AWARENESS OF AGILITY IN SLOVAK MANUFACTURING AND SERVICE ENTERPRISES

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ABSTRACT

The article deals with the awareness of agility in Slovak industrial and service companies, reflecting on the experience gained during the unpredictable changes caused by the coronacrisis. The aim is to identify the attitude to agility in enterprises as the ability to respond quickly to dynamic market conditions and to implement agile principles. The research was conducted through a questionnaire survey, examining activities undertaken to build agility, the ability of enterprises to be agile, perceptions of agile barriers, benefits of agility and the importance of enterprise agility. The results of the research present benefits for theory, science and practice. The findings offer new empirical insights from the Slovak industry and service sectors environment that can contribute to increasing the competitiveness and sustainability of enterprises.

Keywords: agility, awareness, attitude, Slovak enterprises, flexibility, competitive advantage, coronacrisis

JEL Code: L21, M10, D22

1 INTRODUCTION

Agility represents the ability of businesses to respond quickly and effectively to change, making it a key factor for their long-term success (Motwani, Katatria, 2024). In today's dynamic and unpredictable environment, where technological, economic or societal changes are constantly occurring, agility is of increasing importance for businesses. Businesses that can adapt quickly are better prepared to face challenges and exploit new opportunities, thereby gaining a competitive advantage (Yamin, 2024; Kiilu *et al.*, 2024). The benefits of agility are manifested not only in the rapid implementation of change, but also in better team collaboration, greater flexibility, and the ability to manage complex problems effectively (Tsilionis *et al.*, 2024; Motwani, Katatria, 2024). The coronacrisis that has hit the global

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economy has brought unprecedented challenges and has also accelerated the need for the adoption of agile approaches in business (Alkaabi *et al.*, 2024). Firms have been forced to respond promptly to changes, whether it was to migrate to digital platforms, reorganize work processes, or adapt to changing market conditions (Wang *et al.*, 2024; Fang *et al.*, 2024). Experience with the application of agility during this crisis has shown that companies that used agile management methods were able to react more flexibly, innovate faster and thus minimise the negative impacts of the crisis (Rofiaty *et al.*, 2022; Ludviga, Kalvina, 2024). These firms were not only able to manage the crisis period effectively, but also created a stronger foundation for adapting to future challenges (Twaissi, ALawad, 2023). Thus, the application of an agile approach has proven to be essential not only in times of crisis, but also as an enduring advantage for sustainable development and innovation.

Exploring agile awareness is a well-known issue in the world. Wendler (2014) states that despite the growing awareness of agile, the concept cannot be considered easily applicable in practice. As Kumar *et al.* (2016) state, agility offers, especially for SMEs, a revolution in the understanding of how a business can be taken to a new level by applying agile practices and methods. Authors Nassar and Khalil (2020) offer their own perspective on building agile awareness, which they consider as the ability of an organization to anticipate, act and recover from unpredictable changes through the implementation of flexible practices and lean management. In an industrial setting, the study by Padovitz *et al.* (2003) can be highlighted, who focused their efforts on raising agile awareness in the context of individual distribution systems. The group of authors Nguyen *et al.* (2020) used the so-called Awareness-Motivation-Capability (A-M-C) model to increase the possibility of applying agile concepts in the organization and increasing its awareness. In doing so, attention was directed by way of digitalization and its synergies in the transformation period, to new business models. Authors Palanisamy, Chelliah and Muthuveloo (2021) conducted research that was partly devoted to ascertaining the agility awareness of small and medium enterprises (SMEs) in the industrial sector. In their research, they revealed that building agile awareness in SMEs significantly contributes to improving organizational performance. Research by Al-Essawi (2023) demonstrated that the agile awareness present in a given organization directly influences the level with which agility is built.

In the conditions of the Slovak Republic, there are no studies yet that would address the issue of agility in terms of its awareness in the group of manufacturing and service enterprises. Absence of such research creates a research gap that needs to be filled.

