

# Total Quality Management As Managerial Tool Of Competitiveness In Enterprises Worldwide

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## TOTAL QUALITY MANAGEMENT AS MANAGERIAL TOOL OF COMPETITIVENESS IN ENTERPRISES WORLDWIDE

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**Abstract:** This research paper examines the issue of Total Quality Management (TQM) as a dynamic tool for managing and improving the performance and competitiveness of enterprises. The empirical analysis was focused on the current state of using this concept as well as identifying barriers that prevent its use in practice. In order to verify the hypotheses, defined in accordance to the literature review research, the appropriate research methods were applied. Statistical verification revealed that the size of the enterprise has the statistically significant impact on the use of the TQM and the lack of qualified workforce and financial resources are among the most noticeable barriers to the use of the TQM in managerial practice. Concerning the managerial implications, the suitable model of relationships between human resources and the TQM is presented, with a novelty of the creation a comprehensive digital business model according the challenges of Industry 4.0. The paper also includes research studies, which confirm its relatively frequent use mainly in developed economies. We found that the TQM concept is used by more than 25% of industrial enterprises in Slovakia, and referred to the sustainable growth as well as competitiveness within the market environment worldwide.

**Key words:** Total Quality Management, enterprise performance, qualified workforce, financial resources, competitiveness.

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### Introduction

Each activity on global markets is risky therefore any enterprise or economic entity cannot predict the results of financial, investment or other decisions in entrepreneurship (Šofranková et al., 2017; Štefko and Steffek, 2018). In times of massive turbulence, consumers have higher expectations, and companies are pushing for improvement in productivity, quality, and at the same time they reduce the costs. For that purpose, companies adopt some of the three approaches in order to improve the quality of business processes, products and services (Mitreva et al., 2019; Frankovský et al., 2019; Vegsoova et al, 2019; Nasr et al, 2019; Domańska-Szaruga, 2020). Business management has entered the era of internetwork

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1 competition and the ultimate success of a single business will depend on management's ability to integrate the company's intricate network of business relationships (Kot et al., 2019a; Bacik et al., 2019; Glova et al., 2018). Business orientation is considered an important factor of a high business performance, and is highly influenced by the entrepreneur's personality (Nováková et al. 2019). Business orientation is usually viewed as a five-dimensional construct consisting of innovativeness, risktaking, proactivity, autonomy, and competition aggression. We speak about setting up of the strategy and strategic goals of the organisation. Without fulfilling of this requirement the organisation is able to solve possible problems which may occur only on the operative level, reacting on some stimuli instead of creating them on itself (Gallo and Tomčíková, 2019). Business process has changed significantly, because of rising competitiveness due to common world market influence and main global players actions (Štefko et al., 2012). The process of strategic management covers the consecutive stages through which business firms' create, implement and control their objectives as measured in financial and non-financial dimensions (Fitriyah, 2019; Štefko et al., 2017). Enterprises and their stakeholder is through network, collaboration, and communication so that shared resources and knowledge lead to ensure sustainable operations for the environment and societal (Laužikas, Miliūtė, 2020; Sanchez-Roger et al., 2020).

In this research, we focused on the Total Quality Management (hereinafter as TQM) tool, which is linked to enterprise performance and its improvement (Sabella et al., 2014). The industrial sector contributes a significant percentage to the GDP and represents a major segment of the Slovak economy. Currently, the industry is focused on digitization referred to as the Industry 4.0 with focus on main drivers. If Slovak industrial enterprises want to continue to be successful and succeed in the current competitive market, they should implement and improve the use of comprehensive performance management systems and digital trends, including TQM.

The research paper is organized into following sections. The first part is devoted to the introduction and literature review related to the most common management tools with a focus on the TQM. In the next part, the methodology, research sample and data collection are introduced briefly. The third part is focused on statistical verifying the hypotheses set, which formed the main basis of our research. The following part is devoted to the analysis and comparison of other similar research studies. The last part of paper summarized the main research findings, the limits of the study, and pointed to managerial benefits of this up-to-date issue.

