DETERMINING THE CRITICALITY PROFILE OF MANUFACTURING SMES UNDER THE INFLUENCE OF INTERNAL AND EXTERNAL FACTORS ON PERFORMANCE

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Abstract. Recent economic instability has heightened the need for companies to be aware of the threats in their internal and external environments and the impact these have on their performance capacity. Thus, this paper aims to identify the most impactful factors on the performance of small and medium-sized enterprises engaged in manufacturing activities in Romania, by conducting empirical questionnaire-based research, resulting in a database with primary data to be processed. A 5-point Likert scale was used to determine the frequency of occurrence and intensity of impact of the selected factors, the level of criticality of these factors being calculated using the mean value method. The results highlight the prevalence of external factors among the top critical factors, those with the most significant impact on the performance being the high cost of raw materials, lack of professionals and specialists, fluctuations in market demand, fluctuations in government policies and legislative regulations. The usefulness of the results obtained lies in the fact that they create a risk or criticality profile of the analyzed production sector, which makes it possible to address its critical points with the most optimal solutions in the given context, on the part of both management and government, thus ensuring increased performance.

1. Introduction

It can be said that the global events of the last period have tested to the maximum the ability of businesses to manage and be resilient in a hostile external environment, full of challenges and social and governmental pressures. In this context, the activity of many small businesses or of those that were not very well founded in terms of development objectives and strategies or market presence, as well as those that did not perform well enough in terms of various key economic and financial indicators, was highly affected (Engidaw, 2022), there being many other specific aspects that impacted their capacity to survive this period, as shown by the results of Erdiaw-Kwasie et al. (2023) research. Thus, most of the businesses that have been affected fall into the categories of micro-enterprises or small and medium-sized enterprises (SMEs), which are much more vulnerable to the fluctuations and risks of the economic envi-

ronment than large enterprises or corporations, due to the limited availability of resources and financial capacity for investment and development (Du et al., 2023). We believe that in the above context, among the most affected SMEs are those in manufacturing, given the significant challenges generated by the disruption and reorganization of global supply chains, limited organizational resources that have led them to rely only on available stocks (Bettiol et al., 2023), and geopolitical instability caused by the invasion of Ukraine that has led to massive fluctuations and increases in the cost of production (Andersen, 2022).

SMEs have always played an important role in the economic and social life of countries, representing an engine of economic development through their dynamism, flexibility, and innovation, as they represent the majority of companies that make up a country's economy (Ciubotariu, 2013). Therefore, in order to better observe the impact of the COVID-19 pandemic on the manufacturing sector in Europe and in particular, on SMEs in this activity, we can analyze the results of the study carried out by the European Economic and Social Committee, which highlights the challenges and the trajectory of European SMEs in six sectors of activity. According to this report, 2.1 million companies before the pandemic, of which approx. 59% were SMEs, represented the European manufacturing sector. In 11 out of 12 analyzed countries, decreases in the number of SMEs in the manufacturing sector in the period 2019–2020 were identified, among the most significant decreases being those identified in Croatia (–7.41%) and Romania (–5.9%) (Camonita et al., 2022), with the same downward trend being reported for the employment rate in the sampled companies. Therefore, in such a context, all business functions must operate at an optimal level, so that the development of strategies and the implementation of the decision-making process are well-founded, ensuring continuity, competitiveness, and business performance.

Given the importance of business resilience in an adverse economic context, we consider the present research to be relevant, as it aims to identify the extent to which the performance of the production activity and thus the financial sustainability of SMEs has been influenced by the manifestation of various specific internal and external factors in the context of the recent economic, social, health and political turmoil. In this regard, the following research objectives were established: O_1 – identification of internal and external impact factors on the performance of a company, according to the literature; O_2 – analysis of the frequency of occurrence and intensity of the impact of selected factors on the performance of production activity. The importance and relevance of the research are given by the fact that through it it is possible to identify the factors with significant impact on the performance of SMEs with production activity, thus highlighting the weaknesses at the industry level and allowing to address them to improve and make them more efficient by formulating development strategies and allocating appropriate investments.

In addition to the introductory part, the present research consists of a section devoted to the literature review which highlights the theoretical background of the present research, followed by a presentation of the research methodology that was used to obtain the results, which are presented in a subsequent section along with the discussions details, the last sections being represented by the conclusions and bibliographical references.

2. Literature review

There are many theories in the literature that focus on developing perspectives on how to approach issues related to the organization of a company's activities, the functioning of strategic management – including the use of available resources to generate performance,

stakeholders' relationships and many other aspects of optimal business management. The resource-based perspective – proposed by Jay Barney in 1991 – can be considered as the most appropriate in the context of our research, as it emphasizes the importance of identifying the source of value creation that ensures the company's competitiveness, by conducting both an internal and external analysis in order to create an overall company profile of its strengths, weaknesses, opportunities and threats (Barney, 1991). This theory focuses on the critical role of strategic implementation of the company's vision and objectives through managerial decision making in determining performance and generating competitive advantages (Utami & Alomanos, 2023), embodied in an optimal use and combination of internal and external resources and capabilities by effectively managing rapid changes in the organization's environments (Çera et al., 2019; Porter, 1989). It can be appreciated that achieving organizational gains as a result of the implementation of established objectives generates a gradual change in the company that strengthens and consolidates its development direction and strategies (North, 1990). Therefore, what managers have to do in the context of the resource-based theory is to "understand the functionality of the resources that are under their control and also to comprehend the capacity for usage their resources permit" (Lockett et al., 2009), in order to have a clear and real perspective on the performance capacity of the company.

These considerations of the resource-based view of firm drive us to the particularities of the stakeholders' theory, which focuses on the "imperative of value-creation of organizations as central aspect to stakeholder interests" (McGahan, 2021), Ozdemir et al. (2023) highlighting the importance of considering these interests in the organizational planning by stating that a driven communication with stakeholders by certain motives and interests could create value and innovation in different contexts, considering an efficient management of available resources and capabilities. Many of the answers to questions raised by stakeholders' theory on issues such as resource development, performance, organizational formation, value creation and others are found in the implementation of resource-based theory (McGahan, 2021), fact that demonstrates a strong complementarity of the two theories whose particularities are deeply analyzed by Barney (2018) in his paper.