The aim of the paper is to assess the awareness and attitude towards agility after the experience with the implementation of unplanned, rapid changes during the coronacrisis in industrial and service companies in the Slovak Republic.

The contribution of the article presents new empirical findings from the environment of Slovak manufacturing and service enterprises in the meaning and importance of agility, which is the basis for building agility in enterprises.

2 METHODOLOGY AND DATA

The methodological procedure of this research was divided into several parts that were logically organized. In the first part, an analysis of secondary sources was carried out and constituted the basis of the research in the field of agile awareness in Slovak manufacturing and service enterprises. In this part, mainly logical methods such as: analysis, synthesis, deduction, comparison, summarization, description and analogy were used. In the following section, we focused on primary data collection using a questionnaire survey. The aim of the survey was to find out how Slovak enterprises have coped with the changes caused by the COVID 19 pandemic, what their attitude towards agility is, how they perceive it and to what extent they are agile. The questionnaire survey was conducted using the Google questionnaires platform

between January 2024 and June 2024. Our respondents were managers or owners of firms in industries and selected service sectors: accommodation, catering and transport, which were most affected by the coronacrisis interventions. In total, there are 135,088 businesses in the industrial and service sectors (Finstat, 2024), from which we randomly distributed 5,327 questionnaires. The return rate of our questionnaire survey was 5,19 %. In total, the questionnaire contained 10 questions. The first part of the questionnaire focused on the identification of the research sample: size of the enterprise, ownership, line of business, industry, and ROE ratio. The second part of the questionnaire focused on questions regarding the awareness and understanding of agility in the enterprise: description of agility capability, steps implemented to improve agility, barriers and benefits of agility, importance of agility. The term agility was replaced in the questions by its description as the ability to react to unexpected changes, in order to avoid the risk of the concept not being recognised by company managers.

The data obtained from the questionnaire survey were evaluated using Microsoft Excel and Statistica 12. The present evaluation was preceded by the determination of the minimum size of the research sample. The following formula was used to determine it:

(1)

$$n \geq \frac{z^2 \cdot p \cdot (1-p)}{e^2}$$

Where:

- "n" represents the research sample size,
- "z" is the critical value of the normalized normal distribution for the chosen confidence level,
- "p" is the estimated population size, and
- "e" is the margin of error (Labudova *et al.*, 2021).

Our confidence level (z) was set at 90% and the margin of error (e) was set at 5%. In calculation with population size 135,088 entities, we found that representative sample size is 271 respondents. In total, 277 enterprises participated in our questionnaire survey, including 155 respondents from the manufacturing sector (55.95%) and 122 from the service sector (44.05%). According to data of the Finstat database (2024), the population size of manufacturing sector was 86,406 and of selected service sectors was 48,682. From calculation of representative sample size follows, that the size of both parts of the research sample is representative by 90% confidence level. The distribution of the sample also reflects the structure of the overall population.

The evaluation of the questions in the second part of the questionnaire survey was carried out by finding the relationships between the categorical variables. Our aim was to verify the existence of a relationship between the variables under investigation by means of Contingency Analysis using Pearson's chi-square test. The test statistic has the form (Labudova *et al.*, 2021):

(2)

$$x^2 = \sum \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

Where:

- "O_{ij}" is the observed abundance in the i-th row and j-th column of the contingency table,
- "Eij" is the expected abundance calculated based on the independence of the variables (Labudova *et al.*, 2021).

3 RESULTS

The return rate of the questionnaire was 5.22% of enterprises engaged in industries or certain service-providing sectors. The results of the basic identification of the research sample are shown in Table 1.