### Literature review

Corporate sustainability is an evolutionary strategic management concept that has now attained much attention both in literature and practice. Quality management systems have evolved from a systems approach to management sciences. The systems approach concentrates on analyzing the organization as a system of

interrelated elements. This approach is derived from cybernetics and mathematical modeling methods (Wolniak, 2019; Wolniak, 2020). In the present globalization and digital age, the competitive strengths of technology management and TQM practices are widely accepted but to what extent these strategies can interact and impact the sustainability performance is unknown (Tasleem et al., 2019; Talapatra and Uddin, 2019). With the aim of improving the quality and efficiency of corporate management, a number of standardised norms have been developed, such as TQM, but in parallel; for example; SCOR or ISO9000 (Gonzalo et al., 2019). TQM is a system approach to management in order to continuously increase customer value (Ulewicz and Skowron-Nowicka, 2017), design and continuously improve organizational processes and systems. TQM focuses on the management of the entire system, and not just on some subsystems, isolated processes or functional departments. TQM is a way of thinking about goals, organizations, practices and people to ensure that they do the right things first (Bajaj et al., 2019; Eniola et al., 2019). TQM is an integral management philosophy which is based on a set of social and technical factors that must be put into practice through a reference framework (Calvo-Mora et al., 2019). Commitment by leadership and top management towards quality involves providing a stimulating vision, guiding quality values, encouragement, and quality direction to subordinates in a manner that is understood by all (Dilawo and Salimi, 2019; Lasrado, 2019). To achieve its concept, the company uses a documented and constantly improved quality system, including all employees of the and subcontractors. Continuous promotion of TQM culture should support and develop efforts to improve their own work and the quality of the product or service (Krajcsák, 2019; Savov et al., 2019). TQM emphasizes the focus of internal and external customer satisfaction, the high obsession to quality, disciplined methodology using a scientific approach to make decisions and solve problems, make continuous improvement, build teamwork, have a long-term commitment, build education and training, give freedom from control, and have a united purpose (Juran and Godfrey, 2001). Overall, TQM is a management system that elevates the quality as a business strategy and customer satisfaction-oriented by involving all members of the organization (Gapp et al., 2008; Nurcahyo et al., 2019). Similar to Psomas and Jaca (2016), the implementation of TQM in service organization is concerned on quality practices of top management, employee quality management, employee knowledge and education, and customer focus. There is no doubt that human resource is one of the most important resources in the life of modern companies. Nowadays, human resource management has become an essential part of corporate strategic management (Gorgenyi-Hegyés and Fekete-Farkas, 2019; Riana et al., 2020). TQM is directed at quality consciousness throughout all organisational processes (Siwec and Pacana 2019). Organizational performance is directly linked with the investment in human capital. Therefore, employers are more concerned about the volume of human capital investment and about the outcomes from it. For instance,

whether the return from the human capital investment will cover the cost of investment or not (Madani and Wajeetongratana, 2019). A successful TQM practice requires a culture that can adapt to changes and promote innovation and in socio-technic systems could improve engagement and quality in companies (Beard-Gunter et al., 2019; Rajiani and Ismail, 2019). Development culture focuses especially on improvement, flexibility and external environment, concerning with growth, innovation and adaptation (Gozukara et al., 2019; Sahoo, 2019; ul Haque et al., 2019).

The findings of research studies focused on the tool TQM stimulate us to create these hypotheses of our research, which we formulated as follows:

H1: We assume that there is a statistically significant relationship between the enterprise size and the use of the Total Quality Management.

H2: We assume that the lack of qualified workforce is one of the most significant barriers to the use of the Total Quality Management.

H3: We assume that more than 25 % of enterprises in the industry sector use the Total Quality Management as a tool for managing their performance.

### Data and methodology

In this research paper, we addressed the analysis of TQM managerial tool and its use in Slovak industry enterprises. Moreover, the barriers to the use of this model were examined. The main research aim is supported by the partial objectives included in the hypotheses set. The relevant data from enterprises operating in the industry sector were obtained by the structured questionnaire method, using online application. The questionnaire consisted of open questions, multiple choice questions and in obtaining certain types of answers we used the known Likert scale. The structured questionnaire was divided into two basic parts. The first one consisted of identification questions of the enterprises, the second part concerned the questions about the creation and use of strategies, measuring enterprise performance and the most common management tools. In the last part we analysed the frequency of use of TQM in industry sector and the reasons complicating application in practice.

The questionnaires were distributed to industrial enterprises in Slovakia. The selection of respondents was carried out in accordance with a probability theory, which means that the results found out in the selection file can be generalized to a basic file, which we further save and thus perform census. In our research, we applied random selection, which prevents the results to be distorted by the tendency of choice (Marcheová et al., 2011).

