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Economic Substantiation of Innovative Solutions for Direct Cooperation between Manufacturers and Restaurants

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Abstract: The traditional supply chain management between manufacturers and restaurants is not effective enough, considering its high costs, long turnaround times and reliance on third parties, which creates challenges to profitability and agility. This study aims to find out how this system helps optimise costs and supply chain management within the restaurant industry. Data was obtained through manager interviews for some middling and high-end restaurants presenting some operational issues confronted before and after the system was installed. A sample of 50 restaurants was selected using a stratified sampling technique, targeting various restaurant categories. A structured questionnaire was designed to interview restaurant managers on operational efficiency, cost reduction, and supply chain performance. The logistics costs, transaction costs and overall efficiency improvements, among other quantitative metrics, were monitored for the first and second intervals. To achieve this, the analysis used a difference-in-difference methodology, where restaurants before and after the implementation of the system were compared concerning specific performance indicators. Data was processed using SPSS Statistics 27, ensuring accuracy and reliability in the analysis. The findings show that wastage management cost efficiency has improved to 15%, while significant decreases have also been observed regarding transaction time and logistics costs. This also resulted in a substantial decline in time-to-order delivery which positively influences operational speed. Based on these findings, it is suggested that direct trade models would benefit the restaurant business in terms of cost savings and enhanced performance. The policy recommendations

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include promoting digital supply chain platforms using tax credits, assisting SMEs with government-sponsored projects, and facilitating direct interaction between producers and consumers.

Keywords: Supply chain, Direct trade model, Restaurant logistics, Cost efficiency, Marketplace adoption, Automated technologies

Introduction

The restaurant business, as a sector considered one of the engines of economic development and entrepreneurship, experiences complex supply chain issues in cost management and competition globally (Ku et al., 2020; Swink et al., 2022). In their procurement practices, large organisations mainly depend on suppliers as a party, creating a dominant power primarily to control their operations (Cricelli et al., 2024). Affirmative policies help these processes reduce unnecessary expenses for employees. These inefficiencies prevent most restaurants from realising their total profit and responsiveness to the market segments. Both parties still create a gap that some manufacturers look for ways to fill by looking at the final customers, like restaurants, to expand their areas of growth and even innovation (Toromade et al., 2024).

While the introduction of digital technologies has reshaped many industries, for the most part, the supply chain of the restaurant industry remains afflicted by traditional & middleman-laden processes (Huang et al., 2024b). Modern logistics system designs for restaurant supply chains have been more of technology integration in the restaurant businesses, thus neglecting the opportunities for direct trade from the manufacturers to the restaurants (Abbas & Hussien, 2021). The global pandemic and subsequent crises have only underscored these vulnerabilities and the need for change, which helps to cut the middleman and enhance efficiency in sourcing and logistics (Anderson et al., 2021). However, although some efforts have been made to incorporate direct distribution models, such as digital platforms, that can ease interactions, there is little real-world evidence available that evaluates the impact of such systems on cost savings and profitability (Xu et al., 2023).

Research Problem

The research problem revolves around the dependence of the inefficiencies of the traditional supply chain on the presence of the intermediaries and the room that there is for the manufacturers and the restaurants to complement these gaps (Mitchell, 2024; Wang et al., 2024). Automated communication technologies through negotiation to battle the adverse change of economic crisis to this interaction are the evaluation focus (Volyanyk et al., 2024). The study is structured so that such questions are well-factored provisions considering what is more practical regarding the factors of obtaining the direct trade system in restaurants and how cost-effective this system is in reality, particularly in restaurant productivity.

To cope with these issues, a direct trade system was created between producers and restaurants with relatively sophisticated logistics and e-commerce (Dorneich et al., 2024). For example, the restaurants who were interviewed were targeted since the problems arose in the supply chain itself, and these managers had very useful experiences of how such technologies can be developed to overcome these issues.

