

Review Paper

Impact of Total Quality Management in Productivity

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ABSTRACT

The goals of the study are to draw conclusions about the use of total quality management to increase the efficiency of the functioning of companies (especially in developing countries), and to assess what indicators of their performance it affects. The main methods in the framework of the study can be considered analysis, modelling, formalization, abstraction. The paper describes the essence of total quality management, its philosophy, and application features. Also, a statistical analysis was carried out on the basis of data from American enterprises, which assessed some main characteristics of the activities of enterprises using total quality management and not. A similar study was conducted for enterprises in some developing countries, in which the main indicators were revenue, net profit, and asset growth rates. During the analysis, the author came to the conclusion that the application of the overall quality management strategy increases the overall efficiency of the functioning of companies by increasing the growth rate of net profit.

HIGHLIGHTS

- In modern conditions of the functioning of the economy, competition between enterprises is becoming increasingly fierce.

Keywords: Liberalization, marketing, entrepreneurship, developing countries, modelling

The modern conditions for the functioning of the economy, in the realities of the rapid pace of technology development, open access to information, increased data transfer rates, trade liberalization, and a greater level of freedom of movement of factors of production (Guzel *et al.* 2021; Contractor, 2021), create such a situation, in which it becomes increasingly difficult for companies to maintain their position in the market. Most countries do not actually have the ability to pursue protectionist policies in order to protect their own enterprises due to the need to adhere to the principles of the World Trade Organization (WTO) (Chemutai and Escaith, 2017). This causes an increase in the rate of global specialization, which has a twofold effect on states' economic development (Dosi *et al.* 2022).

From the point of view of the economic theory of international trade, such trends increase the overall well-being of the population (Salvatore,

2014). On the other hand, they increase risks and can negatively affect the development of individual developing countries: unable to start their own production and surviving only through the export of resources, poor countries suffer from a lack of jobs and a high level of poverty. For countries and enterprises, it is still relevant to find opportunities to increase the competitiveness of business, both in developed and developing countries. One way to achieve this goal is total quality management (TQM), the essence of which can be stated as the creation of such an atmosphere within the company, within which employees and employees will be in conditions that can ensure a gradual and constant increase in the quality of their products (Dihardjo and Ellitan, 2021).

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S. Chauke *et al.* (2019) evaluated the process of development and change in the context of the evolution of understanding and application of the concept of total quality management, during which several time periods were identified and described the existing trends in the use of TQM companies.

A.H. Jbeily (2022) conducted his research in Lebanon, and N.H. Alsefri and H. Mugharbil (2021) in Saudi Arabia. Scientists note that within the studied companies, there was a clear relationship between the use of TQM and their economic efficiency. It is worth paying attention to the fact that the application concepts were studied within the public sector. I.A. Musenze and M.S. Thomas (2018) described a model for the application of total quality management in Uganda based on analysed data from more than 200 local governments.

MATERIALS AND METHODS

During the research, the author used a significant number of different kinds of scientific methods: an analysis, given the large amounts of data used to form that other kind of conclusions; modelling, a several models were described, from one side or another, illuminating the essence of the concept of total quality management; methods of formalization

and abstraction; statistical methods for collecting and processing data.

As part of this study, an analysis of statistical data was carried out to determine how the application of the TQM strategy affects the financial performance of the company. For this purpose, 40 companies were selected, 20 of which adhere to this strategy, and the other 20 do not. Their list can be seen in Table 1.

As it can be seen from Table 1, most of the companies provided in the study are American, the reason for which is their large number, as well as the availability and openness of all the information necessary for the study. The indicators of these companies were analysed by several indicators, namely: sales, production cost, revenue, net profit, liabilities, assets, as well as the value ratios Liabilities/Assets (L/A). Using the value of these indicators in 2017 and 2021 (with an interval of 5 years), it is possible to determine the current development trend of this group of companies and the average growth (decrease) rates. A similar study was conducted for companies in developing countries (Table 2).