For the purposes of this study, the data was obtained from portal managed by the company DataSpot, I.L.C. and the Slovak Business Agency, which collect information on industrial enterprises in Slovakia and create comprehensive databases. In total, we addressed 613 selected industrial enterprises for the purposes of our research between September and December 2019. However, of all

the questionnaires sent, the return of questionnaires reached the level of 31.16% (191 questionnaires received).-In order to verify the formulated hypotheses, the research method of the proportion of a given phenomenon in the population and the Pearson's Chi-square test of independence were applied (Table 1) and processed in the DELL Statistica software, 5.5<sup>th</sup> edition.

**Table 1: Formulas for verifying the hypotheses**

Pearson's Chi-square test of independence	
Formula	Explanatory note
$\chi^2 = \sum \frac{(f_c - f_t)^2}{f_t}$	$\chi^2$ – the Chi-square value subsequently compared to a table value based on the selected error probability, $f_c$ – the empirical frequency of observed variables, $f_t$ – the theoretical frequency of observed variables.
Method of proportion of a given phenomenon in population	
Formula	Explanatory note
$p = \hat{p} \pm z_\alpha * \sqrt{\frac{\hat{p} * \hat{q}}{n}}$	$\hat{p}$ –method of proportion of given phenomenon in thepopulation, $z_\alpha$ –confidence level, $\hat{q}$ –proportion of the opposite phenomenon in the selected sample, $n$ –size of sample.
Standard Deviation	
Formula	Explanatory note
$s = \sqrt{\frac{1}{n} \sum_{i=1}^n (x_i - \bar{x})^2}$	$s$ – standard deviation, $x_i$ – the observed values of the sample item, $\bar{x}$ – the mean value of these observations , $n$ – the number of observations in the sample.

Source: Marcheová et al., 2011

### Results of research

The subject of our research study was the assessment of using of one of the modern performance managerial tool TQM in Slovak industrial enterprises and the current state of using this concept as well as identifying barriers that prevent its use in practice. The structure of analysed enterprises according to their size is presented in Table 2.

**Table 2: The structure of enterprises according to their size**

	Number of employees	Number of enterprises
Enterprise size	1 – 9 employees	11
	10 – 49 employees	45
	50 – 249 employees	66
	over 250 employees	69

Source: authors' elaboration

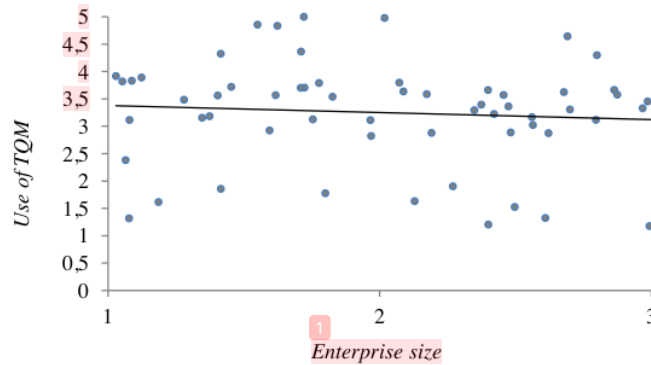
Based on the data obtained from the respondents, we verified the first hypothesis: H1: We assume that there is a statistically significant relationship between the enterprise size and the use of the Total Quality Management. To verify this hypothesis using the Pearson's Chi-square test of independence, we used data from respondents applying the TQM concept in practice. Using this method, we calculated the Chi-squared test characteristic, which we then compared with the critical table value for the error probability chosen by us and the degree of freedom found. The critical value was calculated as  $\chi^2 = 0.01$  and the degree of freedom by  $DF = 1.00$  (Table 3).

**Table 3: Results of testing the first hypothesis**

Pearson's Chi-square test of independence			
Calculated value	Error profitability	Degree of freedom	Critical value
$p = 0.04855$	$\alpha = 5\% (0.05)$	$DF = 1.00$	$\chi^2 = 0.01$

Source: authors' elaboration

Based on the performed calculations, the p-value was lower than 0.05 (0.04855), so we can conclude that there is a statistically significant relationship between the enterprise size and the use of the TQM management tool. Thus, the first hypothesis is accepted. The relationship between these variables was also graphically illustrated in the following scatterplot (Figure 1) confirming this dependence.



**Figure 1: Enterprise size vs. TQM usage**

Source: authors' elaboration

From the data obtained from the respondents we can state that the current use of the TQM management tool reaches an insufficient level. In this regard, we have also focused on identifying the most significant barrier causing low use of TQM in practice, and on this basis we set the following hypothesis:

H2: We assume that the lack of qualified workforce is one of the most significant barriers to the use of the Total Quality Management.