Therefore, it can be appreciated that the best results of a company are obtained by ensuring an efficient management of resources and capabilities with a focus on stakeholders' interests that pursue nothing else than the creation of value and performance in company's activities. Harrington James states that the "measurement is the first step that leads to control and ultimately to improvement: if you can't measure something, you can't understand it; if you can't understand it, you can't control it; if you can't control it, you can't improve it" (Kaydos, 1998). Therefore, the measurement of the progress and performance generated by the value creation and innovation is an absolute necessity for a good understanding and control of the business, as this process is the foundation of business development and innovation. As Dmitrijeva et al. (2020) stated in their paper, this development and transformation of a manufacturing business depends both on "the manufacturer's ability to leverage its capabilities and resources (internal context) and also on the ability to navigate its market and industry setting (external context)", highlighting the role of resource-based view in the administration of a business. In the same vein, Melega et al. (2022) point out that the performance of a company is nothing more than an optimal level of effectiveness and efficiency on the part of management in managing its resources to achieve the objectives set at minimum cost and without wasting resources, which is reflected in the revenues and expenses recorded that are "strictly linked to the process of evaluating the company's performance" (Mates et al., 2008). Therefore, as essential as measuring performance is knowing and linking the factors that

influence it – as this allows effective management of transformation efforts – and the nature and intensity of the impact of these contextual factors (Leonidou et al., 2017; Hallgren & Olhager, 2009), as this allows efforts to be focused on those issues that need to be addressed immediately and concretely for improvement, the importance of this matter being highlighted by Petrescu et al. (2023) in their paper.

Therefore, the Table A1 presented in the Appendix provides a scientific basis for the internal and external factors selected for analysis in the context of the present research, allowing us to create a global performance profile of the sampled companies in terms of the use and management of their internal and external resources and capabilities in relation to stakeholders' interests, an analysis that also implies the assessment of human factor (management) entrepreneurial skills that can have a constructive or destructive impact on performance, as suggested by Douhan and Henrekson (2010) in their paper. The selection of these factors was based on the authors' observation of the economic reality and its current challenges, as well as suggestions from managers of companies operating in the sector under analysis. According to the analysis, a preponderance of the resource-based view of the firm could be observed in the analyzed papers. Among the most significant works highlighted in the analysis, we can mention that of Yuan et al. (2021) who identified 41 risks specific to manufacturing activity, which he substantiated through interviews with different categories of stakeholders. In the top 10 most significant risks, he identified a lack of management and technology practices and experience, incomplete technical systems, incompetence of materials and equipment, high overall cost, and low quality of materials. The results obtained by Ismael and Shealy (2018) in their research position the lack of contractor and designer experience related to sustainable construction as the risk element with the greatest possible negative impact on business, in addition to high initial material costs and lack of public awareness that is most likely to manifest in the economy under analysis.

The work of Okoye et al. (2022) is also notable for the research methodology used and the results obtained which assign a high criticality level to 23 of the 42 risk factors analyzed, with the factors with the highest likelihood of occurrence being identified as unavailability of sustainable materials and equipment and high upfront costs, and those with the most significant impact being high upfront costs, poor and ineffective communication between participants and high cost of sustainable materials and equipment. Also, Butdee and Phuangsalee (2019) analyzed the specific risks of a manufacturing company in Thailand that are managed according to a supply chain concept and identified that the highest risk is presented by the production planning phase followed by the actual production phase, with the lowest values attributed to the risk of product returns. Regarding the impact of market competition on the performance of manufacturing SMEs, Rudiawarni et al. (2022) identified that, in general, the level of competition in the industry does not play a very important role in determining the performance level of companies (except for ROA), as it is not able to moderate the relationship between business strategy and performance.

Analyzing the drivers of the negative impact of the selected internal factors, it can be estimated that one of the general solutions to minimize or eliminate it, would be the implementation of software to effectively support activities such as production planning, internal communication, cost estimates, ensuring minimum stocks to cover shortages in critical situations, supply and purchase management, and others. Strategies in this regard have also been proposed in the literature, such as those offered by Yuan et al. (2021) which refer to selecting an appropriate rate of prefabrication, stimulating market demand, enhancing advertising and education, encouraging technological innovation, and executing a strict quality

control system or those offered by Ismael and Shealy (2018) which emphasize the need for educational interventions, optimizing risk allocation, and behavioral science to turn upfront costs into long-term savings. In this sense, significant investments are needed in digitization and automation of activities, resources that companies can obtain by submitting projects to attract government or European funds, by obtaining external repayable financing, or by sharing their profits for investment.

3. Research methodology

In order to carry out the empirical research, the target group of micro, small, and medium-sized enterprises with production activity in Romania was chosen, which are active in the field covered by class 16 of the CANE (Classification of Activities in the National Economy) code "Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials". According to the classification at the time of data collection, the number of companies classified according to these criteria is over 6000, which underlines the representativeness of this sector in the national economy. To be able to disseminate the questionnaire to the companies forming the selected sample, their email addresses were collected from the *List of Companies* platform (https://www.listafirme.ro/) which allows the application of filters related to the size of the companies and the field of activity according to the CANE code and their prioritization according to the descending order of turnover. Therefore, the questionnaire was sent to all the companies that had an email address available on this platform, i.e. 2137 companies, of which approximately 96 could not be sent due to invalid addresses, and 246 of the respondents answered the request to complete the questionnaire, which means a response rate of 12.05%. Responses were collected in two stages: in the first stage a set of 83 responses were collected (September and October 2023), and because they did not represent a statistically significant percentage of the population for the validation of the results, a second stage (January 2024) was organized, at the end of which a total of 246 responses were collected. Out of these answers, seven of them were eliminated due to the respondents' position within the company that was not providing them with the necessary knowledge to provide an unbiased perspective in completing the questionnaire.