Research Focus

The research looks into the cost structure evaluation of direct sales between manufacturers and restaurant businesses, particularly how advanced technologies and automatic means assist in optimising supply chains in the absence of intermediary parties(Greenberg et al., 2024; Ngo, 2023). It intends to analyse the improvements in operational cost, logistical, and transactional processes with actual data collected from restaurant managers and performance metrics (Kolisnychenko et al., 2023). The study will

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address the goal of increasing profitability and reducing operational inhibitions in the restaurant sector by assessing the value of direct cooperation strategies through qualitative and quantitative lenses.

Research Aim

The study's goal is to find out how an electronic market-direct trade system influences cost efficiency in the restaurant segment and prove its contribution to achieving supply chain optimisation.

Research Questions:

1. What is the influence of the direct trade system set up for reducing liabilities to the intermediaries on the cost efficiency of the restaurants in the restaurant business?
2. What critical factors explain the factor efficiency change observed after adopting the system?
3. What issues arise while the direct trade system is in progress, and how can such issues be mitigated?

The originality of this research lies in its attempt to combine and provide economic reasoning for traditional sourcing practices and the new concepts of digitalised supply chains by justifying the use of direct trade models in the restaurant business. This paper is important as it provides a theoretical construct that can be used in practice and replicated in other industries with similar supply chain problems.

This study fills this gap by assessing the economic feasibility of direct trade, which encompasses high-tech logistics and internet markets involving manufacturers and restaurants. This research sheds concrete evidence through Difference-in-difference analysis on how such innovations can enhance cost efficiency in the restaurant industry, thereby creating literature on how effective supply chain management can be transformed in this sector.

This research adds originality to the existing literature, mainly examining direct cooperation among manufacturers and restaurants. It is a novel area within digital supply chain management that still lacks empirical research. The contribution is essential because it convincingly demonstrates the cost-efficiency opportunities of direct trade systems, which may alter the sourcing strategies in the restaurant sector. The research results are important to politicians, restaurant managers, and producers since the given system helps solve operational inefficiencies and increase competitive advantage in a rapidly changing environment.

Section 2 consists of a literature review. Section 3 discusses the methods and materials. Section 4 describes and discusses the results, whereas Section 5 concludes the study.

Literature Review

Most studies highlight restaurant issues (Abdou et al., 2023; Chen et al., 2020; Ghaderi et al., 2024; Hwang et al., 2022; Yost & Cheng, 2021). Singh et al. (2024) investigated the restaurants' utilisation of different elements of digital marketing to enhance and sway customers' buying decisions. The research helped determine the importance of digital marketing by applying the asset-process-performance (APP) framework and especially structural modelling for conducting analysis of relationships among the various variables. Findings revealed that social media, online branding and advertisements, and service quality measures after selling services significantly affected the competitive position of the restaurant business. The study's findings also included some recommendations for practice for practitioners in the industry and regulators on how best to utilise digital marketing to enhance restaurant performance. Future studies develop these arguments by examining customer retention and loyalty enhancement by these digital marketing tools and the impact of new technologies on marketing development in the scope of the restaurant business. Based on extending these topics, however, makes persistent competitive pressure for digital marketing more transparent.

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Moreno-Gené et al. (2023) investigated the typical cost structure and its influence on profitability, mainly revenue for massage centres in Spain, between 2014 and 2019 compared to fine dining restaurants. Using random-effect panel data models, the empirical analyses examined a subsample of 140 Michelin-star restaurants and 388 non-Michelin-star restaurants. The results established that food costs constitute a significant operating cost in the business of restaurants. However, personnel costs went a notch higher for the Michelin star establishments. Personnel and food costs were the most critical but were generally profitable, particularly for larger restaurants. Being a Michelin-starred restaurant increases profitability because customers are willing to pay more. Yet the study pointed out the limited profitability of restaurant businesses with Michelin stars and negative restaurant profitability of most fine dining restaurants and why it would be essential to devise efficient cost management strategies. The Michelin star properties industry is characterised as low-performing, with little emphasis on how specific management practices might change.

