

# RADICAL AND INCREMENTAL INNOVATIONS PERFORMANCE IN EASTERN EUROPEAN SMES: AN EMPIRICAL STUDY OF DEVELOPED AND EMERGING ECONOMIES

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## ABSTRACT

Assessing the effectiveness of radical and incremental innovation in small and medium enterprises (SMEs) in Eastern European countries is a significant issue in regional economics. In contrast, radical innovation entails the creation of wholly novel goods or organization processes that establish new markets. Progressive enhancements to current goods and processes are referred to as incremental innovation. This study explains the influence of incremental and radical innovation on the performance of SMEs in Eastern Europe. Employing EUROSTAT data from 2012 to 2021 and using regression analysis and a graphical model, the examines basic, radical, and incremental innovation and total researcher performance in SMEs, which could enormously affect business performance in Eastern European countries. Our findings indicate that radical, incremental innovation, and total research are all favorably related to the performance of SMEs and an approach to studying various innovations and their impact on SMEs. The particular performance effects of radical and incremental innovations in Eastern European SMEs might vary considerably, and empirical investigations and comprehensive research are required to provide more specific knowledge and suggestions for them. Our results can contribute to SMEs both theoretically and practically, providing fresh theoretical perspectives for scholars and helpful management consequences for administrators of SMEs in developing countries.

**Keywords:** radical innovation; incremental innovation; SME performance; Eastern Europe

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## INTRODUCTION

Increased competition worldwide has raised the demand for elasticity in constantly shifting business conditions, and small and medium-sized enterprises (SMEs) are considered a source

of elasticity and flexibility, with better capacity for innovation and adjusting promptly to changing conditions. According to a developing body of literature on them, SMEs have particular benefits that allow them to contribute to the

business in various ways (Ponta et al., 2021). Among the most commonly cited arguments (a significant driver of employment generation), SMEs are lauded for contributing to national growth, primarily via innovation, and they are considered the champions of novel concepts and innovations in unpredictable contexts, resulting in greater adaptability of the economic system as a whole in reacting to exogenous shocks (Saunila, 2016). Particularly in economies that are transitioning, the positive impact of SMEs on a country's economy is particularly crucial given the structural transformations that the economies of these nations have experienced in their gradual move to an economy oriented toward markets. These businesses' adaptability allows entrepreneurs to adapt more quickly to emerging possibilities than larger firms (Dziallas & Blind, 2019). In systemically transforming transitional circumstances, SMEs are capable of contributing an important role not just in reallocating labor as well as other resources among both the public and the private sectors but also in producing premium items depending on modern technology (Szutowski & Szulczyńska, 2017). Besides, as Europe has become more prominent, the role of business strength and marketplace dynamics in technological growth has arisen as one of the primary objectives of legislators in the new nations. Economies entering the European Union (EU) will experience greater rivalry from nations with advanced competitive businesses that utilize more modern technology. Considering the topic's prominence, there have been almost limited quantitative studies on countries in transition in the existing literature (Modranský et al., 2020).

The beneficial effects of radical and incremental innovation are examined in six advanced Eastern European economies that are presently members of the EU: Bulgaria, Czech Republic, Hungary, Poland, Romania, and Slovakia. An empirical examination of the performance of both innovations in the countries under examination depends on Eurostat data between 2012 and 2021. The countries examined in our research have been chosen primarily because they are top economic innovators, are members of the European Union (EU), and have demonstrated more robust innovation in the sample as a whole (Kondratiuk-Nierodzińska, 2016). In this perspective, such economies offer excellent ground for examining more known

innovation models. Another reason was the quantitative reasons for data accessibility since data on enterprises' innovation activities in low-performing nations were inadequate or too representational for economic evaluation and correlations. More particularly, the research explores how business size and SME R&D performance impact a firm's decision to engage in innovation. This work adds to the existing research by noting the characteristics of two forms of innovation (radical and incremental) (Krajewski, 2014). The study hypothesizes that the influence of incremental and radical innovation is expected to be positively related to the performance of small and medium-sized enterprises in Eastern Europe.

## LITERATURE REVIEW

One of the essential concepts associated with the technological advancement and growth of the European Union's business is innovation. At the same time, there is little quantitative research on innovation in the framework of worldwide corporate performance. R&D (research and development) effort represents one of the fundamental factors of innovation activities studied in the framework of business effectiveness in the EU member states. The practice is defined as a methodical method of innovation that incorporates fundamental and practical research to expand the business's understanding of capabilities and implement them in practice (Abiodun, 2017). Organizations' innovative output may be measured by R&D investment along with its outcomes, including inventions and the percentage of innovations among all revenue. Research and development could result in increased company productivity. Initial theories of endogenous growth literature generally emphasized the necessity of innovation in business development in a globalized world where customers want diversity and/or excellent quality of available goods (Amdaoud & Le Bas, 2021).

Innovation is still an essential component of economic growth and competitive advantage. Considering its importance, numerous research investigations have been conducted to explore the determinants of a company's innovative effectiveness, particularly in implementing novel goods or procedures (Ato Sarsah et al., 2020). Organizational factors, including businesses' long-term goals, marketplace makeup, or

competitiveness, along with foreign possibilities like international value chains, inter-firm cooperation, trade efforts, and systems for innovation, are examples (Gurcanlar et al., 2021). Currently, diverse research presents numerous justifications for what motivates innovation among companies in well-functioning, advanced economies; the comprehension of the process that determines or prevents innovation in developing and less-developed marketplaces remains inadequate due to their particularities in these methods that form the frequency and significance of non-market tactics in these situations. Researchers do not yet understand how these factors affect innovation throughout enterprises, sectors, and national borders (Du, 2021).