As mentioned in the previous section, the impact factors were selected based on the authors' direct observation of the economic reality and its current challenges, as well as suggestions from managers of companies operating in the sector under analysis. We consider this approach to be appropriate in the current context, as the present research aims to be as concrete as possible to the challenges and needs of the business environment. As for measuring the frequency of occurrence and intensity of the impact of selected internal and external factors on the performance of the production activity, the 5-point Likert scale was used – following the model used by Okoye et al. (2022) in their paper – whose units of measurement are presented in Table 1.

As for the methodology of prioritization of the identified factors, it is also inspired by the method presented by Okoye et al. (2022) in their paper, where they prioritize the risks taken in the analysis by applying the mean value method and calculating the Risk Criticality Index, in our case for the selected impact factors. Thus, the average value of the frequency of occurrence and intensity of impact of the selected factors is determined according to the following calculation formula:

$$M_{f^y} = \frac{1}{n}\sum FR^y \times INT^y ; \tag{1}$$

$$M_{iy} = \frac{1}{n} \sum FR^{y} \times INT^{y}, \tag{2}$$

where: M_{fy} – mean frequency for factor y; FR^{y} – frequency of occurrence of each response; INT^{y} – the intensity attributed to each response (Likert scale from 1 to 5); M_{iy} – mean intensity for factor y.

Table 1. Presentation of Likert scale levels (source: adapted from Okoye et al., 2022)

Frequency of occurrence			Impact intensity		
Level	Description	Interpretation	Level	Description	Interpretation
1	not once	never once manifested itself	1	not at all	had no impact
2	very rare	has occurred very rare	2	to a small extent	minimal impact
3	rare	has rarely manifested itself	3	to some extent	medium impact
4	often	has often manifested itself	4	to a large extent	major impact
5	very often	has manifested itself very often	5	to a very large extent	a critical impact

Note: this table presents the interpretation of the Likert scale levels used in the study to measure the respondents' perceptions of the frequency and impact of selected internal and external factors.

As for the Criticality Index of the impact factors, it is determined according to the following calculation formula:

$$CIF^{y} = M_{fy} \times M_{iy}, \tag{3}$$

where: CIF^{y} – criticality index of factor y.

The establishment of the ranges for classifying the impact factors into *low, medium,* and *high* categories is based on the fact that both the frequency and the intensity of the impact factors have been assessed on a 5-level Likert scale (5×5), so the assessment of the criticality index is done on a 25-point scale, the ranges being shown in Table 2 below.

Table 2. Factor ranking ranges based on the criticality index (source: adapted from Okoye et al., 2022)

Criticality intervals	Level of criticality
y ≤ 5	low
5 > **y** ≤ 8.5	medium
8.5 > **y** ≤ 12	medium
12 > **y** ≤ 25	high

Note: this table shows the ranges and criticality levels into which the impact factors will be placed based on the value of the criticality index; y – the criticality value obtained for each risk.

Therefore, impact factors that score less than or equal to 5 will be classified as low criticality, those that score more than 5 and less than or equal to 12 will be classified as medium criticality, and those that score more than 12 and less than or equal to 25 will be classified as high criticality.

4. Results and discussions

This section of the paper presents the results of the empirical research based on a question-naire carried out on Romanian SMEs operating in the field of class 16 of the CANE code. Thus, the first questions of the questionnaire aim at identifying the respondents and grouping the surveyed companies according to certain characteristics related to size, duration of opera-tion, and size of assets at the date of the last balance sheet, the results being highlighted in Table 3 below.

Table 3. General and company identification information (source: processed by the authors)

No.	Question	Answer	Frequency	Percent
1.	What is your position in the company?	administrator	76	31.8%
		production manager	24	10.04%
		head of section/director	13	5.44%
		financial director/accountant	126	52.72%
2.	What is the period of operation of the company?	between 0–10 years	105	43.93%
		between 11–21 years old	80	33.47%
		>21 years	54	22.6%
3.	What is the size of the company?	max. 9 employees	103	43.1%
		between 10 and 49 employees	92	38.49%
		between 50 and 249 employees	44	18.41%
4.	What is the total value of assets according to the last balance sheet?	max. 2 mil. euro	147	61.5%
		>2 mil. euro – ≤10 mil. euro	64	26.78%
		>10 mil. euro – ≤50 mil. euro	17	7.11%
		>50 mil. euro	11	4.61%

Note: this table shows the structure of the sample surveyed based on the characteristics of seniority and size, as well as the position held by the respondents in the companies.

It can be seen that 47.28% of the respondents hold management positions, which gives them a direct link with the production process within the company and the rest of 52.72% hold positions in the financial and cost department where information regarding manage-ment control, key performance indicators (KPIs) of production, and cost and efficiency reports are managed, giving them access to the knowledge needed to give unbiased answers in the questionnaire, the quality and the truthfulness of the answers being therefore assured. Con-cerning the length of operation of the analyzed companies, it can be seen that for 56.07% of them, the duration exceeds 11 years, which underlines the experience and knowledge acquired by them over the years of activity, which is relevant especially in the context of their resilience and ability to survive the challenges generated by the crises of recent years. Also, the considerable percentage of 43.93% of companies with less than 11 years of activ-ity suggests a significant level of entrepreneurial action in the analyzed sector for the last 10 years. The predominance of 61.5% of companies at a level of up to €2 million in balance sheet assets may suggest a lower level of technological sophistication in terms of holding fixed assets – given the smaller size of SMEs, which does not imply a very high volume of activity – or the implementation of supply policies oriented more towards meeting the current needs rather than potential future needs.

The next question aims to identify the prevalence of the use of different control tools in managing the challenges and activities involved in the production activity, the results of which are shown in Table 4 below.

Table 4. Prevalence of use of control instruments (source: processed by the authors)

No.	Question	Answer	Frequency	Percent
1.	What production control tools do you use in your company?	strategic business planning and organization (balanced scorecard);	64	26.78%
		activity budgeting (budgeting);	26	10.88%
		software programs for real-time observation of the production process;	36	15.06%
		software programs for real-time stock-keeping;	102	42.68%
		risk dashboard analysis;	9	3.76%
		other	2	0.84%

Note: This table shows the prevalence of the use of different production control tools in the analyzed companies.