From Table 1 we see that most of the respondents are in the manufacturing sector with a majority percentage. In terms of number of employees, small and micro enterprises are predominant, with capital tied up mostly in the domestic environment (73.64%). The highest return on capital of 26.62% is achieved by companies at ROE of 2.0% to 3.99% and the second significantly highest of 22.30% at ROE of 4.0% to 6.99%. The identification of the research sample was supplemented with an open-ended question that inquired in which sector the company operates. In total, there were 10 different industries: automotive; wood; electrical; metallurgical; chemical; furniture; food; construction; engineering and textile and 4 service sectors: catering, hotels, restaurants and transportation. The highest percentage share was achieved by the catering industry with 22.30%, while the lowest percentage share was achieved by the metallurgical industry with 2.16%.

In the next section we look at the results of the contingency analysis. The contingency analysis was carried out between several questions of the second part of the survey, where results of each question are accompanied by a table, which is divided by sector (manufacturing, services) containing the p-level values.

Testing the relationship between a company's ability to respond to unexpected changes and crisis situations (Question 1) and the other questions 2–4 shows the results in Tables 2–4. The company's ability to respond to unexpected changes and crisis situations could be described through a choice of options – A. we are unable to react to changes in a timely manner; B. we are slow to take action and do not react to changes in a timely manner; C. we react with difficulty; D. we react quickly and effectively and change strategies and processes; E. we are at the forefront of anticipating and predicting market trends.

Table 2 shows the results of testing the dependency of agility capability with the steps companies take to improve their ability to be agile.

From Table 2, we can observe that within the tested contingency, we confirmed a strong dependence in only one case. These are manufacturing enterprises, where the low p-level value (0.001) indicates a significant dependence, in the sense that enterprises that cooperate with external experts in order to gain new perspectives are able to react quickly and effectively to unexpected changes and crisis situations, i.e. they are able to be agile.

Tab. 1 Basic identification of research sample

Questions	Answers					
Business activity subject	Manufacturing		Services		Trade	
	56.03 %		*43.96 %*		*0 %*	
Number of employees	0 - 9		10 - 49		50 - 249	250 +
	43.68 %		*29.96 %*		*16.25 %*	*10.11%*
Company ownership	Net domestic capital		Domestic capital prevail		Net foreign capital	Foreign capital prevail
	70.86 %		*15.47 %*		*6.47 %*	*7.19 %*
Return on Equity (ROE)	< 0 %	0.1% - 1.99%	2.0% - 3.99%	4.0% - 6.99%	7.0% - 9.99%	10% >
	6.12 %	*18.71 %*	*26.62 %*	*22.30 %*	*8.99 %*	*17.27 %*

Source: own research

Tab. 2 Contingency Analysis for: Dependence of steps taken towards building the ability to be agile

	Options (Question 2)	Industry	Services
A	regular monitoring of the market and competition	0.656	0.531
B	investments in research and development of new technologies and products	0.902	0.631
C	flexible workflows and processes	0.274	0.719
D	cooperation with external experts	0.001	0.164
E	continuous acquisition of knowledge regarding customer preferences, processes, work organization	0.236	0.169

Source: own research

Table 3 presents the results, which were devoted to testing the relationship between agility capability and the barriers that companies perceive in the enterprise's efforts to be agile.

In Table 3 we see that a significant dependence in both sectors for the same response was detected. We confirmed the dependence in the manufacturing sector, where the p-level value reached 0.001, and at the same time in the service sector, where the p-level value was at 0.012, where we can claim that companies that are able to be agile consider slow implementation of changes and processes as a barrier. In all other cases we did not confirm the dependency.

We also looked for a statistically significant relationship between agility and the benefits that respondents able to be agile see in their business. The results are shown in Table 4.

For Table 4, we observe that we could not detect a significant dependence between questions 1 and 4, neither for manufacturing nor for service firms.

The following contingency table (Table 5) shows the results between question 2 and question 5. For question 2, we asked what steps respondents are taking to improve their company's ability to be agile (A. regular monitoring of the market and competition; B. investing in research and development of new technologies and products; C. maintaining flexible work practices and processes; D. collaborating with external experts, E. continuously gaining knowledge regarding customer preferences, processes and work organisation). For question 5, we asked respondents how they would rate the importance of a business agility (A. very important – a key factor for success and survival; B. important – without it, the business would fall behind competitors and lose customers; C. moderately important – it is useful but not essential to the business's operations; D. not important – there is no value or benefit to the business). Where 'I' is industry and 'S' is services.