The concept of "Central and Eastern Europe (CEE)" refers to the 11 European Union (EU) member countries that entered the European Union after 2004 (Bulgaria, the Republic of Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia) (Lopes et al., 2021). These economies have seen extraordinary improvement over the past thirty years, owing mainly to foreign investments and their incorporation into the worldwide supply chains of advanced-country companies. The rest of the Central and Eastern European nations, except Bulgaria and Romania, have attained high GDP rates. Most of this improvement may be ascribed to CEE manufacturers transforming their supply chains to high-value-added goods (Matras-Bolibok et al., 2017).

The CEE model of innovation differs from that seen in developed countries. According to Maurer et al. (2018), the success of CEE countries is not dependent on research-driven innovation but rather on the interplay of native manufacturers with imported equipment and inputs. Instead of fostering local innovation, research, and development efforts in such circumstances function as a mechanism for absorbing foreign knowledge and technological advances. Furthermore, most innovation initiatives in the CEE area do not come under the category of developing innovative skills; instead, they represent non-R&D investments that include purchasing innovative equipment, applications, and machinery. Odei et al. (2021) discussed behavioral patterns that involved developing the innovation skills necessary for

understanding innovative goods and services, which are opposed to developing the capacity for innovation needed for radical innovation.

Radical innovation is often defined by a whole novel set of efficiency characteristics - between 5 and 10% enhancements in existing efficiency and a minimum of a 30% decrease in related expenses. Radical innovations have the ability to change current markets or establish novel ones, thereby pursuing the innovative disruption method described by Schumpeter and others with greater precision (Onea, 2021). However, this criterion can only detect radical innovation after the fact. Other research has provided guidelines for resolving the difficulty of identifying radical innovation. According to Parida et al. (2012), innovation is considered radical when it meets more than one of the criteria that follow: it must have the ability to impact (1) consumer demands and behaviors significantly, (2) business competitiveness, and (3) businesses. Furthermore, radical innovations are more advanced innovations with significant uncertainties.

On the contrary, incremental innovation is viewed as a decreased-order innovation with fewer degrees of risk, occurring when the efficiency of a previous good is improved or increased. A good, for instance, can be upgraded by improving its efficiency or decreasing its prices via the implementation of increased characteristics, materials, or technological systems. As a result, an enterprise's utility and purposeful application vary from those associated with radical innovation (Yusof et al., 2023).

Although it has undisputed significance for educational and commercial areas, research remains divided regarding what defines innovation. In basic terms, innovation is a method that helps organizations emphasize possibilities by looking for perspectives, applying them, and delivering value in the marketplace. Meanwhile, collecting the entire scope of this procedure remains challenging, and following the recommendations is one of the most commonly acknowledged methods of preserving innovation (Gui et al., 2022). In this context, innovation is described as adopting an entirely novel or considerably better promising service, procedure, innovative advertising approach, or administrative technique in business processes, places of work, or interactions with others.

Whereas the development of innovation is unambiguously required, this change in perspective focuses on the implementation or establishment phase of innovation and incorporates non-technical innovations, including business management and marketing innovation, with more mature terms related to technological innovation, like innovation in processes and products (Freixanet & Rialp, 2022).

Additionally, professionals need to have the expertise required to develop these novel innovations. Businesses rely on internal incentives to discard current expertise, knowledge, and investments to make space for new offerings. Radical innovations can provide more significant uncertainty than incremental innovations, which presents difficulties for numerous companies. The challenges and opportunities related to incremental innovations are considerably fewer than those connected with radical innovations, while they are used to meet particular market demands in a minimal time (Vanyushyn et al., 2018). According to Uvarova et al. (2019), incremental innovations are critical to a business's sustainability over the long term. The distinctions between incremental and radical innovations can determine an organization's innovation emphasis. Currently, ideas disagree on whether business size influences the innovation output selected. Vercher et al. (2023) believed that more prominent organizations primarily create radical innovations. In favor of this, Acemoglu et al. (2022) discovered that growth-focused SMEs focus their growth initiatives on incremental innovations. Additionally, SMEs have limited resources and a smaller variety of products than bigger rivals, so they reduce risk by generating incremental (compared to radical) innovations.

At the same time, other researchers have claimed that SMEs are more capable of introducing radical innovations than more prominent and better-established companies because they exhibit more significant entrepreneurial activity; for SMEs, presenting completely novel concepts may encourage their goal of modifying existing frameworks (Hain & Lindgaard Christensen, 2020). Ultimately, other research has shown no association between company size and technological uniqueness, with Ouyang et al. (2022) indicating no company-size influence on radical innovations

and Samovoleva (2022) suggesting that SMEs develop equally incremental and radical innovations. One potential reason for this mix of data is that when SMEs progress, so do their assets, including the finances required to manufacture more sophisticated goods with higher innovation potential.