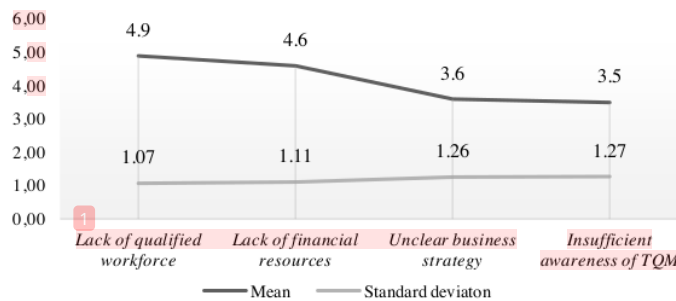
From the answers received, the lack of qualified workforce is considered as the most significant barrier affecting the implementation of the TQM in Slovak industrial enterprises; the second one is the problem with obtaining the necessary financial resources. Another relatively noticeable reason for not using this tool in practice is the insufficient awareness of TQM and unclear business strategy. The results are shown in the following Table 4.

Based on data processing, we can conclude that the most significant reason for not using TQM in practice is the lack of qualified workforce. We have analysed this barrier also by using a standard deviation method. Since the standard deviation of the given factor reached the lowest level, the second hypothesis is accepted.

**Table 4: Main barriers affecting the implementation of the TQM in practice**

Cluster	Specification of barriers			
	Lack of qualified workforce	Lack of financial resources	Unclear business strategy	Insufficient awareness of TQM
The most common answer	5	4	3	3
Minimum	3	3	2	1
Maximum	5	5	4	4
Frequency of the most common answer	71	49	37	34
Mean	4.9	4.6	3.6	3.5
Standard deviation	1.07	1.11	1.26	1.27

Source: authors' elaboration



**Figure 2: Comparison of mean and standard deviation for barriers in the use of TQM**

Source: authors' elaboration



According to Bain & Company's (2018) research, the TQM management tool is used by 34 % of the enterprises surveyed (on average). In the conditions of Slovak business environment, the use of all modern managerial concepts and tools undoubtedly at a lower level. In this regard, we set the following hypothesis:

H3: We assume that more than 25 % of enterprises in the industry sector use the Total Quality Management as a tool for managing their performance.

To verify this hypothesis, we used the method of the proportion of a given phenomenon in the population. The calculation consisted in determining the individual variables where the first variable was replaced by a coefficient converted from the percentage of enterprises using the TQM. The second variable contained a coefficient of percentage of enterprises not using the TQM. For a complete calculation, we have also used the value of total number of respondents who participated in the questionnaire research. To acquire a relevant result, we used a determined rate of reliability. In our case, the value was at the level of 95%, which is evaluated by the coefficient 1.96. The results are shown in Table 5.

**Table 5: Results of testing the third hypothesis**  
**Method of proportion of given phenomenon in population**

$\hat{p} = 0.3456$ $\hat{q} = 0.6545$	$p = 0.3456 \pm 1.96 * \sqrt{\frac{0.3456 * 0.6545}{191}}$ $p = 0.3456 \mp 0.0344$ $0.2781 \leq p \leq 0.4130$
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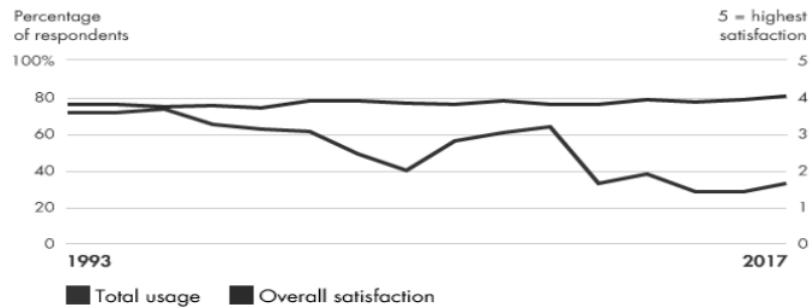
Source: authors' elaboration

The results achieved ranged from 27.81% to 41.30%. As the minimum value is above the 25%, we can confirm our assumption and accept the last hypothesis.

