

## APPLICATION OF THE THEORY OF CONSTRAINTS IN THE SERVICE SECTOR

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**Abstract:** Innovations involve changes to strengthen the company's position in hugely competitive markets. McDonald's food chain has always sought to implement the Theory of Constraints (ToC), detecting global weak points to work on. This innovative approach comprises facilitating and cost reduction of production processes or expanding business services. In the article, we evaluate the impact of these innovations using the linear regression method in the McDonald's food chain in Czechia between 2007 and 2020. Our results show that the McCafé and McDelivery services are the most profitable businesses for the expansion of business activities, services and distribution channels. By following successful business models, the food chain reacts intelligently to new market trends in this global competition. Our findings agree with the further pursuit of ventures for expanding business activities.

**Keywords:** theory of constraints; services; gastronomy; quick service restaurant, innovation.

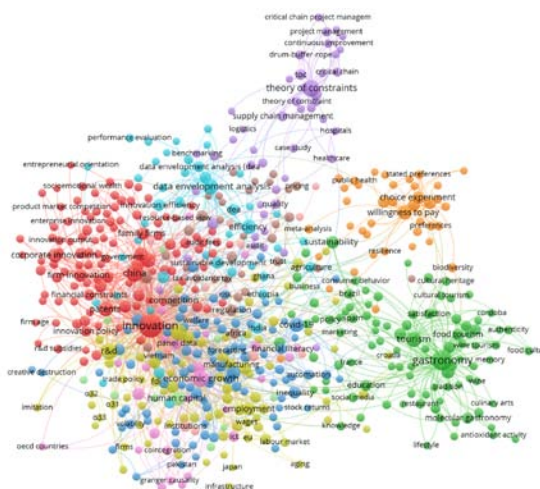
### 1 Introduction

Businesses today are faced with a number of management challenges (Pawliczek et al., 2022, Talíř, M. & Straková J., 2023). A wide range of tools and methods can be used to optimise decision making (Zimmermannová, J., & Čermák, P., 2014; Pawliczek A., & Navrátilová D., 2016; Talíř et al., 2023). This research study applies the methods and techniques of the theory of constraints to the business and service sector. The study focuses on the McDonald's fast food chain, a leading representative of Quick Service Restaurants and its activities in the Czech market.

The theory of constraints is an essential and universally applicable tool, developed in the 80s of the last century and used for production efficiency, which is used most often in the secondary sector of the economy (Watson, Blackstone & Gardiner, 2007). Especially in the new millennium, its elements penetrated the service sector, which was unusual until then (McCleskey, 2020). TOC is a robust tool, significantly interfering with established procedures and is usually very expensive to implement (Orouji, 2016).

An overview of selected studies that mention the application of the modified TOC for use in the service sector is given literature review by Kumar, Siddiqui & Suhail (2020), McCleskey (2020) and Miguel et al. (2017). Beylihan (2018) further states that TOC is a universal tool that can improve the functioning of any business regardless of the area of its operation. Janosz (2018) deals with the possibility of implementing universal steps (based on TOC) in SMEs. Franceschelli (2018) then deals with the possibility of implementing intended innovations in a small gastronomic enterprise. Figure 1 suggests, in professional literature, the connection between innovations in gastronomy and the theory of constraints is not too high.

Figure 1. Overview of ToC, Gastronomy and innovation in current professional literature



McDonald's France developed many international procedures for the global market. Bisson (2020) states that he uses knowledge from TOC when implementing new customer services at McDonald's France and has repeatedly applied them when introducing self-service kiosks or changing the production concept from Make-to-Stock to Make-to-Order. He adds that these techniques can simplify production and partially replace human work. The necessity of these steps then justifies the differences between the unification of the product and different staff approaches and habits anywhere in the world. Campos (2021) explores the innovations in Quick Service Restaurants (QSR), according to whom the sophisticated 3D - Digital, Drive-thru and Delivery system improved McDonald's position on the market.

Baba (2020) and Yaacob (2022) then mention ways of influencing customer behaviour through self-service kiosks. Musfiroh (2020) evaluates the loyalty of customers using kiosks. Bonadonna (2020) deals with a more general concept of phenomena that affect employees and customers of QSR upon implementing innovations. Puleka (2018) deals with the parameters of training new employees when comparing different approaches in individual QSR chains.