It can be seen that the preponderant used instrument in production control is the software for real-time stock-keeping, followed by the use of balanced scorecard for business planning, only 9 of the companies using risk analyses for the management of production activity, which is an alarmingly low level for an important tool in identifying the position of companies concerning the internal and external threats they face. This result identifies a niche of interest for our research, as it highlights a deficient area of the analyzed sector, thus requiring an in-depth approach resulting in providing options for the business environment in optimally managing this deficiency. The *other* category includes market studies and paper records of different processes, which are not very representative among the tools used.

The next section of questions focuses on identifying the frequency of occurrence and intensity of the impact of selected internal and external factors on the performance of the production activity, the results of which are presented in Table 5 below.

Table 5. Frequency and intensity of occurrence of impact factors (source: processed by the authors)

No.	Question	Intensity response (i)	F	P %	Frequency response (f)	F	P, %
G_1	*To what extent* has ***poor internal communication*** affected your production performance? / *How often* have you experienced problems with your production activity as a result of ***poor internal communication***?	1 – not at all;	13	5.44	1 – not once;	13	5.44
		2 – to a small extent;	50	20.92	2 – very rare;	56	23.43
		3 – to some extent;	96	40.17	3 – rare;	112	46.86
		4 – to a large extent;	68	28.45	4 – often;	51	21.34
		5 – to a very large extent;	12	5.02	5 – very often;	7	2.93
G_2	*To what extent* has ***unrealistic*** production ***planning*** affected production performance? / *How often* have you identified ***unrealistic production planning***?	1 – not at all;	16	6.69	1 – not once;	16	6.69
		2 – to a small extent;	58	24.27	2 – very rare;	84	35.15
		3 – to some extent;	100	41.84	3 – rare;	96	40.17
		4 – to a large extent;	50	20.92	4 – often;	35	14.64
		5 – to a very large extent;	15	6.28	5 – very often;	8	3.35

No.	Question	Intensity response (i)	F	P %	Frequency response (f)	F	P, %
G_3	*To what extent* have **erroneous cost estimates** affected your production performance? / *How often* have you encountered **erroneous production cost estimates**?	1 – not at all;	11	4,6	1 – not once;	8	3.35
		2 – to a small extent;	61	25.52	2 – very rare;	76	31.8
		3 – to some extent;	102	42.68	3 – rare;	113	47.28
		4 – to a large extent;	55	23.01	4 – often;	37	15.48
		5 – to a very large extent;	10	4.19	5 – very often;	5	2.09
G_4	*To what extent* have **machine failures** affected your production performance? / *How often* have you encountered a situation where you have experienced **machine failures**?	1 – not at all;	17	7.11	1 – not once;	13	5.44
		2 – to a small extent;	43	17.99	2 – very rare;	63	26.36
		3 – to some extent;	76	31.8	3 – rare;	116	48.53
		4 – to a large extent;	71	29.71	4 – often;	38	15.9
		5 – to a very large extent;	32	13.39	5 – very often;	9	3.77
G_5	*To what extent* has **the lack of qualified staff** affected your production performance? / *How often* have you encountered situations where you have been **short of qualified staff** for certain activities?	1 – not at all;	12	5,02	1 – not once;	10	4.18
		2 – to a small extent;	33	13.81	2 – very rare;	33	13.81
		3 – to some extent;	74	30.96	3 – rare;	94	39.33
		4 – to a large extent;	83	34.73	4 – often;	73	30.54
		5 – to a very large extent;	37	15.48	5 – very often;	29	12.14
G_6	*To what extent* have **product returns with manufacturing faults** affected your production performance? / *How often* have you encountered situations where **products have been returned due to manufacturing errors**?	1 – not at all;	46	19.25	1 – not once;	44	18.41
		2 – to a small extent;	65	27.2	2 – very rare;	87	36.4
		3 – to some extent;	88	36.82	3 – rare;	80	33.47
		4 – to a large extent;	32	13.39	4 – often;	21	8.79
		5 – to a very large extent;	8	3.34	5 – very often;	7	2.93
G_7	*To what extent* has **the lack of materials or late delivery of materials** affected your production performance? / *How often* have you encountered situations where you have been **short of materials** or had them **delivered late**?	1 – not at all;	19	7.95	1 – not once;	14	5.86
		2 – to a small extent;	48	20.08	2 – very rare;	67	28.03
		3 – to some extent;	92	38.5	3 – rare;	116	48.54
		4 – to a large extent;	54	22.59	4 – often;	32	13.39
		5 – to a very large extent;	26	10.88	5 – very often;	10	4.18
G_8	*To what extent* have **price increases** affected your production performance? / *How often* have you encountered situations where you have faced **significant price increases**?	1 – not at all;	5	2.09	1 – not once;	0	0
		2 – to a small extent;	13	5.44	2 – very rare;	18	7.53
		3 – to some extent;	72	30.13	3 – rare;	67	28.03
		4 – to a large extent;	92	38.49	4 – often;	99	41.42
		5 – to a very large extent;	57	23.85	5 – very often;	55	23.02