Tab. 3 Contingency Analysis for: Dependence of perception of agile barriers on the ability to be agile

	Options (Question 3)	Industry	Services
A	lack of funds for investments in technology and inovation	0.453	0.275
B	complex bureaucracy and regulatory environment	0.270	0.330
C	lack of qualified employees	0.511	0.984
D	competition that also seeks to respond quickly to chang-es and adapt	0.876	0.301
E	lack of top management commitment	0.104	0.120
F	slow implementation and process changes	0.001	0.012

Source: own research

Tab. 4 Contingency Analysis for: Dependence of benefits from being agile on the ability to be agile

	Options (Question 4)	Industry	Services
A	gaining a competitive advantage over other businesses	0.849	0.085
B	improving reputation, trust and customer satisfaction	0.978	0.890
C	greater probability of survival in the market in adverse conditions	0.611	0.353
D	more effective use of opportunities for growth and development	0.285	0.501
E	faster delivery of products tailored to changing customer needs	0.488	0.543

Source: own research

From Table 5 we observe the percentages of enterprises (manufacturing, services) by degree of agility importance. Agile is considered important or very important by 94% of manufacturing enterprises and by 54% of enterprises in the service sector for step A. For manufacturing enterprises as well as enterprises operating in the service sector implementing step B, agility is considered important or very important by 18% of enterprises. By Step C, the ability to be agile is considered important or very important by 56% of manufacturing enterprises and 46% of service enterprises. Agility is considered highly important for step D by 18% of manufacturing and 22% of service enterprises. By step E, agility is considered important or highly important by 43% of manufacturing and 50% of service enterprises. Furthermore, we can observe that manufacturing enterprises implement more than 2 activities to improve agility

Tab. 5 Contingency Table of: Dependence of importance of company's agility on the steps to improve ability to be agile

Options (Question 2)		Options (Question 5)									
		Very important		Important		Moderately important		Not important		SUM	
		I	S	I	S	I	S	I	S	I	S
A	regular monitoring of the market and competition	57%	23%	37%	31%	4%	4%	2%	2%	100%	60%
B	investments in research and development of new technologies and products	10%	8%	8%	10%	1%	0%	0%	1%	19%	19%
C	flexible workflows and processes	27%	22%	28%	24%	3%	1%	0%	1%	58%	48%
D	cooperation with external experts	11%	9%	7%	13%	0%	1%	1%	1%	19%	24%
E	continuous acquisition of knowledge regarding customer preferences, processes, work organization	31%	27%	12%	23%	2%	1%	0%	0%	45%	51%
SUM		136%	89%	92%	101%	10%	7%	3%	5%	241%	202%
											I - industry, S - services

Source: own research

(241%) and service enterprises 2 activities (202%). The enterprises that consider agility as important and very important are predominant in these activities and carry out activities A, C and E. Only 13% of manufacturing and 12% of service enterprises perform activities towards agility even they don´t consider the agility important.

4 DISCUSSION AND CONCLUSIONS

Agility is a dominant concept in contemporary business management that emphasises the ability of organisations to respond flexibly to dynamic change, anticipate market trends and adapt effectively to new challenges. The scientific purpose of the presented article is to evaluate the perception and awareness of agility after the experience of implementing unplanned, rapid changes during the coronacrisis in industrial and service enterprises in the Slovak Republic.