This article aims to identify the business procedures and methods applied in McDonald's Czech Republic between 2007 and 2020, based on the techniques of the theory of constraints, and to evaluate their overall influence and impact on the general restaurant business within the limits of monitored factors (McCafé, MTO system, ordering via Self-Order kiosks and McDelivery delivery).

In the horizon of the mentioned years, it is possible to obtain relevant input data, the data before 2007 are qualitatively insufficient, and the development in 2021 has yet to see its publication in many cases.

The Labor-to-sales ratio allows evaluation of this phenomenon, which should decrease with the realization of each monitored innovation. Due to the conducted research, it will be possible to evaluate which of the listed factors most influence this indicator or to decide whether it is better to implement innovations to increase sales (outputs and performance) or implement procedures for replacing employees with technologies.

RQ1: Considering the evaluation of influences in time series and the measurement of the resulting effectiveness, it is appropriate to identify which analyzed ToC-based procedures lead to maximum savings and can be considered the most effective or

decide if it is better to reduce the number of employees for the same services (for cost reduction) or retain employees and expand the portfolio of services (to increase revenues)? Solving the research question will provide prerequisites for solving RQ2. RQ2: Furthermore, it is advisable to find how to convert the mentioned steps into a universal format suitable for the gastronomy industry (or the service industry in general). Especially in the gastronomy sector, costly innovations do not usually speed up the production process, so it would be appropriate to identify a way of possible universal implementation. Answering the research question will fulfil our aim. At dignissim nisi. Nam viverra metus ut neque lacinia faucibus. Cras viverra sagittis lorem vitae ornare. Morbi euismod elementum orci. Donec ut aliquet ligula. In nibh lacus, facilisis ut ultricies id, porttitor ac dui. Curabitur ultrices lacinia ornare. Morbi eros ipsum, rhoncus sit amet congue in, vulputate id tellus. Nulla ipsum libero, vehicula vitae hendrerit at, ultrices nec nisi. Nullam vitae diam sit amet leo accumsan iaculis at sed urna. Nulla tincidunt aliquam laoreet. Vestibulum at ipsum metus. Sed mollis consectetur pellentesque. Sed fermentum hendrerit purus, vel facilisis urna fermentum quis.

## 2 Literature review

Innovation is a necessary part of any business that wants to achieve long-term sustainable growth or an established company that wants to maintain a strong position in today's highly competitive market. Like manufacturing companies try to improve their productivity by introducing innovations in production, companies in the service sector try to optimize their processes effectively. QSR food chains are no different, spanning the world with thousands of branches. QSR chains such as McDonald's, Subway, Burger King or Wendy's are constantly trying to use potentially suitable strategies to expand their service portfolio or to reduce costs.

The crucial factor for a successful business in the initial phase is the choice of location. Hladkyi (2019) analyzed the distribution method of McDonald's restaurants in Ukraine, where branches located in residential areas and housing estates achieved the highest sales. Wu (2021) emphasizes the factors behind choosing an appropriate location. He conducted his research in Beijing, China, where food chain branches span most commercial centres. This article does not deal with the issue of location, as it cannot be influenced or perceived as an innovation. Singh (2021) further examines innovation in QSR during normal operations, tracing the interrelationship between product innovation (PI), customer satisfaction (CS) and service innovation (SI). He concluded QSR's competitiveness rests on continuous innovation. Lubetsky (2020) further states the service area, especially QSR, has been lacking digital refurbishment for a long time even though the Covid-19 pandemic and consumer trends before the crisis forced restaurants to adopt the given system. One of the most fundamental innovations in the 21st century in the field of QSR (as well as in other industries) is the introduction of self-service kiosks for handling customer requests (Vakulenko, 2019). According to Leung (2021), self-service kiosks in QSRs can very well substitute cashiers, receiving consumer preferences over human-operated cash desks. On the other hand, cashiers can generate more revenue. Rastegar (2021) conducted a service analysis, exploring the advantages of self-service kiosks in QSR. He confirms that self-order stalls reduce costs, speed up customer service and increase order accuracy. The author conducted a survey covering 619 respondents, who expressed their preferences on a scale from 1 to 5, evaluating the experience of their last visit to QSR McDonald's. The findings suggest that customers would even be willing to pay \$2.47 for faster, more advanced service. Vakulenko (2019) analyzes the types of customer value derived from using a self-service kiosk. On a larger scale, Chua (2020) explored customer preferences in all types of restaurants, classifying them into full-service, quick-casual and quick-service. His survey of 617 respondents indicated price as the critical factor, followed by Word-of-Mouth, Personal Experience and Variety of Menu Items. On the contrary, the least significant aspects are Sales promotions and e-Reviews from customers.

