:

- Landfill savings and conservation;
- Electricity and heat production and the independence of waste generators from the landfill fee;
- Own, stable energy source without external limitation of raw material inputs – diversified energy security of the region;
- Independent energy source from commodity prices (gas, electricity, heat, ...) on world markets, hydrogen production potential;
- An energy source not yet covered by the Emissions Trading Scheme;
- A fully emission control source with the strictest BAT limits by the environmental authorities;
- Low heat production costs compared to the costs of standard fossil fuel dependent heating sources;
- Solving the problem of fulfilling the binding goals of the Slovak Republic towards the EU in the field of waste management and avoiding infringements for non-fulfillment of landfill targets;
- Only 1–3% of flue gas dust from the original volume of waste;
- The slag from the process is widely used, for example, in construction.

4. CONCLUSION

The presented data and the conclusions drawn from them can also be confirmed by several relevant data. In 2021, a team of scientists and experts in circular economics from the Technical University in Košice prepared an analysis of the state of waste management and the potential of the circular economy model in Slovakia, which confirmed the regional needs for material and energy recovery and recommended the following:

Completion of bio-waste recycling and non-recyclable waste capacities; completion of the Waste-to-energy plant - to be implemented into the Waste Management Program for the years 2021–2025 – i.e. expansion of current capacities in Bratislava, or in Košice, and the

construction of new ones directly in the regions with the highest waste production and the highest share of landfilling – Trnava region, Nitra region, Trenčín region and Žilina region.

From the above, it can be stated that the analysis confirmed the current regional needs, as new lines for ZEVO are in the process of environmental impact assessment in Košice and Bratislava. In the approved materials "Waste Management Program of the Slovak Republic for the years 2021–2025", the government confirmed this direction, whereas, in order to divert waste from landfills, it envisages the use of existing and at the same time building new capacities for energy recovery, which is in line with the waste analysis and the EU vision for the next decade. Only in this way can Slovakia achieve the goals of the Green Deal by 2035, because a vision of a world without any waste is an unattainable illusion.

REFERENCES

Castillo-Giménez, J., Montañés, A.J., Picazo-Tadeo, A. (2019). *Performance in the treatment of municipal waste: Are European Union member states so different?* "Science of The Total Environment", Vol. 687. DOI: 10.1016/j.scitotenv.2019.06.016.

Cehlár, M., Tauš, P., Šimková, Z., Taušová, M., Šimko, I. (2022). *Analýza stavu odpadového hospodárstva a potenciál modelu cirkulárnej ekonomiky na Slovensku*. Odborné vyjadrenie – štúdia. Access on the internet: https://www.odpady-portal.sk/files/Priloha2/Odborna%20studia_Odpady_FBERG%20final_26082021_.pdf

Cicular economy indicators (2022). Access on the internet: https://ec.europa.eu/eurostat/web/circular-economy/indicators/monitoring-framework

Domaracká, L., Taušová, M., Čulková, K., Pavolová, H., Bakalár, T., Seňová, A., Shejbalová-Muchová, M., Teplická, K., Kowal, B. (2020). *Interdependence of mining industry and industrial sectors in Slovakia. "Acta Montanistica Slovaca",* Vol. 25. DOI: 10.46544/AMS.v25i4.05.

Hubatka, S., Theisen, N. (2021). *Slovakia low carbon economy pathways. Achieving more by 2030*. Access on the internet: https://www.globsec.org/wp-content/uploads/2021/02/Slovakia-LCEP_Achieving-more-by-2030_Dec2020.pdf

Lacy, P., Long J., Spindler, W. (2020). *The Circular Eocnomy Handbook. Realizing the Circular advantage*. Palgrave macmillan, United Kingdom.