### Discussion

TQM as well as the other most common performance management systems are the subject of many research studies and consulting companies. Therefore, we can compare the results of our research with already realized studies. Our assumption that financial resources are among the most significant reasons preventing the use of TQM is confirmed by CIMA's (2018) research. This organization attributes up to 35% to this significant factor. The problem is mainly the high financial costs for the implementation of the instrument, but also the relatively high wage requirements for the well-trained employees. High financial resources can also be caused by the use of TQM related to its updating, processing or innovations. Our research also found that TQM is relatively underutilized in Slovak business environment. However, the situation is significantly different in Western European countries - according to Gartner's Group (2018), more than 53% of large enterprises report using the TQM concept in practice. World-renowned research on

modern management tools is also presented by Bain & Company (2018), which indicates that more than a third of companies use this sophisticated performance system. Bain & Company is also focused on revealing satisfaction with the use of individual top management tools (see Figure 3).



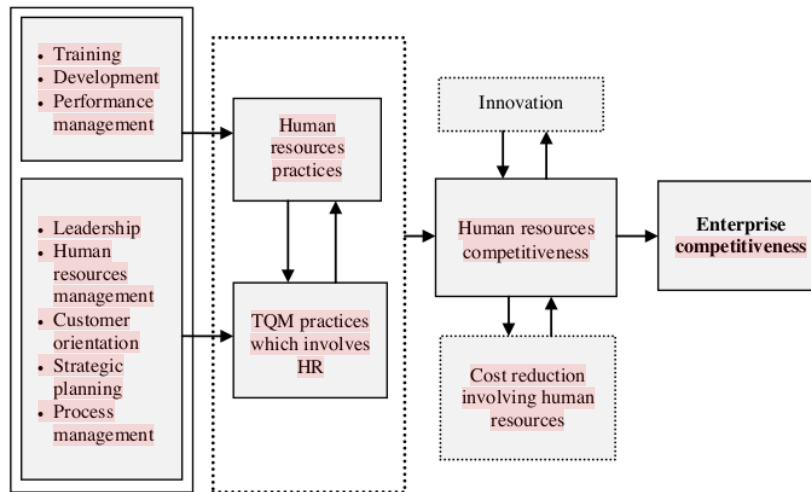
**Figure 3: Comparison of total usage and overall satisfaction with the use of TQM**  
Source: Bain and Company (2018)

Based on the above it can be concluded that TQM concept indicates the relatively high satisfaction ratings and it is one of the leading, preferred, and frequently used performance tools worldwide. Research conducted by Bain & Company (2018) also states that the TQM is used mainly in large enterprises, while the use in SMEs drops to 5%. The preference of using the TQM tool in large enterprises is also confirmed by our findings, since the statistically significant relationship between the size of the company and the use of the TQM was confirmed. In Slovak engineering industry, the issue of this management tool was addressed by the authors Pawliczek and Piszczur (2013), who analysed the TQM system in relation to ISO standards 9000 and 14000. The statistically significant relationship between the implementation of ISO standards and the use of TQM was confirmed, as well as the TQM utilization rate at the level of 22.40%. The research by authors Galová et al. (2018) conducted in the Czech Republic on a sample of 118 industrial enterprises revealed that around 39% of them use the TQM tool to ensure performance improvement. Střiteská and Svoboda (2012) also carried out research in the Czech Republic. Based on the results, the authors report up to 29% use of quality performance measurement systems in practice.

### Managerial implications

In this paper, we addressed the analysis of the TQM and revealed its relatively sufficient use in industrial companies operating in Slovakia. However, compared to other developed countries (including the Czech Republic), the use of this

sophisticated performance management system is inadequate, which has led us to identify the barriers causing this situation. The most significant reasons for which Slovak industrial enterprises do not use the TQM in managing its performance include ensuring a qualified workforce and financial resources. A skilled workforce is an important part of human capital, which increases the potential productivity of the company and thus meet the expectations of owners and investors. In addition to land, labor, physical capital and technological progress, human capital is another determinant of the sustainable economic growth. It contributes to a faster spread of technological progress, increases the efficiency of the use of physical capital, and contributes to higher productivity.



**Figure 4: Relationship between human resources model – the Total Quality Model**

Source: Izvercian et al. (2014)

The above Figure 4 illustrates the relationship between the human resources and the TQM. The return on investment in human capital is usually a long-term issue, as this investment is not usually associated with a specific person. In this regard, a qualified workforce can successfully implement and manage the TQM concept and thus meet the company's goals and improve its performance in the long term. This process would contribute to increasing the TQM use in Slovak companies and improve our attitude to modern performance management systems as we are lagging behind other developed countries in this area (Izvercian et al., 2014).