The companies analysed in Tables 1 and 2 were selected randomly, and the only criterion for getting

Table 1: List of analysed US companies

No.	Apply	Do not apply
1	Chevron Corp.	A.O. Smith
2	Exxon Mobil Corp.	Abbott
3	3M Co.	Activision Blizzard
4	General Motors	ADM
5	Apple Inc.	ADP Inc.
6	Google Inc.	AES Corporation
7	Intel Corp.	Agilent Technologies
8	Honeywell	Bed Bath & Beyond
9	Microsoft Corp.	Cablevision Systems Corp.
10	Motorola Solutions Inc.	Philip Morris
11	NetFlix Inc.	Alpha Natural Resources
12	NVidia Corporation	Baker Hughes Inc.
13	Ford Motor Company	Edwards Lifesciences
14	Johnson & Johnson	Amphenol Corp A
15	Starbucks Corp.	Rockwell Automation
16	Toyota Motor Company	Applied Materials Inc.
17	McDonald’s Corp.	eBay Inc.
18	Tesla	Kimberly-Clark
19	Boeing Company	Visa
20	Walmart	Ball Corp

Table 2: List of analysed companies of developing countries

No.	Apply		Not apply	
	Country	Company	Country	Company
1	Brazil	Eletrabras	Brazil	Banco Itaú Unibanco
2	Brazil	Companhia Siderurgica Nacional	Brazil	WEG Industries
3	India	Indorama	Brazil	Votorantim
4	India	Mahindra & Mahindra Ltd. (M&M)	India	Oil and Natural Gas Corporation
5	India	Eicher Motors Ltd.	India	Bharat Petroleum Corporation Ltd.
6	India	SRF Ltd	India	Angel One
7	India	Tata Steel	India	Bharat Forge
8	India	Datamatics Global Services Ltd.	India	Biocon
9	Indonesia	Astra International	India	Bombay Dyeing
10	Indonesia	Gudang Garam	India	Dynamatic Technologies Ltd.

into the list was the fact of using or not using TQM. Three indicators are analysed for developing countries: revenue, net profit, and assets. Given these data, conclusions can be drawn about the impact of TQM on the development of enterprises. Thus, the hypotheses that were considered in the work are the following: H_1 (the application of the TQM strategy causes an increase in the number of manufactured products (sales) of the company); H_2 (TQM has a positive effect on the company's net income).

RESULTS

TQM is described as a separate way of thinking that prevails within an organization, the essence of which is to increase the efficiency of the enterprise and achieve better production quality (Chauke *et al.* 2019). Total quality management can be divided into two components: philosophy and tools. Interaction within the framework of total quality management is carried out taking into account the TQM philosophy, which is moving into the implementation stage. At the same time, the TQM philosophy includes the following factors: absolute customer orientation; empowering employees, involving them in production processes and exercising property rights; continuous improvement; use of systematic approaches to management (Khan, 2003).

In the 1960s, quality management was based on organizational processes, in the 1980s on improving product design, and in the early 21st century on applying the best approach to customers (Chauke

et al. 2019). With regard to the tools used within the framework of the overall quality management, at the moment, tools are used that are based on more detailed interaction between employees. Among them are brainstorming, using the method of continuous improvement (kaizen), building a "house of quality" and others.

The productivity of an enterprise is the ability of a company to produce a certain number of products. Although such a factor seems to be important for the subsequent development of the enterprise, however, in fact, it does not always remain so, since the enterprise in this case does not necessarily receive the highest net profit. This is due to the interaction of fixed, variable, marginal, and gross production costs (Fig. 1).

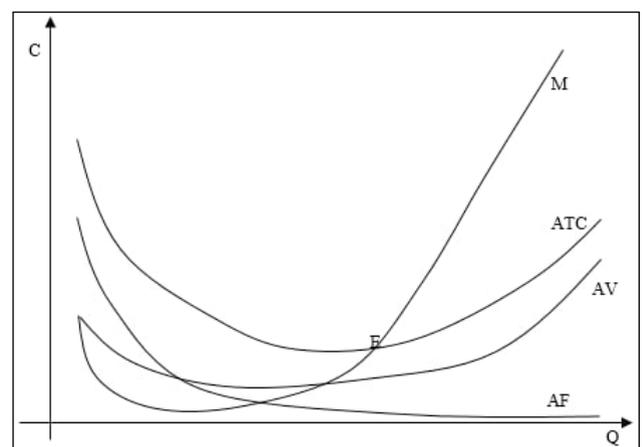


Fig. 1: Interaction of fixed, variable, marginal, and gross cost curves for enterprises

Note: C – costs; Q – production volume; MC – marginal cost; ATC – average gross costs; AVC – average variable costs; AFC – average fixed costs.