Based on research conducted in Malaysia, Ahmad (2019) states that self-service kiosks do not reward all industries. While they can represent competitive advantages in the restaurant business, their implementation in hotels was not worthwhile, as it reduced the quality of the service provided. However, Lubetsky (2020) does not consider self-service kiosks the only key innovation, including delivery service, often with the participation of third parties, as equally vital. Campos (2021) also states that among the three main advantages of McDonald's in QSR is the "three D's": digital, drive-thru, and delivery, which made the restaurant a market winner during the Covid-19 pandemic. The issue of order delivery is dealt with more by Andari (2018), who, based on a questionnaire survey, compared data from 200 respondents in Europe, the USA and Indonesia, finding differences in customer loyalty. Chadwick (2018) highlights that QSR restaurants are easy to adapt to a delivery service and points to its advantages and disadvantages, which can be handled in-house or outsourced. Since McDonald's hires third-party import services, professional literature does not give much information. Likewise, very little research explores the new Market-to-Order (MTO) manufacturing model, increasing the average service time of one customer but significantly reducing waste and personnel costs. However, as early as 1993, the restaurant chain started opening McCafé cafes in Australia (Guerguis, 2019) and introduced the same service in the Czech Republic in 2007. Wright (2007) discusses the concept and co-branding arrangement of McDonald's/McCafé and determines the incentives of this joint initiative. We should note that the above does not capture all the possible factors and innovations according to which the financial results of QSR McDonald's can be monitored and evaluated. According to Guerguis (2019), a great novelty is serving the customer at the table, who does not have to wait in line to place an order. Nowadays, the Czech branches follow the abroad model (Panwar, 2017), adapting dishes and drinks to the local market.

Now it is appropriate to propose a suitable indicator for monitoring the development of the restaurant over periods. The service sector and especially restaurants are significantly different from other forms of business - unskilled labour, high employee turnover or relatively high employee costs compared to sales and other discrepancies in financial indicators (Mun, 2018). According to TGG Accounting (2021), the labour costs ratio (personnel costs) to sales should be 40-45% for gastronomic enterprises, even if we must tailor the final value to the specific business. This situation creates pressure to achieve better results with existing personnel costs or the same results with lower personnel costs. Bisson (2020) agrees with the idea, suggesting replacing workers with machines to reduce costs (among other things). An indicator of the working costs-sales ratio will help evaluate the business development, expressed as the Labour-to-Sales ratio (Kcard, 2020). An increasing value means deficiencies in resource allocation, while a decreasing value over time indicates improper use of resources. Chuang (2016) mentions the labour-to-sales ratio as a tool to monitor corporate business or economic development. TGG Accounting (2021) adds that this procedure is suitable for overseeing restaurant business development.

Furthermore, we must determine a suitable method of measuring factors of the above-mentioned monitored indicator, suggesting time series of advanced statistics and econometrics for the analysis and evaluation. This technique is essential mainly for covering a relatively large number of fluctuations in a small amount of data influenced by external conditions, especially economic cycles. We must note that modified time series methods for data processing currently span professional literature, e.g. Maharaj (2019). Our analysis favours a regression analysis method, which enables the prediction of future developments. The technique uses least squares to rewrite a linear function with superstructure elements of a polynomial and expresses the degree of reliability using a correlation coefficient (Kim, Lee and Kim, 2020; Ho, Ngo and Le, 2021). The development of a time series indicator can also be evaluated and analyzed based on forecasting-based methods, as reported by Cerqueira (2020) or Liu (2021). In this context, Sezer (2020)

provides suitable methods for analyzing time series of an economic nature. Wu (2020) further mentions a labelling method to explore financial time series.