Štatistický úrad SR. Access on the internet: http://statdat.statistics.sk/cognosext/cgi-bin/cognos.cgi?b_action=cognosViewer&ui.action=run&ui.object=storeID(%22i57F8D1568E444621B1FC04094207561E%22)&ui.name=Mno%c5%bestvo%20komun%c3%a1lneho%20odpadu%20(v%20ton%c3%a1ch)%20%5bzp3001rr%5d&run.outputFormat=&run.prompt=true&cv.header=false&ui.backURL=%2fcognosext%2fcps4%2fportlets%2fcommon%2fclose.html

Taušová, M., Mihaliková, E., Čulková, K., Stehlíková, B., Tauš, P., Kudelas, D., Štrba, Ľ., Domaracká, L. (2020). *Analysis of Municipal Waste Development and Management in Self-Governing Regions of Slovakia*. *„Sustainability",* Vol. 12, No. 14. DOI: 10.3390/su12145818.

Taušová, M., Mihaliková, E., Čulková, K., Stehlíková, B., Tauš, P., Kudelas, D., Štrba, Ľ. (2019). *Recycling of Municipal Waste: Current State and Future Potential for Sustainable Development in the EU. „Sustainability",* Vol. 11. DOI: 10.3390/su11102904.

Ukkonen, A., Sahimaa, O. (2021). *Weight-based pay-as-you-throw pricing model: Encouraging sorting in households through waste fees*. *„Waste Management",* Vol. 135. DOI: 10.1016/j.wasman.2021.09.011.

Valenčíková, M. (2021). *The Circular Economy in Selected EU Countries: Perspective on Strategies*. „Zborník vedeckých príspevkov doktorandov a mladých vedeckých pracovníkov, Doktoranduszok és fiatal kutatók tudományos kötete, Scientific Proceedings of PhD. Students and Young Scientists", Paneurópska vysoká škola, Fakulta ekonómie a podnikania v spolupráci s Univerzitou J. Selyeho, Fakultou ekonómie a informatiky a s Odborom ekonomiky a manažmentu Slovenskej akadémie pôdohospodárskych vied v roku 2021. Bratislava.

DOI: 10.7862/rz.2022.mmr.17

The text was submitted to the editorial office: June 2022.
The text was accepted for publication: September 2022.

ADDITIONAL INFORMATION

The Journal annually publishes a list of reviewers: in the last issue of the quarterly - No. 4(2022) and on the website:
https://journals.prz.edu.pl/mmr/about/editorialTeam

Previous name of the Journal: *Zarządzanie i Marketing*, ISSN 1234-3706
https://journals.prz.edu.pl/mmr/index

The Journal uses as described on its website the procedure for reviewing:
https://journals.prz.edu.pl/mmr/recenzja

Information for authors available at:
https://journals.prz.edu.pl/mmr/about/submissions

Review's form available at:
https://journals.prz.edu.pl/mmr/etyka

Instruction for Authors:
https://journals.prz.edu.pl/mmr/about/submissions

Contact details to Editorial Office available at:
https://journals.prz.edu.pl/mmr/contact

Electronic version of the published articles available at:
https://journals.prz.edu.pl/mmr/issue/archive

Reviewing standards, information for authors, the review form, instruction for authors and contact details to MMR Editors and to Publishing House are also published in the fourth number of Modern Management Review, Vol. 27, No. 4(2022).

Manuscript completed in September 2022.
Printing Publishing House, 12 Powstańców Warszawy Ave., 35-959 Rzeszów

DOCUMENT CREATED WITH

PDF COMBINER

PDF Combiner is a free application that you can use to combine multiple PDF documents into one.

Three simple steps are needed to merge several PDF documents. First, we must add files to the program. This can be done using the Add files button or by dragging files to the list via the Drag and Drop mechanism. Then you need to adjust the order of files if list order is not suitable. The last step is joining files. To do this, click button Combine PDFs.

Main features:

secure PDF merging - everything is done on your computer and documents are not sent anywhere

simplicity - you need to follow three steps to merge documents

possibility to rearrange document - change the order of merged documents and page selection

reliability - application is not modifying a content of merged documents.

Visit the homepage to download the application:

www.jankowskimichal.pl/pdf-combiner

To remove this page from your document, please donate a project.