### THE HYPOTHESIS OF THE STUDY

This study hypothesizes that the influence of incremental and radical innovation is expected to be positively related to the performance of SMEs in Eastern Europe. Significantly, investing in innovation ultimately improves a company's business performance (Asad & Homolka, 2023). Modern businesses are usually compelled to launch novel products quickly into an overcrowded marketplace due to the rapid pace of technological advancement. According to Allocca & Kessler (2006), SMEs are essential for the global economy to grow and contribute innovatively. A number of studies support our hypothesis that there is a positive correlation between the performance of SMEs and the impact of both radical and incremental innovation. It is also essential to investigate whether business performance is impacted by incremental or radical innovation (Massaro et al. 2017). For instance, the effectiveness of SMEs' product innovation is positively affected by innovation culture (Aksoy, 2017). The results from Ato Sarsah et al. (2020) showed that both potential and realized absorptive capacities significantly influence the relationship between radical innovation performance and entrepreneurial orientation among manufacturing SMEs. In addition, a positive correlation between radical innovation and firm performance has been observed, indicating a positive relationship between radical innovation strategies and firm performance in SMEs. Furthermore, the theory of incremental innovation has been examined in other studies, such as Britto (1989), which depicted that incremental forms of innovation are typically necessary for market success. According to Oduro and Nyarku (2018), SMEs have performed better as a result of incremental innovation practices in terms of growth in sales, global market reach, competitiveness, and customer satisfaction and loyalty.

### THE OBJECTIVE OF THE RESEARCH

Incremental and radical innovation in Eastern



Europe is crucial for the economic growth and development of the region. Research objectives in this context can vary depending on specific goals and priorities, but here are some specific research objectives for innovation in Eastern European countries: first, to conduct a comprehensive analysis of the incremental and radical innovation performance in SMEs in Eastern European countries; second, to evaluate the effectiveness of the total number of researchers and initiatives aimed at promoting innovations in SMEs in Eastern European countries; third, to compare yearly SME innovation performance among Eastern European countries with emerging economies, and to identify best practices and areas for improvement; and finally, to evaluate the long-term impact of innovation on economic growth, job creation, and overall well-being in Eastern European countries. Overall, these research objectives can serve as a starting point for academics, policymakers, and organizations interested in promoting and understanding innovation in Eastern European countries. Tailoring research to the specific needs and challenges of individual countries in the region is also essential for effective policymaking and fostering a culture of innovation.

#### DATA AND METHODOLOGY

Panel data was utilized in this study to examine the influence of incremental and radical innovation on the performance of SMEs in Eastern European countries. The Fixed Effect Model (FEM) was used to evaluate innovation's influence on SMEs' performance in Eastern European countries. The research was carried out by utilizing yearly data from 2012 to 2021, and the statistical findings were obtained using Stata. The primary results of the research are described in the results section. Numerous databases provided details about each of the variables that were used in the current study, with Eurostat as the primary source of statistics. Data on SMEs' performance factors are accessible on an annual basis. To achieve better results, panel data was created yearly for all SMEs. Some variables have been effectively utilized in the study, and factors such as researchers in small enterprises, researchers in medium enterprises, incremental innovation, radical innovation, and basic

innovation were immediately employed. A graphical approach was also used to study the correlations of the variables and generalize the conclusions. Most positive individuals prefer the use of quantitative methods since they allow for simple generalization, so when the study's goals involved clarification, explanation, or assessment, statistical and graphical approaches were applied. When the study's goal was focused on discovery, the aim was to evaluate, explain, and generalize the influence of incremental and radical innovation on the performance of SMEs in Eastern Europe. In this case, statistical visual approaches were more suited and made it easy to achieve study goals.

#### TYPES OF INNOVATIONS AND ORGANIZATIONAL SALES PERFORMANCE

We used the fixed effect regression method (Table 1) to address the issues regarding how innovations influence corporate success and which forms of innovation had the most explanatory potential. The statistical study shows a considerable connection between innovation and annual revenue achievement. Model 1 (R square 0.9969) reveals that small and medium-sized businesses with R&D spending generate more significant revenues. Model 2 augments Model 1 with three distinct types of innovation: incremental, radical, and essential. Model 2's R square of 0.9938 is somewhat lower compared to Model 1. The contrast reveals that "incremental innovation" and "radical innovation" equally predict "business sales growth" considerably at the 0.05 and 0.01 levels, respectively. Model 2's minor R square boost to 0.9972 implies that company size has a more significant influence on business revenue than innovation. Furthermore, according to popular belief, diverse types of innovation are not the primary source of sales profits; both incremental and radical innovations significantly indicate corporate revenue.

**Table 1:** The Fixed Effect Regression Model

Predictor	Model 1	Model 2
<b>Control variables</b>		
Researcher Small Ent		0.0734317*
Researchers in Medium Ent		-0.0371387*
Radical Innovation	0.8917145*	0.846316*
Incremental Innovation	1.023696*	0.9680891*
Basic Innovation	1.168219*	1.255616*
Constant	65.07886*	90.08417*
F value	0.0006	0
R2 overall	0.9969	0.9938
R2 between	0.9993	0.9972
R2 within	0.9939	0.9954
Observation	54	54

Source: author's work.

This study shows that innovation always leads to improved business sales fulfillment. According to the bottom line measure of revenue, this quantitative conclusion conclusively reveals that innovation is vital for increased revenue. Businesses that fantasize about innovation must confront the fact that, in the end, the key to success may be a whole-system commitment to a complex, concentrated, and meaningful effort delivered via both types of innovations. Similarly, fixed-effect panel data analysis, which is empirically applied in the study of Jin & Choi (2019), positively affected R&D investment, research resources, company age, and business performance in both large and small enterprises. According to the fixed effect panel results from Ren, Eisingerich, and Tsai (2015), when SMEs have strong R&D or marketing capabilities, internationalization improves innovation performance.