Furthermore, it is necessary to focus on methods and procedures that allow completing (calculating) missing data in time series. Due to the nature of the data and the high number of sources, some data are unavailable, but this error rate is less than 3 % of the whole case. Van Buuren suggests general procedures and principles for replacing missing data (2018), while Little and Rubin (2019) provide a comprehensive overview of suitable solutions for specific statistical techniques. Both authors classify and explain basic methods (and specific procedures) involving data set reduction, imputation, multiple imputations or the maximum likelihood model. Madley-Dowd (2019) suggests avoiding Multiple Imputations (MI) if there is more than a negligible amount of missing data in the research sample. Due to the relatively small length of the time series, it is not appropriate to replace the missing data with a time series trend based on linear regression. Finally, Zhang (2022) recommends classifying the availability of neighbouring values and a small length of the time series to complete the data. This procedure is a linear interpolation of values.

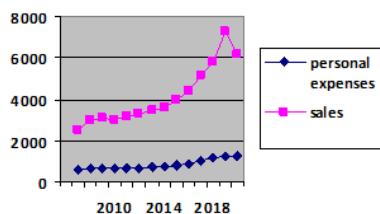
In order to collect and process data, the procedures below are used. Data for answering the first research question are obtained from the financial statements and annual reports of a total of 25 companies that are individual franchisees of the McDonald's chain in the Czech Republic. Data processing is carried out using the statistical method of linear regression, which enables the explanation of the influence of individual factors. Data to answer the second research question are obtained from the previous research question. The processing is subsequently carried out on the basis of qualitative procedures and synthesis of the knowledge obtained.

**3. Data & Methods**

This part suggests data, methods and procedures applied to answer research question RQ1.

The reliable Labour-to-Sales indicator requires relevant data that show the development of sales and the development of personnel costs. These data can be obtained from the annual reports, reflecting the 14 years of 25 relevant companies (24 franchisees and one parent company) operating in the Czech Republic in the observed time horizon of 2007 and 2020. Chart in Figure 2 suggests the development of the Sales and Personal expenses indicators.

Figure 2. Development of personnel costs and sales of the McDonald's chain in the Czech Republic from 2007 to 2020.



The figure shows a high increase in sales, reliably outspeeding the cost increase, especially from 2014 to 2019. We can see a significant drop in sales in 2020, reflecting the period of the Covid-19 pandemic. As a result of this negative influence, the year 2020 is not further monitored or taken into account in research, as it causes a lower quality of data.

Another input value is the equipment of McDonald's restaurant branches in the Czech Republic measured by innovation factors. These include (1) Self-service ordering kiosks, (2) McDelivery delivery service, (3) implementation of the Make-to-Order (MTO) production process and (4) creation of a network of

McCafé cafes. The necessary information reflects the annual reports of individual restaurants, supplemented with data from our research.

Before using the mentioned data, we must find correlated variables - determine Pearson's Correlation coefficient using IBM SPSS software. Table 1 compares data covering only the period between 2007 and 2020.

Table 1. Correlation between individual factors - output from SPSS

		SOK	McDelivery	MTO	McCafé
SOK	Pearson correlation	1	614*	999**	650*
	Sig (2-tailed)		0.025	0.000	0.016
	N	13	13	13	13
McDelivery	Pearson correlation	614*	1	635*	0.380
	Sig (2-tailed)	0.025		0.020	0.201
	N	13	13	13	13
MTO	Pearson correlation	999**	635*	1	653*
	Sig (2-tailed)	0.000	0.020		0.015
	N	13	13	13	13
McCafé	Pearson correlation	650*	0.380	653*	1
	Sig (2-tailed)	0.016	0.201	0.015	
	N	13	13	13	13

\*. Correlation is significant at the 0.05 level (2-tailed).

\*\*. Correlation is significant at the 0.01 level (2-tailed).

Before using the mentioned data, we must find correlated variables - determine Pearson's Correlation coefficient using IBM SPSS software. Table 1 compares data covering only the period between 2007 and 2020.

The above outputs from the IBM SPSS program point to a strong dependence between the MTO production system and the introduction of SOK, implemented in similar periods. Since Pearson's correlation coefficient reaches a very high value of 0.999, we must exclude one of these factors from further investigation for more reliable results. After the calculation, the variable with a lower p-value, which has a lower predictive value, is discarded, in this case, the information on SOK, but retaining the data on the MTO.