End of Table 5

No.	Question	Intensity response (i)	F	P %	Frequency response (f)	F	P, %
G_9	To what extent have **fluctuations in demand** for the products you offer to the market affected your production performance? / *How often* have you encountered situations where you have experienced **significant fluctuations in the demand** for the products you supply to the market?	1 – not at all;	14	5.86	1 – not once;	8	3.35
		2 – to a small extent;	37	15.48	2 – very rare;	37	15.48
		3 – to some extent;	96	40.17	3 – rare;	103	43.1
		4 – to a large extent;	73	30.54	4 – often;	69	28.87
		5 – to a very large extent;	19	7.95	5 – very often;	22	9.2
G_{10}	To what extent have **the actions of your competitors** affected your production performance? / *How often* your market position has been **threatened by your competitors**?	1 – not at all;	19	7.95	1 – not once;	14	5.86
		2 – to a small extent;	50	20.92	2 – very rare;	53	22.18
		3 – to some extent;	108	45.19	3 – rare;	113	47.28
		4 – to a large extent;	49	20.5	4 – often;	48	20.08
		5 – to a very large extent;	13	5.44	5 – very often;	11	4.6
G_{11}	To what extent has **the instability of legal provisions** affected your production performance? / *How often* have you encountered situations where **fluctuations in legal regulations** have affected your business performance?	1 – not at all;	17	7.11	1 – not once;	11	4.6
		2 – to a small extent;	34	14.22	2 – very rare;	50	20.92
		3 – to some extent;	101	42.26	3 – rare;	99	41.42
		4 – to a large extent;	67	28.03	4 – often;	63	26.37
		5 – to a very large extent;	20	8.38	5 – very often;	16	6.69

Note: this table shows the frequency of subjects' responses on each of the Likert scale levels for each of the questions aimed at identifying the criticality of the analyzed impact factors.

The table above shows the frequency (FR) of responses and their related intensity (INT) (Likert scale from 1 to 5) for the intensity (i) of impact and frequency (f) of occurrence of the internal and external factors selected for analysis, the questions being grouped in pairs (G_1, G_2, G_3, ...G_{11}) for each of the factors. For the first two mentioned factors, it can be observed a medium level of frequency and intensity of the impact on production performance, which does not necessarily mean that their management does not require a sustained effort, considering that a single occurrence can generate significant negative consequences through loss of contracts, missed delivery deadlines, failure to meet performance targets, damage to image in relation to stakeholders and others. The obtained frequency of occurrence of erroneous cost estimates can be caused by uncertainties and fluctuations in the market, instability in the social and political environment or other external factors, and not only by internal problems such as calculation errors, lack of experience of the staff in charge or lack of efficient software to ensure the accuracy of estimates. The intensity of its impact could have determined imbalances in production budget planning and below-cost or low-profit sales, which implies a decrease in recorded financial performance.

The responses regarding the machine breakdowns suggest that a considerable part of the surveyed companies felt a significant impact from their occurrence, which can be reflected in interruptions in production, missed deadlines, delivery times, material losses and others, all of which are ultimately reflected in different business performance parameters. It can be observed that the lack of qualified personnel has a high frequency of occurrence, which underlines the acute lack of professionals and specialists in the technological fields in Romania, a problem that is increasing from year to year and which hampers the economic activities mainly of companies operating in the technical and production fields. Also, the intensity of the impact of this factor is assessed at a high and very high level, which means that the lack of qualified staff is significantly reflected in the ability of companies to perform, as employees are among the main generators of added value and bearers of know-how of a business.

Product returns due to manufacturing errors recorded the lowest frequencies of occurrence and intensity of impact, suggesting satisfactory performance related to the quality of products supplied to the market, and that they do not frequently burden their production with repair operations and adjustments that would generate deviations from the initial plans. The results related to material shortages or late delivery suggest that more than 60% of the surveyed companies have experienced frequent material supply problems, and over 30% of them have been significantly impacted by the occurrence of this phenomenon, which can result in loss of contracts, delays in execution and delivery times, production suspensions and others, all of which in turn lead to imbalances that prevent performance.

It can be seen that material price increases are a significant impact factor both in terms of the frequency of its occurrence and the intensity of the impact generated by its occurrence. This frequency distribution underlines the instability of the market in which these companies operate and the difficulty of carrying out budget planning that takes into account all the risk factors linked to market fluctuations, and considerable efforts are needed to manage the effects of this phenomenon to ensure the continuity and profitability of the activity. The results of the research related to fluctuations in market demand suggest instability in the behavior of buyers, which may have occurred for various reasons such as reduced consumption and investment and a shift towards saving and identification of more affordable products, which happened in the context of the war in Ukraine that generated a massive untaxed export of goods specific to the analyzed industry. This could have determined decreases in sales volume, increase in storage and stock handling costs, reorganization of the activity and others for the national companies.

The frequency distribution of the recorded responses related to competitors' actions does not show a very high risk for the analyzed companies, suggesting normal competitive conditions and a certain stability in the sampled companies' customer portfolio. The results related to the provisions of the legislative system highlight a certain instability of these provisions for the Romanian productive sector, over 30% of respondents appreciating a high and very high frequency and impact of these fluctuations. These considerations come against the backdrop of significant tax changes in recent months that place a considerable tax burden on the shoulders of SMEs, as well as additional administrative and reporting burdens considering the implementation of e-invoice and e-transport systems, for non-compliance considerable penalties being applied. Therefore, additional costs have been added on aspects like the use of specialists, the time required for compliance or the payment of various penalties, the intensity of the impact of this factor remaining preponderantly at a medium level.

Table 6 below shows the average values for the intensity and frequency of the analyzed impact factors, as well as the values of the criticality index of the factors according to which

they are carried out and their ranking, determined according to the formulas presented in the methodology section of the research.

Table 6. Criticality matrix of internal and external factors

Impact factor category	Mean i	Rank i	Mean f	Rank f	CIF	General rank	Level of criticality
G_1. Inefficient and poor internal communication	3.07	7	2.93	6	8.98	6	medium
G_2. Inefficient and unrealistic production planning	2.96	9	2.73	10	8.07	10	medium
G_3. Erroneous estimation of production costs	2.97	8	2.81	9	8.34	9	medium
G_4. Incompetence of materials and equipment	3.24	3	2.86	7	9.28	5	medium
G_5. Lack of professionals and specialists	3.42	2	3.33	2	11.37	2	medium
G_6. Return of products for manufacturing faults	2.54	11	2.41	11	6.14	11	medium
G_7. Inefficient logistics and delayed supply	3.08	6	2.82	8	8.69	8	medium
G_8. High cost of raw materials	3.77	1	3.80	1	14.31	1	high
G_9. Fluctuations in market demand	3.19	4	3.25	3	10.38	3	medium
G_{10}. Market competition	2.95	10	2.95	5	8.70	7	medium
G_{11}. Fluctuations in govern-ment policies and regulations	3.16	5	3.10	4	9.79	4	medium

Note: This table presents the ranking of internal and external impact factors based on the average value of the frequency of occurrence and intensity of impact, and the value of the criticality index based on which the criticality level of each factor was determined.