## RESULT AND DISCUSSION

### Yearly performance of SMEs in Eastern European Countries

Worldwide, SMEs have faced tremendous obstacles in the last few decades. Eastern European SMEs have experienced financial instability, recruiting problems, price increases, interest rate hikes, and more expensive utility and raw materials prices. The outcomes of SMEs can be considered quantitatively, such as effectiveness, financial outcomes, the volume of manufacturing, the total number of consumers, position in the market, profitability, output, income circumstances, expenses, and funding. In

contrast, qualitative outcomes such as achieving objectives, manner of leadership, the behavior of staff members, satisfaction with clients, innovations in products and processes, and organizational innovations in marketing can also be included.

Eastern European countries are attempting to improve their efficiency and economic growth; SMEs are vital in this sector, as they contribute significantly to creating employment and boosting the economy. The European Union supports SMEs' operations through its regulations and financial programs, especially those situated along the European Union's border in the so-called Eastern partnership territory. Small efforts were taken to obtain the rank of "advanced countries" along the journey from poverty to wealth. This study has examined the factors that influenced the success of SMEs in Eastern European economies, with a particular emphasis on their access to financial markets, innovation ability, and participation in global trade. It is generally recognized that having access to credit for SMEs is one of the most significant obstacles to growth in the private sector. Likewise, the ability of SMEs to innovate in Eastern European countries is decreasing, which has a detrimental influence on their production level. Furthermore, globalization creates new opportunities for SMEs, and the advantages of participating in worldwide trade are widely recognized; however, a small proportion of these Eastern European firms engage in foreign economic activity (Matras-Bolibok et al., 2017).

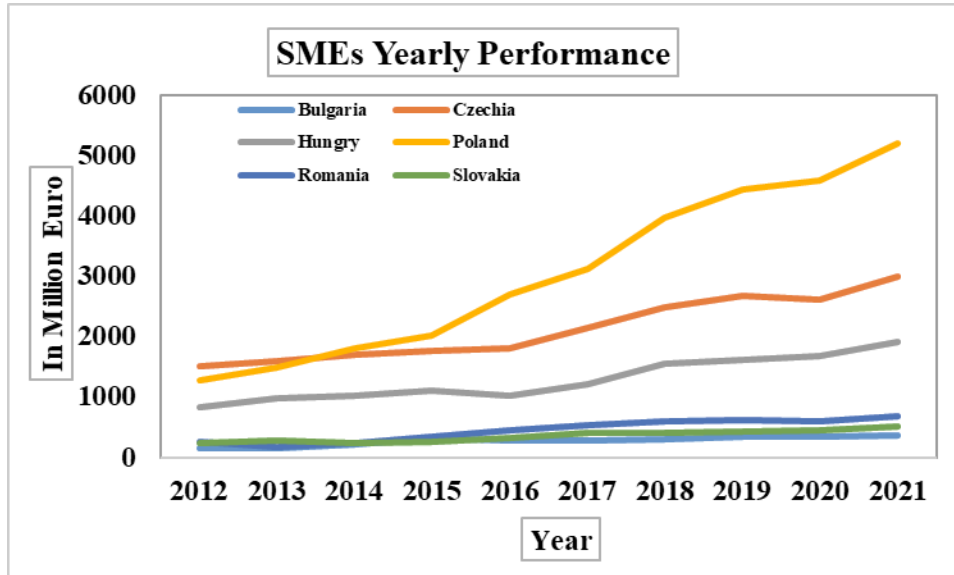


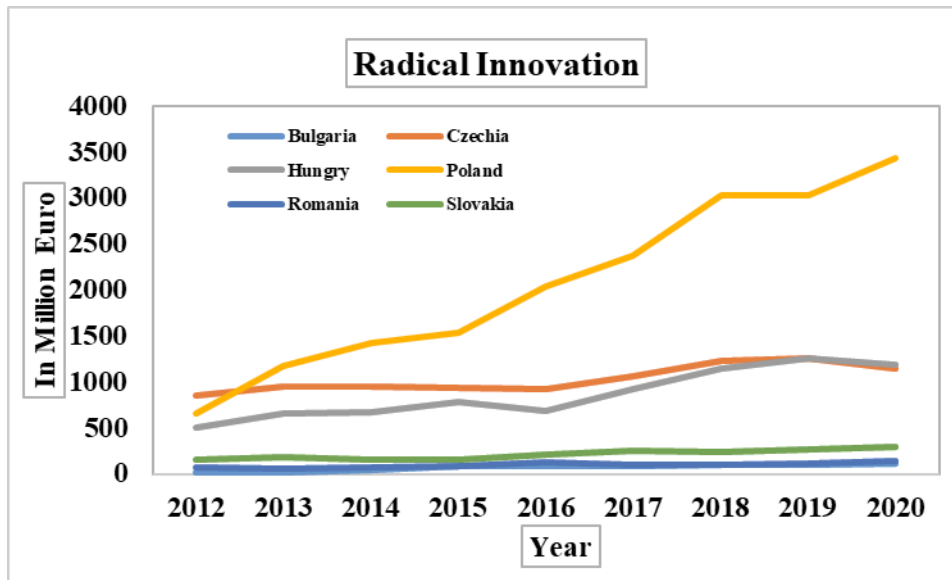
Figure 1: Yearly performance of SMEs in Eastern European Countries.