Table 2 below the text illustrates all analysed data over the period, dark-shading the irrelevant information, as it is unnecessary for our research for the reasons stated above.

Table 2. Development of financial data and investigated influences

Year	Financial data		Indicator Labour-to-Sales Share of value	Innovation and influences affecting results			
	Personal expenses (mil. CZK)	Sales (mil. CZK)		SOK	McDelivery	MTO	McCafé
2007	582,31	2 510,42	4,31	0,00	0,00	0,00	0,00
2008	661,81	3 012,78	4,55	0,00	0,00	0,00	0,00
2009	693,35	3 107,32	4,48	0,00	0,00	0,00	0,07
2010	648,58	3 010,63	4,64	0,00	0,00	0,00	0,09
2011	669,59	3 178,47	4,75	0,00	0,00	0,00	0,27
2012	696,05	3 306,26	4,75	0,00	0,00	0,00	0,45
2013	709,79	3 475,52	4,90	0,00	0,00	0,00	0,48
2014	717,15	3 613,87	5,04	0,00	0,00	0,00	0,54
2015	786,37	3 984,97	5,07	0,06	0,00	0,08	0,56
2016	883,78	4 374,49	4,95	0,43	0,00	0,41	0,6
2017	1 025,90	5 112,45	4,98	1,00	0,00	0,93	0,63
2018	1 195,93	5 811,18	4,86	1,00	0,15	1,00	0,64
2019	1 224,85	7 248,39	5,92	1,00	0,69	1,00	0,66
2020	1 241,65	6 190,57	4,99	1,00	0,74	1,00	0,67

2007	58231	2 51042	431	0.00	0.00	0.00	0.00
2008	66181	3 01278	455	0.00	0.00	0.00	0.00
2009	69335	3 10732	448	0.00	0.00	0.00	0.07
2010	64858	3 01063	464	0.00	0.00	0.00	0.09

In Table 2, it is appropriate to note the long-term increasing value of the Labour-to-Sales indicator (column 4), which confirms the company's efforts to reduce employee costs. The data on innovation effects shown on the right should be statistically evaluated and explained using the Labour-to-Sales indicator. These data were derived from the following resources available in the public domain: <https://or.justice.cz/ias/ui/rejstrik>

Next, we describe the data and procedures applied to answer research question RQ2.

RQ2 reflects the outputs and findings from RQ1, generalized by the generalization method. The information obtained in the investigated phenomenon is verbally generalized to a broad spectrum and confronted with other general discoveries within QSR-type enterprises. Furthermore, we analyse the text presented in literary research. As part of the subsequent analysis of findings, we explore dependencies between the application of monitored factors in gastronomy and other sectors. Subsequently, we synthesize the knowledge to formulate general conclusions.

**4. Results**

Below are the results of statistical analysis processing using the software tool and programming language "R", used for machine learning operations such as regression and classification. Individual findings are further commented on to explain them in this research.

First, it is appropriate to indicate the input call entered into the software tool, for the purpose of data processing. It is worth reminding that we removed the SOK variable from the solution in order to improve the quality of the outputs. Figure 3 shows the Call.