As can be seen from Fig. 1, with an increase in production volumes, average costs decrease up to a certain point, but the greatest efficiency occurs when marginal costs equal the average gross, that is, at point E (Mateer and Coppock, 2020). Although it is worth noting that such behaviour can be considered justified in some cases: in particular, if the company has the goal of capturing as much of the market as possible while sacrificing some profits, such an approach may be justified (Ren and Huang, 2020; Wu *et al.* 2021). The data after the study is provided in Table 3.

Table 3: The rate of average annual change from 2017 to 2021 of some indicators of enterprises using or not using TQM, %

Index	Do not apply TQM	Apply TQM	Difference
Sales	6.95	8.85	1.9
Cost price sales	6.13	8.15	2.02
Revenue	8.18	8.61	0.44
Net profit	22.39	25.9	3.51
Commitments	3.57	8.61	5.04
Assets	4.93	8.51	3.58
L/A ratio	-1.74	0.73	2.47

Source: Compiled by the author based on data from the statistical source Macrotrends (2022).

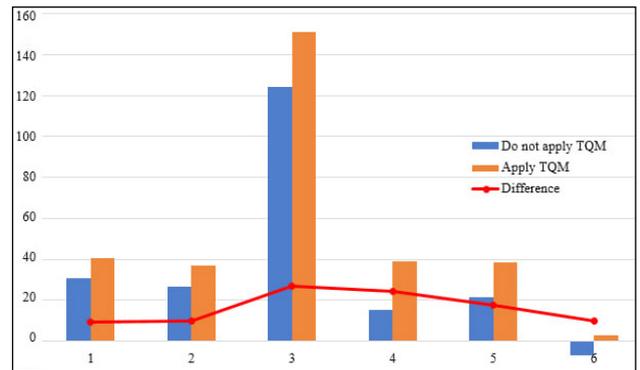
In Table 3, data are provided as the average percentage change in the corresponding indicator of 20 companies in the context of 2021 and 2017. This can be represented using the following formulas:

$$n_1 = \frac{n_{2021}}{n_{2017}}, \dots(1)$$

$$n = \left((n_1 * n_2 * \dots * n_{20})^{\frac{1}{20}} \right)^{\frac{1}{4}}, \dots(2)$$

where: n_1 – value factor n for the first company; n_{2017} – factor indicator in 2017; n_{2021} – factor indicator in 2021; n – the final value of the factor for 20 companies. Thus, a value of 6.95 for sales of enterprises using TQM indicates that sales over 5 years grew by an average of 6.95% each year. To find the difference, the values of companies that do not apply TQM were subtracted from the value of companies that use it. It should also be taken into account that some of these indicators are positive (sales volumes, net income, and assets), and some are negative (cost

of sales, liabilities, and L/A value). The data from Table 3 can also be presented graphically, as shown in Fig. 2.



Source: Compiled by the author based on data from the statistical source Macrotrends (2022).

Fig. 2: Data on the change from 2017 to 2021 of some indicators of enterprises using or not using TQM in the form of a histogram, %

From Table 2 and Fig. 2, it can be seen that enterprises that use the TQM strategy in their business processes are ahead of others in terms of sales growth, increase in net profit, and asset growth. It can be concluded that the application of the TQM concept is generally beneficial for companies since it allows increasing revenue and net income. In the event of a crisis, increasing liabilities can be dangerous. The data were obtained after analysing the financial performance of developing countries (Table 4).

Table 4: The rate of average annual change from 2017 to 2021 of some indicators of enterprises using or not using TQM, %

Index	Do not apply TQM	Apply TQM
Sales	3.33	3.59
Net profit	-3.53	4.02
Assets	7.01	3.01

As can be seen from Table 4, the results for companies in developing countries are generally similar to those obtained for developed countries: the growth rate of sales and net profit of companies using TQM, on average, outperform companies that do not use this concept. This is especially noticeable for the net profit indicator, which turned out to be negative for companies that do not apply total quality management. The opposite situation is with the growth rates of assets, which turned

out to be higher for these enterprises, which, however, is not necessarily a good indicator, since the growth of assets can occur, among other things, due to the growth of borrowed funds, which generally negatively affects the company. Thus, both hypotheses H_1 and H_2 provided at the beginning of the work can be considered confirmed: enterprises using TQM generally have high growth rates in sales and net revenue, both in the context of developed and developing countries.