Figure 1 presents the yearly performance of SMEs in Bulgaria, Hungary, Romania, Czechia, Poland, and Slovakia from 2012 to 2021. SMEs in Poland, Czechia, and Hungary consistently improved their yearly performance by about 1,276, 1,520, and 825 million euros in 2012, and an increase was observed in 2021 by about 5,207, 2,986, and 1,910 million euros, respectively. In other developed economies such as Bulgaria, Slovakia, and Romania, yearly performance in 2021 was observed at about 154, 242, and 251 million euros, respectively, whereas in 2021, just a slight increase was observed. This record of performance indicates how important SMEs are to the European economy, with significant contributions to employment creation, innovation, and economic development.

### Radical Innovations of SMEs in Eastern European Countries

SMEs in Eastern European countries require radical innovation to improve as they combine specific marketplaces, generate fresh markets, and eliminate existing markets. It may catapult tiny newcomers to market dominance and drag down giant incumbents who are unable to innovate. SMEs at the forefront of radical

innovation prefer to gain an advantage in global marketplaces and boost their home country's competitiveness internationally. Thus, radical innovation simultaneously fosters market expansion, company profitability, and national economic growth. As a result of these factors, executives and authorities all around the globe are appreciating the crucial relevance of radical innovation. Organizational innovation within Eastern European countries has evaluated various innovation elements, including investment in research and development, human resources, and royalties (Parida et al., 2012). Few cross-national research investigations into innovation have officially evaluated the results of innovation, such as industrialized technologies, and the monetary rewards associated with such innovations, even though their contributions always produce new goods or the monetary worth businesses want to achieve.



**Figure 2:** Radical Innovations of SMEs in Eastern European Countries.

Radical Innovation's SME performance in Bulgaria, Czechia, Poland, Hungary, Romania, and Slovakia from 2012 to 2020 is shown in Figure 2. Radical innovation performance in 2012 in Czechia, Poland, and Hungary was about 849, 663 and 508 million euros, respectively; radical performance in Poland increased continuously compared to Hungary and Czechia, which was about 3,439, 1,188 and 1,142 million euros in 2020, respectively. Bulgaria, Romania, and Slovakia (the less developed European countries) had 18, 75, and 158 million euros in 2012, respectively. There was a slight development in radical innovation performance in 2020, which was about 111, 137 and 302 million euros, respectively, but this radical innovation performance was less than other European developed countries, and those developing countries were more concentrated in research and development.

#### Incremental Innovation performance in Eastern European countries:

Eastern European countries are developing quickly, and present-day strategies concentrate solely on R&D-based improvement, failing to deal with the primary determinants for technological formation and improvement in productivity. The more acceptable approach would be centered on production, exportation, and technological advancement. Meanwhile, an in-depth awareness of the processes of advancement in technology and incremental

innovation in Eastern European economies is required. The critical sources of innovation differ between countries depending on their degree of advancement. Eastern European economies ought to represent distinct local efficiency and technological modernizing factors. Eastern Europe's innovation operations are comparable to those in various EU countries for both intensity and frequency, but they vary in terms of particular operations. Organizations are less concentrated on R&D, whereas they concentrate on manufacturing capabilities or operations linked to leadership procedure, performance, and technical advancements (Freixanet & Rialp, 2022).

Figure 3 displays incremental innovation performance for Bulgaria, Hungary, Romania, Czechia, Poland, and Slovakia from 2012 to 2020. Czechia, Poland, and Romania consistently improved their incremental innovation performance in SMEs from 2012 to 2020, while Hungary, Bulgaria, and Slovakia (less developed economies) performed worse with incremental innovation over the same period.

In 2020, the overall performance of incremental innovation in Czechia, Poland, and Romania was significantly observed at 625, 164, and 163 million euros, respectively.



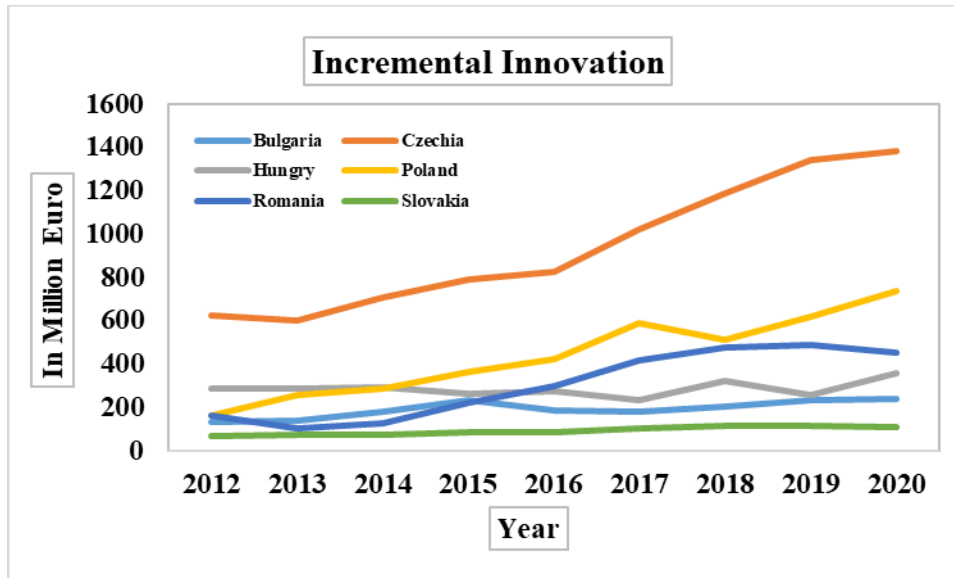


Figure 3: Incremental Innovation performance of SMEs in Eastern European countries.