Figure 3. Call to R.

```
lm(formula = Coen ~ MCDeliv + MTO + McCafe, data = VD)
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Further, we present a summary statistic. The output below in Figure 4 provides information about the symmetry of the distribution of the residuals.

Min	1Q	Median	3Q	Max
-0.18982	-0.03668	0.02164	0.07641	0.15000

Figure 4. Symmetry of the distribution of the residuals.

The median should be close to 0, the same as the mean of residuals is 0. For symmetric distributions, the median = mean. Furthermore, the values of 1Q and 3Q should be close to each other regarding magnitude. They would be equal under a symmetric 0 mean distribution. In the same way, the Min and Max values should be similar.

The output obtained by calling the linear regression summary is information about the individual analysed coefficients. This information includes coefficients estimates, standard errors, t-statistics and p-values, which determine the significance level and the importance of individual factors. Figure 5 shows the output.

Figure 5. Linear regression summary

	Estimate	Std. Error	t value	Pr(> t )	
(Intercept)	4.4578	0.0626	71.214	1.07e-13	***
MCDeliv	1.4958	0.2366	6.322	0.000137	***
MTO	-0.2672	0.1318	-2.028	0.073202	.
McCafe	0.9906	0.1759	5.632	0.000321	***
---					
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					

A key indicator in the output for evaluating the results is Pr(>|t|), indicating the individual p-value coefficient. The significance level allows us to confirm or reject the established hypotheses on the given indicator. Therefore, if we proceed from the standard significance level of 0.05, we can say that McDelivery and McCafé services influence the labour-to-sales rates. On the other hand, the Make-to-Order production system does not drag the given index or self-service kiosks, whose p-value was originally even higher.

The confirmation of these factors leads us to conclude that procedures for the extension of services are more effective than procedures leading to the replacement of labour by machines.

The last part of the output is Assessing Fit and Overall Significance, which indicates the residual standard error of the R<sup>2</sup> and the F statistic and test. Figure 6 indicates the model quality and the overall significance of the coefficients.

Figure 6. Assessing Fit and Overall Significance

Residual standard error: 0.1216 on 9 degrees of freedom
Multiple R-squared: 0.9272, Adjusted R-squared: 0.903

We applied a Durbin-Watson test using the durbinWatsonTest() function to indicate potential residual autocorrelations. Figure 7 shows the output.

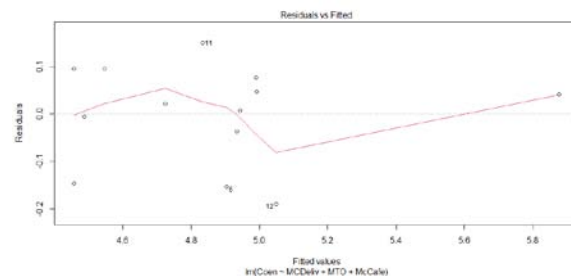
Figure 7. Symmetry of the distribution of the residuals

lag	Autocorrelation	D-W Statistic	p-value
1	-0.3263609	2.478472	0.952
Alternative hypothesis: rho != 0			

The output suggests that the test statistic is 2.478472, and the corresponding p-value of 0.952. The p-value is high, showing no residual autocorrelation. As a result, we cannot reject the null hypothesis that there is no correlation among residuals.

Chart in Figure 8 depicts the linearity assumption of the model.

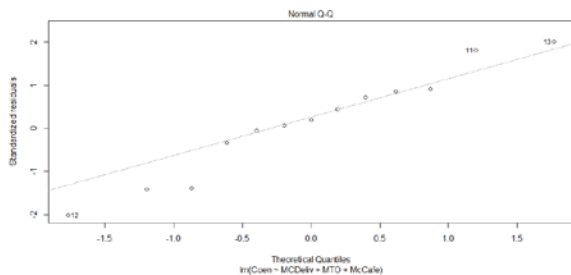
Figure 8. Linearity assumption.



The data are relatively linear, keeping the red curve close to the theoretical dashed line. The figure does not make any specific shape that would show a correlation.

The following Figure 8 observes normality assumption of the model.

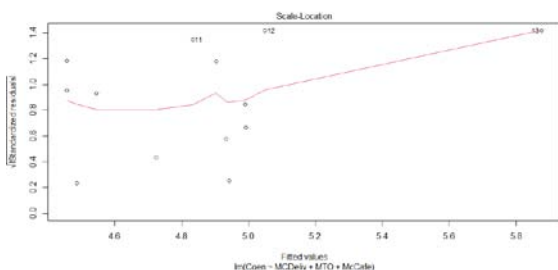
Figure 9: Normality assumption



The figure shows all points close to the theoretical line, indicating a relatively high percentile matching with the standard normal distribution. On the left, we can see variables below the line, partially caused by the standard deviation.

The Figure 10 below depicts a simplified analysis of assumption of homoscedasticity in the model, i.e. same variance in linear regression.

Figure 10: Assumption of homoscedasticity in the model



The constancy of the red function line (horizontal with a slight growing trend) scales with the average of standardized residuals. Since the dispersion around the function does not change with the interspersed values, we can consider the model homoscedastic.

## 5 Discussion

Procedures involved in the Theory of Constraints are costly, discouraging enterprises from their effective implementation. Strangely enough, the service sector has seen a surprisingly rare use of these techniques, whereas healthcare, among others, is reaping the fruits of their successful application (Bacelar-Silva, 2022). Bisson (2020) suggests implementing ToC in gastronomy, especially at McDonald's. The QSR food chain currently pays an arm and a leg to stay competitive, applying the Theory of Constraints to boost production and reduce costs. The presented article explored four decisive factors of implemented innovations over the period, including self-service kiosks to make an order, introducing a make-to-order production system, food delivery and opening McCafé.