Based on the research conducted, we were able to uncover several important aspects about the awareness and application of agility. The analysis revealed that businesses assess the level of agility in their enterprise primarily as the ability to respond quickly and effectively to change by changing strategy and processes (41.29%), with the second largest proportion saying as the ability to be at the forefront of anticipating and predicting market trends (24.73%). This attitude corresponds with a global trend where agility is not just about reacting, but also about being proactive and strategically planning. It is evident that the coronacrisis has highlighted the importance of agility, which has motivated businesses to change faster and be more adaptive. The study in question is supported by the work of Wendler (2014) and further by the work of Nassar and Khalil (2020), who highlight the importance of building agile awareness through specific measures such as digitalization or the implementation of lean management. These aspects are significant for deeply embedding agility in individual processes and activities, allowing to increase its contribution to the enterprise. Furthermore, we find that manufacturing companies that collaborate with external experts in order to gain new perspectives react quickly and effectively to unexpected changes. A study by Barhmi (2022) confirms our findings, where the author concludes that agile supply chains that collaborate effectively with external partners perform better in volatile environments than those that lack such collaboration. The results of the relationships between agile barriers and the ability of firms to be agile showed that both manufacturing and service firms perceived the barrier of slow implementation of change and process change as significant. These results are complemented by a study by Koçyiğit and Akkaya (2020), which identified the positive impact of organizational flexibility on the agility of enterprises of different sizes. Other barriers, such as lack of finance or bureaucracy, did not show a significant relationship, suggesting that agile enterprises are able to overcome these barriers. The results highlight the need to focus on improving internal processes and change management as a key factor for increasing agility (Reed, 2021). Another important finding is the analysis of enterprises' actions to improve agility in relation to the assessment of the importance of agility as ability to respond to environmental changes in a timely manner. From the findings, we conclude that enterprises that consider agility important and very important implement the steps of regularly monitoring the market and competition, maintaining flexible work practices and processes, and continuously gaining knowledge regarding customer preferences, processes, and work organization. This coincides with the work of Adele (2021), who emphasises the importance of these steps as a means of achieving market leadership. In contrast, the steps of investing in research and development of new technologies and products and collaborating with external experts are implemented by the respondents to a very small extent compared to the others, even though they are considered important or very important by the companies. These findings are in direct contradiction to the findings of Sukharev (2019) and Grumbach (2023), who consider these steps to be key

to achieving long-term growth and competitiveness, which is considered crucial in their understanding. Continuous acquisition of knowledge about customer preferences and work organisation is also considered important, but a large proportion of surveyed companies do not pay enough attention to this step. Overall, the results suggest that although enterprises are aware of the importance of certain steps to increase agility, their implementation is not always systematic and often remains marginalised. This points to room for improvement, especially in areas related to innovation and collaboration. Agility is an essential pillar of contemporary business, enabling businesses not only to respond flexibly to dynamic market conditions but also to build competitive advantage in a systematic way. The implementation of agile principles can bring a number of benefits to businesses, including better use of resources, greater adaptability and the ability to anticipate market trends.

Furthermore, we were able to find out that the majority of Slovak enterprises, especially micro and small enterprises, perceive agility as a key success factor, with a significant percentage of respondents (41.29%) identifying the ability to react quickly and effectively to change as the most important agile capability. At the same time, 24.73% of respondents highlighted the importance of anticipating market trends as another important agile capability for their business. The results indicated that enterprises that collaborate with external experts achieve better performance and efficiency in responding to crisis situations. This result underscores the importance of gaining external perspectives in increasing the level of agility in an enterprise. Another interesting finding is the absence of a statistically significant relationship between economic indicators such as return on equity (ROE) and the implementation of agile actions, suggesting that the benefits of agility may not immediately translate into financial results. Rather, they point to its strategic value, which manifests itself in the long term through increased adaptability, competitive advantage and the ability of businesses to maintain stability even in times of turbulent change.

The direction of future research should be through a detailed examination of the impact of agile strategies on the long-term performance of businesses, including their financial and non-financial indicators. It would also be beneficial to analyse the extent to which cultural factors and organisational structure influence the successful implementation of agility.

The limitation of this paper is the limited size of the research sample, which may not represent all sectors of the Slovak economy, and the focus on short-term assessment of agility without a deeper examination of its long-term effects.

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