These countries showed a rise in overall incremental performance in 2020. The incremental innovation performance of Hungary, Bulgaria, and Slovakia fluctuated and stayed stable and low, although it was not comparable to other advanced European countries.

**Primary Innovation performance of SMEs in eastern European countries:**

Eastern European SMEs are constantly challenged to innovate; in this regard, research and development, programming, technology, training, advertising, and leadership are all progressively essential in creating services and

products. Furthermore, worldwide business and worldwide supply chains are dominated by emerging global standards. As a result, the competitive advantage of SMEs in Eastern European economies depends on their ability to develop and their approaches to information and technological advances. In these countries, innovation is seen as the fundamental principle in tackling societal issues such as emissions, medical care, impoverishment, and unemployment. Nowadays, the significance and value of innovation have increased economic performance; however, the rate of fundamental innovation varies between established Eastern European economies (Amdaoud & Le Bas, 2021).

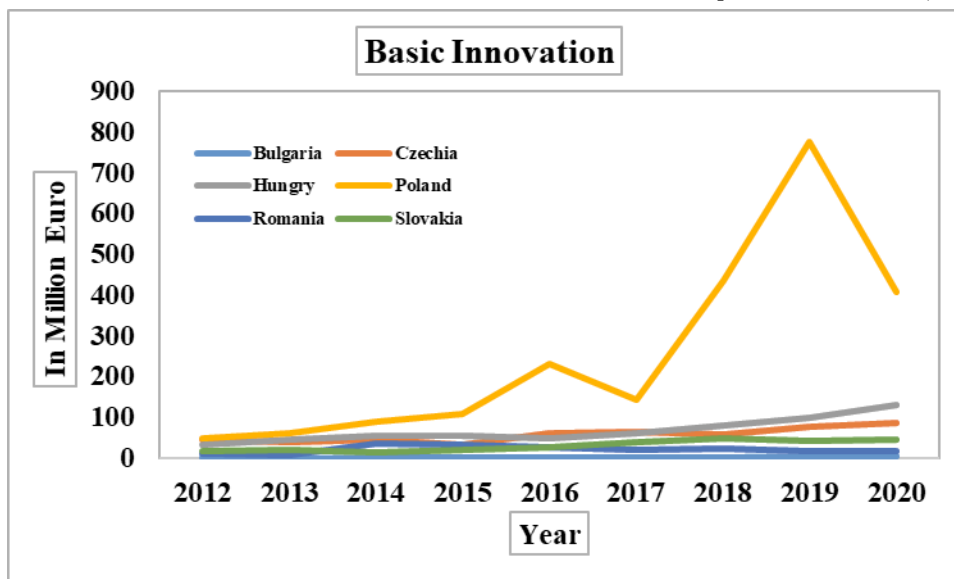


Figure 4: Basic Innovation performance of SMEs in Eastern European countries.

Primary Innovation performance in Bulgaria, Czechia, Hungary, Poland, Romania, and Slovakia is presented in Figure 4. In Poland, basic innovation was approximately 50 million euros in 2012, and it has steadily climbed to about 775 million euros in 2019 before declining to about 409 million euros in 2020. In 2012, basic innovation performance for Bulgaria, Czechia, Hungary, Romania, and Slovakia populations were 1, 47, 33, 13, and 17 million euros, respectively. Hungary, Czechia, and Slovakia experienced a slight increase in 2020, with 133, 87, and 45 million euros, respectively, indicating a more significant adoption percentage of freshly developed equipment, devices, and technology and a smaller share of research and development expenditures. However, Bulgaria and Romania's fundamental innovation performance remained unchanged until 2020.

**Total Researchers in SMEs in Eastern European countries**

SMEs represent a significant share of the European economy and business. European SMEs are essential to economic and social collaboration, development, job opportunities, creativity, and innovation. It is consequently critical to unleash their full capabilities via research and technological advancements, which

will aid in their long-term survival and prosperity. Their more vital collaboration with scientists and researchers will provide importance to the European economy, resulting in enhanced development and greater employment possibilities. Researchers in SMEs are always willing to assist SMEs in resolving shared or complementary technical difficulties, and by increasing involvement and value to SMEs, the sourcing nature of the initiatives will be improved.

The total number of full-time equivalent (FTF) researchers in SMEs in Eastern European countries is represented in Figure 5. The number of researchers in Poland, Czechia and Hungary was 5,408, 10,525 and 4,209, respectively, in 2012. This number was observed with an increase in Poland and Hungary by about 19,848 and 8,667 and a decrease in Czechia by about 10,366 in 2020. However, in Bulgaria, Slovakia, and Romania, there were 979, 1,277, and 3,460 researchers in 2012. There was no progress in research and development in Romania, which was observed with a decrease in number by 1,048 and an increase in the number of researchers in Bulgaria and Slovakia by 3,455 and 2,173 in 2020.