Nowadays, it will be necessary to accept an effort to digital transformation and creation a comprehensive digital business model according the challenges of Industry 4.0, with focus on main drivers and driving forces – educated and skilled

human resources, ecoinnovation, modern technologies and international culture. Nowadays, when there is no doubt that innovation is synonymous with success, it is crucial to take advantage of all opportunities to strengthen customer relationships (Štefko et al., 2019).

### Conclusion

The subject of our research was the TQM management tool analysed in industrial enterprises operating in Slovakia. Out of the total number of questionnaires sent, we received feedback from about one third of the respondents. From the answers obtained, we conclude that the most significant barrier affecting the implementation of TQM within the Slovak industrial enterprises is the lack of qualified workforce. Other relatively noticeable reasons for not using the TQM include insufficient financial resources, lack of awareness of this sophisticated enterprise performance management tool and insufficiently clear definition of the enterprise strategy. Based on the results of the study, we concluded that the TQM concept in our country has a lower utilization rate compared with developed countries. In this regard, we tried to introduce the TQM as a modern management tool that will enable to increase the sustainable enterprise competitiveness and present it as a suitable tool for measuring and managing its overall performance.

Every conducted research has its own limits. The first limit of this study is the research sample, which was limited only to the industry sector. Exploring other sectors would allow us to have a more comprehensive overview of the use of TQM in Slovak business environment. Another limit of this research study is the return rate of questionnaires - a higher number of respondents would ensure more relevant results. These limits motivate us to carry out further and more detailed research on performance management tools and digital systems. In our opinion, these modern management concepts will enable the enterprise to increase its performance and thus contribute to higher competitiveness in the market worldwide.

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### TQM JAKO NARZĘDZIE KONKURENCYJNE W PRZEDSIĘBIORSTWACH NA CAŁYM ŚWIECIE

**Streszczenie:** Niniejszy artykuł badawczy analizuje kwestię Total Quality Management (TQM) jako dynamicznego narzędzia do zarządzania i poprawy wydajności i konkurencyjności przedsiębiorstw. Analiza empiryczna koncentrowała się na obecnym stanie stosowania tej koncepcji, a także na identyfikacji barier, które uniemożliwiają jej zastosowanie w praktyce. Aby zweryfikować hipotezy zdefiniowane zgodnie z przeglądem literatury, zastosowano odpowiednie metody badawcze. Weryfikacja statystyczna wykazała, że wielkość przedsiębiorstwa ma statystycznie istotny wpływ na korzystanie z TQM, a brak wykwalifikowanej siły roboczej i zasobów finansowych jest jedną z najbardziej zauważalnych barier w korzystaniu z TQM w praktyce menedżerskiej. Jeśli chodzi o implikacje zarządcze, przedstawiono odpowiedni model relacji między zasobami ludzkimi a TQM, z nowością stworzenia kompleksowego cyfrowego modelu biznesowego zgodnego z wyzwaniami Przemysłu 4.0. Artykuł zawiera także badania, które potwierdzają jego stosunkowo częste stosowanie głównie w gospodarkach rozwiniętych. Badanie potwierdziło, że koncepcja TQM jest stosowana przez ponad 25% przedsiębiorstw przemysłowych na Słowacji i odnosi się do zrównoważonego wzrostu, a także konkurencyjności w otoczeniu rynkowym na całym świecie.

**Słowa kluczowe:** kompleksowe zarządzanie jakością, wydajność przedsiębiorstwa, wykwalifikowana siła robocza, zasoby finansowe, konkurencyjność.

#### 全面質量管理作為企業競爭力的管理工具

**摘要:** 本文研究了全面質量管理 (TQM) 作為管理和提高企業績效和競爭力的動態工具的問題。實證分析的重點是使用此概念的當前狀態，並確定阻礙其在實踐中使用的障礙。為了驗證根據文獻綜述研究定義的假設，採用了適當的研究方法。統計核對顯示，企業規模對TQM的使用具有統計學上的顯著影響，並且缺乏合格的勞動力和財務資源是在管理實踐中使用TQM的最明顯障礙。關於管理意義，提出了人力資源和TQM之間關係的合適模型，並根據工業4.0的挑戰創建了一個全面的數字業務模型。該文件還包括一些研究，這些研究證實了它主要在發達經濟體中使用相對頻繁。我們發現，斯洛伐克超過25%的工業企業使用了TQM概念，並提到了全球市場環境中的可持續增長和競爭力。

**關鍵詞:** 全面質量管理，企業績效，合格的員工隊伍，財務資源，競爭力。



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