Albanian enterprises have made significant progress in their development in recent years, including small and medium ones. However, the huge amounts of funds they use are often wasted due to inefficiencies in their management (Teta *et al.* 2019). Based on the statistical information analysed above, it can be concluded that the introduction of such a concept could increase the quality of functioning of Albanian enterprises, their output volumes, and net profit. The current situation in Albania in terms of the awareness of enterprises about the importance of TQM is ambiguous. Many companies have a low level of awareness of the implementation of TQM and its benefits, they do not accept the procedures, tools, methods, and principles of total quality management, and they do not know the concepts of determining and applying market advantages, including competitive advantage; Most Albanian firms are not very familiar with the process of standardization and certification and do not see it as a way to capture a larger share of the market, but only as an opportunity to participate in tenders and public procurement (Ceko, 2011).

DISCUSSION

The essence of TQM is considered in the work by R. Elhawi (2022). The scientist points out that at the present stage, total quality management is considered as a philosophy with which organizations can manage processes and systems and compete in world markets. It shows that the principles that are applied within the framework of this concept can be considered effective in achieving the intended goals. The formation process and the contribution of individual scientists to the development of the TQM concept were studied by S. Chauke *et al.* (2019). The scientists come to the conclusion that the application of the TQM concept allows for an increase in efficiency in terms of procurement

processes, the quality of operating systems, production, customer satisfaction and the firm's profitability in a competitive environment.

K.B. Hendricks and V.R. Singhal (1997), based on a sample of 463 firms, showed that the use of TQM allowed companies to increase operating income, sales, and ambiguously affected the cost of products sold (depending on the time period used, the results could be either better or worse). In general, this study shows that the concept of TQM should be applied by companies to increase their own productivity. J.H. Khan (2003) analyses the essence of the TQM concept, draws conclusions about its effectiveness, and also describes the prospects for its application in Pakistan. He believes that TQM allows for more efficient use of the company's resources used for the production of products, to fully satisfy the existing demand for products among potential buyers and, in general, to achieve better financial results.

A high relationship between the efficiency of enterprises, their effectiveness, and the application of the TQM concept was noted in the work of A.H. Jbeily (2022), in which scientists come to similar conclusions after analysing the development of total quality management in Lebanese enterprises. This is also in the article by N.H. Alsefri and H. Mugarbil (2021), where the study is based on organizations in Saudi Arabia. Scholars point out that organizations that already adopt this approach gain a significant advantage over their competitors in terms of product quality, service quality, work environment, and employee productivity.

The application of the TQM concept not only for private sector enterprises but also within the framework of public administration is assessed in the work of A. Qefalia and E. Pojani (2011). Scholars believe that politicians in the CEE countries (Central and Eastern Europe, including Albania) should more actively implement the application of the principles of total quality management in order to be able to achieve better results in the management process in government structures. It is worth noting that for state-owned companies, there is no single product that is produced within the organization. This is due to the fact that most government agencies are engaged in the provision of various kinds of services for the population and other companies.

It is worth noting that the application of the concept of TQM in the public sector was also studied by K.M.S. Abukhadera and D.C. Onbasioglu (2021). Their research focused on how TQM could impact the performance levels of employees in public hospitals in Turkey. Thus, on the basis of statistical analysis, the scientists also noted that the application of the principles of total quality management should increase the efficiency of the functioning of public hospitals. The application of this concept was also demonstrated in the work of I.A. Musenze and M.S. Thomas (2018) within the framework of local self-rule in Uganda. Scientists describe application model TQM for these subjects and described the reasons for the effectiveness of its application.

The results turned out to be more pronounced for developed countries, which is associated both with the gradual devaluation of the currencies of developing countries, and more favourable conditions for the functioning of US companies (which were analysed in the work), which in general allows them to achieve better performance results from the year. in year. Therefore, we can conclude that TQM has a positive effect on the productivity of enterprises, which makes the application of the concept relevant and effective for any company.

CONCLUSION

As part of the study, the authors analysed the essence of general quality management. It has been shown that this concept is more than a set of rules: it should be considered as a philosophy and way of thinking that allows increasing the efficiency of the company's functioning and better satisfy the desires of customers. However, in this case, its implementation can be quite a difficult process, since it may require large periods of time for training employees and top managers.

The work analysed the overall impact of TQM on the development of companies, and the effectiveness of their functioning. To do this, the authors of the study conducted an analysis of data from 40 enterprises for developed and developing countries, half of which applied the principles of TQM, and the other did not. The paper shows the results of statistical data processing, the main among which were: the growth rate of revenue and net profit, as well as assets. As a result, the authors concluded

that total quality management has a positive effect on both productivity (revenue growth rates for companies using total quality management were relatively higher) and operational efficiency (net profit growth rates were also higher).

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