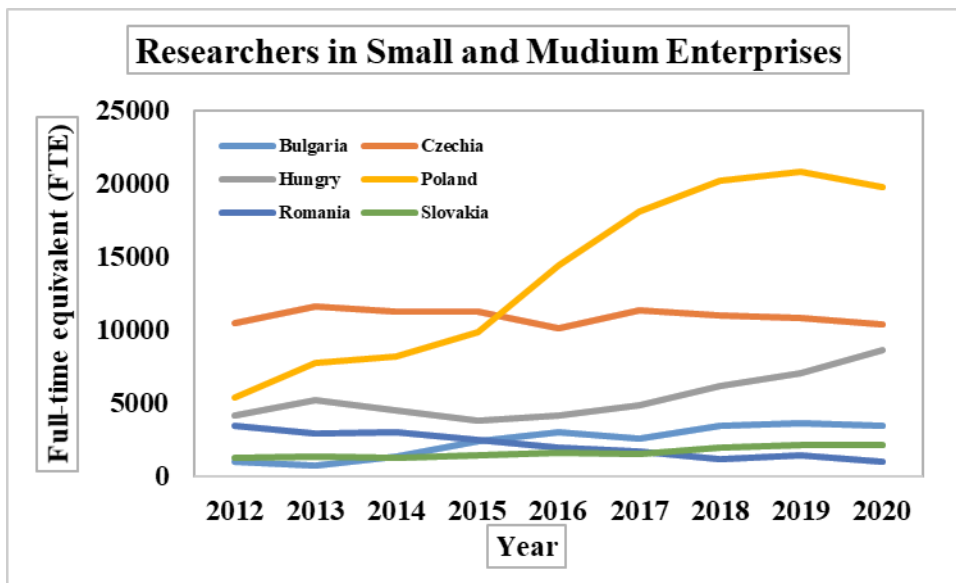


Figure 5: Total Researchers in SMEs in Eastern European countries

**Researchers (Male/Female) of SMEs in Eastern European countries**

As can be seen in Figure 6, the total number of

researchers in the six Eastern European countries being studied has risen; there were approximately 2.00 million researchers (FTE)



working in Europe in 2021, a rise from 2012. Between 2012 and 2021, the number of researchers (FTE) in Poland has almost been increased. The percentages of development in Hungary and Czechia were also rather significant. The few Eastern European countries that showed a reverse trend were Slovakia, Romania, and Bulgaria, in which the number of researchers in FTE increased only marginally

during 2012 and 2021. According to a 2021 assessment of research and development researchers by the business sector, there was also a significant proportion of researchers in the SME and higher educational sectors in Eastern European countries.

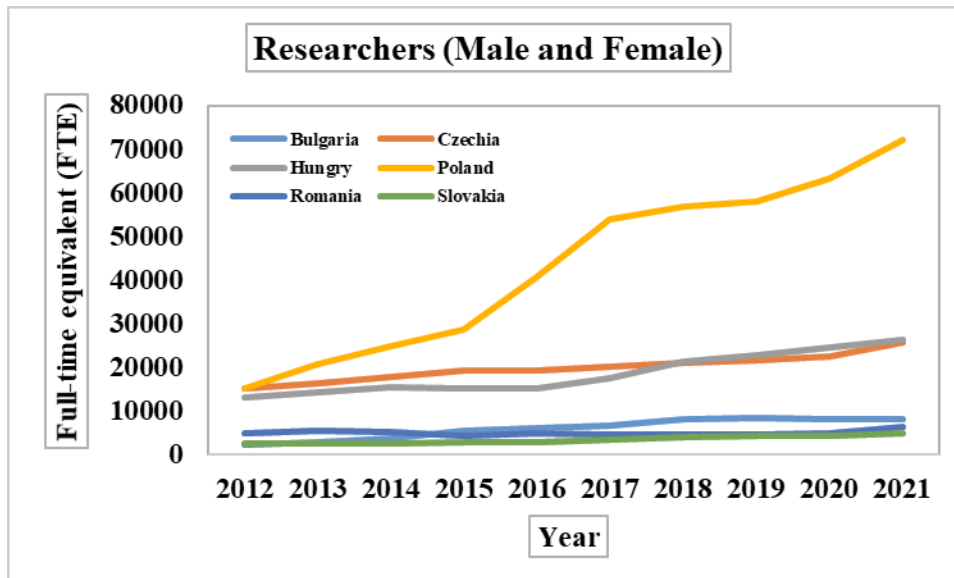


Figure 6: Researchers (Male/Female) of SMEs in Eastern European countries

In contrast, a vast majority of researchers worked in the public business. The corresponding prominence of the various industries fluctuated significantly between Eastern European countries. According to gender analysis, males made up almost two-thirds of the employees for researchers in SMEs in the six East European countries in 2019. In 2019, women made up slightly over 50% of all researchers.

### CONCLUSION

Innovations and R&D are essential in promoting sustainable production, improvement, and employment creation. Producing significant information through research is critical for producing innovative goods, services, and techniques that promote increased competitiveness, efficiency, and general economic growth in the industrial sector. In response to ongoing suggestions from consumers' need for innovative and high-quality products, SMEs have been competing with international rivals. Because of this severe

market rivalry, enterprises, particularly SMEs, continuously look for ways to continue operating and obtaining a competitive advantage over their marketplace competitors. The comprehensive research models in this study were enhanced to examine the capability of affecting SMEs' performance and radical and incremental innovation performance in Eastern European countries. The study's critical theoretical foundations were the perspective based on resources, which included radical and incremental innovations.