According to the above table, none of the selected factors is included in the low category of criticality level, all of them obtaining values over 5 points for the criticality index. However, the lowest value of 6.14 points is attributed to the factor related to product returns for manufacturing errors, this one obtaining the lowest values for both frequency of occurrence and intensity of impact, which is also in line with the results obtained by Butdee and Phuangsalee (2019) who rank the risk of product returns last. This positioning of the factor related to product returns for manufacturing errors suggests that the analyzed group managed to meet the majority of the characteristics and quality conditions required by the market during the period of analysis, and in the case of failure to meet these requirements, the impact of these incidents was not very significant and was managed with efficiency, even though there is still place for improvement. Also, only one factor scored more than 12 points on the criticality index, namely the high costs allocated to raw materials purchases, whose fluctuations in recent years have been strongly felt by both individuals and companies. Thus, the high frequency of price increases in recent years is also highlighted by an average frequency value of 3.8, the highest score obtained by any of the analyzed impact factors, the intensity of the impact of these price fluctuations was rated by respondents as very significant, with a score of 3.77. Although the results obtained by Yuan et al. (2021) and Okoye et al. (2022) do not

rank high commodity costs at the top of the frequency or impact of its manifestation, this phenomenon still ranks among the top in the hierarchy of risks considered by them, which reinforces the priority position in the need to address this impact factor.

It can be seen that the lack of professionals and specialists, as well as fluctuations in market demand are factors that are close to exceed the 12-point threshold to be considered highly critical, with the former scoring 11.37 and the latter 10.38. This positioning of the factor related to fluctuations in market demand is similar to that obtained in the analysis carried out by Ismael and Shealy (2018) in which it is given the fourth position in the hierarchy of risks according to the probability of manifestation, the probable cause of manifestation in our context being the nature of goods, as the object of activity of the analyzed companies is not the production of essential living products, and their purchase can be classified rather in the investment category, the behavior in recent years of the market showing a trend towards saving, which justifies to some extent the assessments made by the respondents.

The factor related to the lack of professionals and specialists can be easily associated with the lack of experience of managers and employees that also Ismael and Shealy (2018) consider as the main carrier of negative impact in the analyzed companies. These results underline the challenges of the business environment related to the lack of qualified personnel that can significantly affect the ability of companies to develop and achieve performance, considerations that drive us to the research of Guan and Frenkel (2018) who highlight the need for managers to take responsibility for employee training in the areas they need, as a possible solution to skills shortage they face, as this has the potential to generate performance and create value for the company.

Another factor that scored a high level for the criticality index of 8.7 points refers to the fluctuations in government policies and regulations in recent years that generate a lack of high predictability for the business environment, as the legislative instability in our country is already known and can also have a significant negative impact on the flow of foreign investment, thus decreasing business financing options. The results obtained by Okoye et al. (2022) rank instability of government policies as the 6th risk out of 42 – assigning a high level of criticality – and our results assign this impact factor the 4th position among the analyzed factors, attributing a medium-high level of criticality, which does not diminish the importance of acting towards the adoption of long-term government strategies that would ensure a predictable and secure investment and administrative environment for businesses.

Similar to Yuan et al. (2021), another factor that obtained a high criticality index score of 9.28 points is the incompetence of materials and equipment which refers to the low quality of materials and machinery failures, it has an average value of frequency of manifestation of 2.86 and intensity of impact of 3.24 points, which highlights that the intensity of impact of these phenomena tends to be higher than the frequency of their manifestation. As for the other five impact factors, they scored between 8.07 and 8.98 points in the following order: Inefficient and poor internal communication, Unfair market competition, Inefficient logistics and delayed supply (the second most common problem in the sample analyzed by Chan et al. (2017)), Erroneous estimation of production costs, and Inefficient and unrealistic planning of production activity. This average level of criticality does not negate the need for interventions and measures to optimize processes, techniques, and strategies for organizing and planning production activity, given that most of these are concerned with the internal management of the business.

5. Conclusions

It can be seen that the major problems of the manufacturing sector under analysis are mainly represented by external factors such as price increases, fluctuations in market demand, lack of qualified personnel, and fluctuations in legislative systems and government regulations, which need to be addressed most urgently to ensure a conducive framework for business development. The moderation of these factors, however, does not fall within the capacity and influence of the business environment, but rather within the responsibility and under the scope of the interventionist policies of the state to regulate and stabilize the market on issues that tend extremity, considering that companies can have an insignificant impact on them through their policies and strategies, because they focus more on identifying tools and techniques to manage the effects of the factors mentioned above. As for the other impact factors, most of them relate to the internal management of the business, which means that they are subject to the policies and strategies of the companies' management and can be optimized internally without any external intervention, excluding, of course, the situation of attracting external funds or investments to support any development and optimization strategies or techniques. Leaving aside the influence of external factors, specific to the market in which companies operate, the results obtained highlight that the performance of companies is rather influenced by the level of asset endowment, economic, financial and managerial resources that are closely related to the size of the company, especially in the global context of intensive digitalization trends and the implementation of Industry 4.0.

It was also identified that the analyzed companies do not give importance to risk prevention strategies, with very few of them using risk identification techniques and methods on a routine basis, nor showing interest in implementing them in the future. This underlines the need to raise businesses' awareness of the importance and usefulness of prevention policies, in this sense, various simplified methods and techniques can be made available to promote and support them with the help of digital technology.