Let's go back to the research questions suggested in the introduction.

RQ1: Considering the evaluation of a greater number of influences in time series and the measurement of the resulting effectiveness, it is appropriate to identify which analysed ToC-based procedures lead to maximum savings and/or can be considered the most effective, or decide if it is better to reduce the number of employees for the same services (for in order to reduce costs) or retain employees and expand the portfolio of services (in order to increase revenues)?

Our findings revealed a strong correlation between introducing self-service kiosks and the MTO production system. Although contributory to cost savings, neither factor proved general significance. Simultaneous and similar implementation of both procedures made an accurate identification impossible. Even

upon excluding the less relevant aspect, self-service kiosks, the MTO production system did not prove of utmost importance, despite higher significance levels. On the other hand, McCafé and McDelivery services largely contributed to increased sales, rendering cost-saving procedures economically inefficient.

We recommend that QSR gastronomic chains expand their product and service portfolio, grounded in the success of McCafé and McDelivery. On top of sales growth, the former has become highly competitive with Starbucks or Costa Coffee, while the latter uses existing delivery services like Uber Eats or Wolt. Attractive offers meet the seasonal customer demand for a quality gastronomic experience, becoming fiercely competitive with fine restaurants.

McDonald's could follow current culinary trends of healthy and vegetarian food. Although this idea is far from the original McDonald's concept of tasty yet often unwholesome processed meat, the fast-food chain must adapt to the new market conditions, offering (in the CZ and abroad) vegetarian and vegan sandwiches. McCafé may expand to a "McFresh" separated bar, selling fresh fruit and vegetable drinks, salad and wraps. This new venture would match current market conditions, satisfying the insatiable global demand for fresh products. Considering McDonald's numerous branches, integrating McDelivery services into the business model would cut the costs of external delivery services.

Let's focus on the second research question, formulated at the beginning of this article.

RQ2: Furthermore, it is advisable to find out how can the mentioned steps be generalized into a universally applicable format suitable for the gastronomy industry (or the service industry in general)?

Our findings revealed that expanding the portfolio of activities and employing effective production and distribution strategies will greatly reward gastronomic enterprises. The single steps include providing delivery services and processing their food rather than ready-to-cook or semi-finished products. On top of that, extending the product range using the same procedures will be time saving and benefitting from modern technologies. Rather than generally applicable, these recommendations relate to QSRs to remain competitive.

Although the suggested procedures do not directly apply to ToC methods, they significantly boost corporate profits and help fight off the competition.

## 6 Conclusion

The presented article uses statistical methods to consider effective implementation of selected innovations in the Czech McDonald's food chain, evaluating four independent novelties introduced to remain competitive in the cut-throat market. The business industry has recently seen ample modernization, determining corporate success. Innovations bring benefits like stimulating continuous processes, cost cuts, less time spent on projecting and implementing new products and high efficiency.

The innovations in the monitored QSR reflect the theory of constraints, aiming to eliminate the human factor from the production process. ToC usage spans the professional and business sphere, seeking to identify and exploit limiting factors. Although the techniques may be vital to business success and long-term profitability, the Labour-to-Sales parameter remains unchanged. On the other hand, innovations, i.e., applied theory of constraints, profoundly improve the Labour-to-Sales ratio. Our findings suggest effectively expanding the service portfolio to boost corporate incomes.

Although the suggested ToC methods do not fully reward our case in the gastronomy business sector, they may increase corporate performance. Our survey covered only 104 Czech restaurants (to 31st December 2020), limiting us to an observation of 14 consecutive years, from 2007 to 2020.

Although the total length is reliable, we would welcome measuring in shorter intervals, like a month or quartile. As self-service kiosks and extended (internal) delivery services rank among popular innovations throughout the QSR sector, confronting our findings with other QRSs in the Czech Republic or Europe would go a long way.

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