The study's primary goal was to evaluate how to improve SMEs' performance through radical and incremental innovations in Eastern European countries. This research has revealed that, in broad terms, these radical and incremental innovations improved the operational effectiveness of SMEs and contributed to economic growth and development. Radical and incremental innovations significantly impact SMEs' new and current product and process outcomes.

Furthermore, the study has determined that SMS expenditure in R&D is a determining component in a firm's decision between radical and incremental innovation. This study also indicates that enterprises in Eastern European countries are more likely to engage in incremental and radical innovations, which is fairly remarkable given their status as significant producers.

The subsequent goal was to look at the total number of researchers in SMEs and their impact on SMEs' performance. We found that the overall number of researchers in SMEs contributes to R&D, helps improve existing goods, and produces newly developed products that seek emerging markets and boost economic growth in Eastern European countries. The findings also have demonstrated that researcher performance in R&D significantly influences both radical and incremental innovation. Last, it was observed that overall, researchers in SMEs favorably affected Eastern European countries, meaning that these countries may be strong innovators and demonstrate higher SME performance success.

This study's findings have proven that both incremental and radical innovation has contributed significantly to the success of SMEs in Eastern European countries. As a result, we urge that SMEs invest heavily in R&D to achieve high turnover levels. SMEs may continue to invest in research and development and subsequently generate a return in profits or obtain funding from a financial institution to expand their innovation operations. This study also has demonstrated that incentive programs based on performance have had the most significant effect on innovation results. As an outcome, SMEs must guarantee that they inspire researchers to contribute to radical and incremental innovation. As a result, enterprises need to strengthen their collaboration with scientific organizations in order to stimulate economic growth in Eastern European countries.

### THEORETICAL IMPLICATIONS

This study contributes to the current research on the impacts of incremental and radical innovation on the performance of SMEs in Eastern European countries, as well as researchers' contributions to the success of SMEs. Basically, these findings are consistent with the work of earlier investigators on this topic, and it is vital to demonstrate and provide

exciting and ongoing potentially useful issues to concentrate on within the study time.

### PRACTICAL IMPLICATIONS

The study's findings have inevitable consequences for practice because present studies can give a greater understanding of essential variables in the performance of SMEs, such as incremental innovation, radical innovation, and the overall effectiveness of research in SMEs. To begin, it should be highlighted that knowing the overall number of researchers has an influence on incremental and radical innovation, and these technological advances improve the performance of SMEs in Eastern European countries more effectively. Furthermore, this study has found that annual performance for SMEs includes total researcher performance in R&D in SMEs' incremental and radical innovation abilities. Technological considerations include equipment reliability, trustworthiness, and its limit, as well as comparative advantage, structure, and current technology. Subsequently, factors such as informational severity and level of competition are considered. Eastern European countries must understand their businesses and marketplace power of position and employ organizational innovations to improve their business abilities and business proficiencies to distinguish their goods and services and compete with, or outperform, their competitors. The perspective used in this study aids organizations in understanding their company and identifying their business competencies, allowing them to improve their ability to effectively implement various types of innovation in their organizations, leading to enhanced business performance. Ultimately, the findings show that total research in SMEs and multiple forms of innovation have an excellent influence on the performance of SMEs in Eastern European countries.

### LIMITATIONS AND UPCOMING RESEARCH PROSPECTS

This research contributes significantly to studies in the innovation literature, both theoretically and practically. The study has attempted to offer special attention to SMEs' radical and incremental innovation, which has been disregarded in previous research. In reality, past studies were unable to objectively

investigate the tendency for radical and incremental innovation within SMEs in Eastern European countries. The majority of current research has been restricted to other forms of innovation, including process, technological, marketing, disruptive, open-source, closed-system innovation, and so on. Furthermore, most investigations on SMEs' innovation methods have been quantitative, with a minimal concentration on qualitative research methods.

On the other hand, the current research investigation takes a novel method of quantitative research to investigate the radical and incremental innovation landscape of SMEs in Eastern Europe. In particular, the current research sought to investigate the differentiation between small and medium enterprises, total researchers, and radical and incremental innovation performance in SMEs. This is an area where scholars have paid little attention, especially within developing nations. Consequently, this study adds to the little research in the sector by improving professionals' awareness of radical and incremental innovation approaches while also introducing legislators, administrators, and interested parties to innovative developments in the discipline for establishing policies and guidance. However, the current investigation has several constraints. The present research was regionally and statistically restricted in coverage because it only included Eastern European SMEs. This may have an impact on the generalization of outcomes. The research effort did not evaluate all elements of SMEs' innovation activities but primarily radical and incremental innovation processes. A subsequent investigation, including qualitative and quantitative studies in other European regions, could enable the results of this investigation to be validated and generalized. This research can also be reproduced in other European developing countries to enable international comparisons of SMEs' radical and incremental innovation strategies. Further studies should look at SMEs' radical and incremental innovation processes in other European domains.

### RECOMMENDATION

The study's outcomes have revealed a beneficial association between incremental and radical innovation and the success of SMEs. It advocates adopting innovation after conducting

a study to determine which innovation procedure corresponds most closely to SMEs, as not every innovation activity will provide beneficial outcomes. This study also suggests a number of initiatives that might be considered to boost innovation: having techniques in place for implementing tax reductions for promoting higher-priced innovations and involving key participants in different kinds of businesses and higher education in advancing research and development for innovation and developing strategies aimed at fostering innovation in businesses covered by this study, such as non-profit organizations, as well as additional strategies that encourage innovation, identifying and rewarding innovative SMEs that promote innovation.

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