The practical implications of the research having thus been highlighted, we cannot neglect the theoretical contribution that this paper makes to the literature, reinforcing already existing results that point to external factors as having the greatest impact on performance in the context of the COVID-19 crisis, highlighting the role of decisions, policies and strategies implemented by governments to manage these moments of crisis. The scientific contribution of this work is given also by the mix between resource-based theory and stakeholders' theory which is concretized in the significant role that collaboration with stakeholders and the orientation of the use of resources to meet their interests has in ensuring an efficient use of internal resources and in achieving the capabilities and potential of the company, manifested through the generation of performance. In this regard, the analyzed companies should ensure transparent collaboration with stakeholders and may consider increasing and diversifying investments by attracting external investors whose input of resources will create value and competitive advantages that would consolidate their position in the market.

It is in the interest of every company to ensure performance in any economic context, which is why monitoring and evaluating the external and internal context of its activities is essential and is the precursor to increasing the performance and quality of products and services offered. Efforts and actions in this direction are therefore the basis for knowing one's own business and provide a degree of certainty and predictability to the activity carried out, which can be considered a performance driver. However, predicted events do not always manifest themselves in the same form or context, as many unforeseen situations and risks

may arise that were not considered in the initial planning and organization of the business, where the performance and resilience of the organization are truly tested.

Author contributions

VG conceived the study, designed the research methodology, and gave a constructive feedback in every step of the research process. CP and MSC were responsible with data collection, processing, analysis and interpretation. All the authors contributed to the writing of the manuscript.

Disclosure statement

None of the authors has any conflicts of interest to disclose.

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APPENDIX

Table A1. Internal and external impact factors (source: processed by the authors)

N	Study	Theories research is based on	Area covered	Data analyzed	Methods used
		Fluctuations in government policies and regulations			
	GENERATORS: lack of a consistent policy environment to ensure the stability of legislative systems and the predictability of requirements and principles to be applied by business; IMPACT: may generate additional costs for companies: call in professionals, time requirements, penalties and fines for non-compliance, etc.				
1	Ismael and Shealy (2018)	– resource-based and stakeholders' theories, as the paper is focused on the importance of resource use and stakeholders communication.	Kuweit, sustainable construction industry	131 sets of primary data	– data was collected through questionnaire; – risk level was evaluated using a weighted score approach.
	Okoye et al. (2022)	– resource-based theory as the paper focuses on forming an overall picture of performance in the use of resources and capabilities in the industry under review.	Nigeria, construction industry	256 sets of primary data	– data was collected through questionnaire; – risk analysis was made using mean value method, resulting in a criticality index used to rank the risks.
		Erroneous cost estimates:			
	GENERATORS: lack of experience of the person in charge; failure to consider market price fluctuations and the factors that may cause these fluctuations; recording of calculation errors; lack of appropriate supporting software; IMPACT: Sale of products manufactured below cost or at a reduced profit; imbalance in production budget planning; decrease in recorded financial performance.				
2	Yuan et al. (2021)	– social network theory as it focuses on interdependencies among stakeholder-associated risks; – life cycle theory as the paper analyzes the risks associated with every stage in the life cycle of the products.	China, prefabricated construction industry	20 sets of primary data and 16 sets of secondary data	– secondary data was collected through literature review and primary data was collected from sustained interviews; – data was processed in a focus group meeting and through a social network analysis.
	Surange and Bokade (2022)	– risk management theory, as the paper focuses on the identification of risks that characterize different selected industries.	Global, construction, manufacturing and software industries	44 sets of secondary data	– data was collected through literature review and the most relevant risks were selected and analyzed.

N	Study	Theories research is based on	Area covered	Data analyzed	Methods used
		Inefficient and poor internal communication:			
		GENERATORS: disinterest and lack of responsibility on the part of the staff involved; lack of appropriate means of communication; lack of access to timely and up-to-date information; IMPACT: Inefficient decision-making, not based on real and timely information; missed opportunities for development and gain.			
3	Samsudin et. al. (2017)	– stakeholders' and resource-based theories as the paper focuses on communication in the context of Total Quality Management implementation which valorizes the capabilities and the resources to have better results.	Malaysia, manufacturing industry	104 sets of primary data	– data was collected through questionnaire; – for factor extraction eigenvalue rule, scree plot, and parallel analysis were used.
	Reis Neto et al. (2018)	– stakeholders' theory as is focuses on organizational communication; – discrepancy theory as the research considers also psychological aspects of business management.	Brazil, drink industry	310 sets of primary data	– data was collected through questionnaire; – the exploratory and confirmatory factor analysis was applied.
4		Fluctuations in market demand:			
		GENERATORS: unstable economic environment causing either sudden increases or decreases; market orientation towards competitors' products; encouragement or discouragement of consumption of products by various government projects or regulations; IMPACT: company's inability to sell its product inventories; increased cost of storing and insuring inventory; downsizing or restructuring of the company.			
	Germain et al. (2008)	– contingency theory as the paper focuses on environment uncertainty as an impact factor on performance.	United States (US), manufacturing industry	402 sets of primary data	– data was collected through questionnaire; – 7-point semantic differential scales was used to measure demand unpredictability.
	Visnjic et al. (2016)	– demand-based view on value creation and complementarity as the paper focuses on creating value by learning the customers.	developed countries, manufacturing industry	133 sets of secondary data	– data was collected from different databases; – panel data analysis with fixed effects to test the hypotheses was used.

N	Study	Theories research is based on	Area covered	Data analyzed	Methods used
			Lack of professionals and specialists:		
	GENERATORS: lack of an education system adapted to the requirements of the business environment; migration of the workforce to more developed countries; lack of adequate financial and professional rewards; lack of involvement of employees in training and development programs; IMPACT: inability to manage various risk or spontaneous situations; need to outsource various production functions; inability to develop and expand production.				
5	Bennett and McGuinness (2009)	– resource-based theory as the paper focuses on the importance and role of utilizing skilled employees for generating performance;	Ireland, high-tech industries	242 sets of secondary data	– data was collected from the results of previous questionnaire; – bivariate probit regression model used to estimate the selection of controls in the productivity regressions.
	Guan and Frenkel (2018)	– resource-based theory as the paper focuses on the importance and role of utilizing skilled employees to gain competitive advantages.	China, manufacturing industry	348 sets of primary data	– data was collected through questionnaire; – PROCESS macro tool was used to test the mediating role of different variables.
6			Inefficient logistics and delayed supply		
	GENERATORS: environmental factors such as natural disasters; political and social factors; delays in contractual deadlines; lack of adequate digital systems for planning and managing logistics activity; IMPACT: failure to meet contractual delivery deadlines, which can lead to loss of contracts and cost increases; suspension of production due to lack of materials.				
	Lu et al. (2017)	– contingency theory as the paper analyzes external factors that moderate or control the behavior of companies; – configuration theory reflected in the analysis of patterns of supply chain in different organizational configurations.	China, automotive manufacturing industry	357 sets of primary data	– data was collected through questionnaire and interviews; – CFA marker technique and Threshold regression analysis.
	Shia et al. (2019)	– social network theory in corporate finance as the paper focuses on the examination of the relationship between supply network and firm performance.	China, manufacturing industry	3630 sets of secondary data	– data was collected from different databases and annual reports; – regression analysis used to determine the relationship between different variables.

Continued Table A1

N	Study	Theories research is based on	Area covered	Data analyzed	Methods used
		Inefficient and unrealistic production planning			
	GENERATORS: lack of experience and professionalism of the person in charge; reasonable disregard of all internal and external factors with possible impact on the production activity; lack of appropriate support software and programs; IMPACT: failure to meet all committed product requests; loss of contracts; damage to company image in relation to stakeholders; failure to meet performance targets.				
7	Sagawa and Nagano (2021)	– contingency theory as the paper focuses on investigating the relationship between internal integration of production planning and environment uncertainty.	Brazil, industrial sector	4 sets of primary data	– data was collected through questionnaire and interviews; – method of multiple-case study was used.
	Salah et al. (2023)	– resource-based theory as the focus is on the use of resources to increase the performance of operations management, including production planning.	Jordan, manufacturing industry	209 sets of primary data	– data was collected through questionnaire; – structural equation modeling to analyze the data was used.
8		Incompetence of materials and equipment:			
	DRIVERS: low quality of materials sourced; procurement of materials from unreliable and unreliable sources; outdated equipment and production lines, not adapted to digitization and automation trends; IMPACT: affecting lead times due to material defects or technical problems with machinery; obtaining products that do not meet the quality requirements agreed.				
	Siregar et al. (2023)	– resource-based theory as the paper focuses on analyzing the adjustment of existing dynamic capability and resources of companies to create value.	Indonesia, manufacturing industry	120 sets of primary data	– data was collected through questionnaire and interviews; – Structural Equation Model-Partial Least Squares (SEM-PLS) to analyze data was used.
	Tsarouhas (2020)	– resource-based theory as the paper focuses on identifying the efficiency of equipment in the production process by identifying its actual time of productivity.	Europe, dairy products industry	One set of primary and secondary data	– data was collected through direct observation of the production line; – method of case study was applied; – Pareto analysis was used to examine different causes of production stoppage.

N	Study	Theories research is based on	Area covered	Data analyzed	Methods used
	Return of products for manufacturing errors:				
	GENERATORS: lack of control or superficial quality control of finished products; ineffective communication with customers on their manufacturing requirements; IMPACT: Increased cost of covering the cost of production for products returned under warranty; damage to the company's image in the eyes of customers, which may lead to a decrease in demand for manufactured products; overload of production planning with work and rework for products returned under warranty.				
9	Aydin et al. (2018)	– life cycle theory as the paper focuses on the total lifecycle cost of a product.	North America, manufacturing industry	one set of primary data	– data was collected through observation of a case study; – Monte Carlo simulation to quantify the impact of return rate on performance was used.
	Srinivasan and Khan (2018)	– social network theory as the paper focuses on optimization of closed-loop supply chain (CLSC) network; – configuration theory as there are analyzed multiple scenarios generated by uncertain environment.	India, manufacturing industry	125 sets of primary data	– scenario-based mixed integer linear programming model was developed and implemented; – a multi-stage, multi-product capacitated CLSC network was applied.
	High cost of raw materials:				
	GENERATORS: rising cost of collecting and processing raw materials; political, military, or social conflicts in areas where different categories of raw materials are extracted and processed; high demand for raw materials but low supply; IMPACT: cost overruns on various projects; increase in sales prices without a proper correlation between this and the value offered, which may lead to a decrease in demand; affect reported financial performance.				
10	Minguella-Canela et al. (2018)	– resource-based theory as the paper focuses on the optimization of costs by better management of materials to obtain better performance.	Spain, additive manufacturing industry	one set of primary and secondary data	– data was collected through direct observation and from company's reports; – Pareto-type analysis was used.
	Singh et al. (2018)	– resource-based theory as the paper focuses on the optimization of different internal and external factors in order to ensure a performant sustainable manufacturing.	India, cement manufacturing industry	one set of primary and secondary data	– data was collected from literature review, company's reports and brainstorming session; – analytic hierarchy process (AHP) and DEMATEL methods were used.

End of Table A1

N	Study	Theories research is based on	Area covered	Data analyzed	Methods used
11	Market competition:				
	GENERATORS: granting government incentives or incentives to certain state-owned or distressed companies; holding a significant market share of a production sector by one or more companies; imports at unduly low prices; IMPACT: The financial inability of companies to invest in innovation, digitization, and automation justifies lack of expansion in terms of market share or product range offered; inability to make production costs as efficient as competitors due to lack of modern technology.				
	Fanggidae et al. (2023)	– resource-based theory as the paper highlights the role of efficient utilization of resources and capabilities in a competitive market to generate performance.	Indonesia, different industries	384 sets of primary data	– data was collected through questionnaire; – correlation and regression analyses were used to analyze the data.
	Rudiawarni et al. (2022)	– industrial organization theory as the paper highlights the impact of the competitive forces in the market on companies' performance.	Indonesia, manufacturing industry	297 sets of primary and secondary data	– data was collected from Indonesia Stock Exchange; – univariate and multivariate analyses were used.

Note: This table highlights the drivers and potential impact that internal and external factors selected for analysis may have on a company's performance, and also lists and presents relevant scientific papers that address the factors listed.