Ngo (2023) formulated an appropriate territorial configuration of open innovation as the design used in this research study that seeks to merge one of the two classical strategies- cost leadership strategy versus differentiation strategy- under the base of open innovation. This time, A framework was developed, positing that these strategies link open innovation to business performance. Secondary data gathered based on a sample of 268 restaurant SMEs captured in a PLS-SEM analysis was presented to test this model. The results demonstrated that open innovation separately did not contribute positively to the business performance. Instead, it affected performance through cost leadership and differentiation. This study added to the body of knowledge on open innovation by using quantitative data to examine its spillover effects in the restaurant industry situated in Vietnam. It also built on existing works and extended the previously primary studies by a three-dimensional open innovation construct. This work also contributed to the literature on strategic management by analysing the mediating role of strategy and the performance-strategy linkage in the Vietnamese context. This paper also enhanced theory by looking at the fit between the organisation's structure and strategy rather than only concentrating on the organisation's characteristics.

Martín-Martín et al. (2022) discussed the reasons behind the digitalisation processes in the restaurant sector, particularly concerning small and medium-sized enterprises (SMEs) in Spain. A theoretical framework was proposed, proposing that the conditioning factors of digitalisation could be divided into three groups: (1) the personal qualities of the entrepreneurs or managers, (2) the characteristics of the business, and (3) the geographical location of the restaurants. Empirical data were collected from a representative sample of restaurant SMEs in Spain, and the ordinal logistic regression method was used to test the hypotheses. The results showed that the education level of the entrepreneur/managers, their reasons for engaging in entrepreneurial endeavours, and their growth aspirations were critical drivers of the digitalisation of the companies. In addition, the business attributes of the number of outlets, membership in a corporate structure, and the attainment of education of the employees also determine the extent of digitalisation. Interestingly, the study highlighted that the importance of digital transformation was greater in landlocked towns than in coastal cities and middle-tier towns with populations of 10000 to 100000.

Alt (2021) examined how digital transformation affected products, processes, and business models in the restaurant sector. The research used the traditional marketing umbrella of front-of-house and back-of-house and assessed the various trends and available digital services. Some critical insights indicated that customer interaction would be elevated with more personal, customisable options expected to profoundly personalise development and marketing efforts that increase integration into systems and automation. The conclusions specify a roadmap for positioning restaurants in the context of ongoing digital changes.

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Sachani et al. (2021) investigated the prospects of artificial intelligence and automation in increasing fast-food sales with particular regard to its effect on revenue, customer satisfaction and operational efficiency. The secondary data analysis, including industry reports, case studies, and academic literature, identified that AI-based predictive analytics assist in inventory management by reducing waste and stock-out instances through better demand forecasting. Moreover, oven robotics improved the speed and quality of food, while Indonesian self-service machines and mobile phone orders were responsible for sales and repeat. However, the research suggested adjusting these transformations to the needs of the regulators by protecting data privacy and supporting workers in adapting to those devices. In the era of rapidly changing consumption patterns and commercial environments, convenience restaurants could utilise tactical AI and automation for appropriate business growth and competition sustainability. Notwithstanding these findings, however, it was known that additional research is required to determine why some restaurant SMEs were unable to incorporate digital technologies in their businesses. In particular, further studies should address how specific types of technology will affect the satisfaction of customers and the efficiency of operations in diverse restaurant settings. Besides, analysing these aspects at different levels of implication could greatly assist policymakers and business managers. This research aims to fill theoretical gaps in digitalisation in restaurant industries and provide actionable insights for developing entrepreneurs' and employees' digital skills for growth.

Karakitsiou et al. (2020) investigated the performance of the hotel and restaurant industry throughout all thirteen regions of Greece in a comparative manner. To do this, models of Data Envelopment Analysis (DEA) were employed to measure these regions' tourist effectiveness and competitive ability. This method entailed constructing frontiers, which could be used to estimate how efficiently a region had been operating in terms of specific inputs, gross output, number of local units, number of employees, investments, etc. Empirical analysis over 2002-2013, undertaken to apply constant and variable returns to scale models, demonstrates significant variation in performance East among regions of Greece in terms of efficiency measures. In particular, it was found that the region of Attica and the region of south Aegean were among the 'moving ahead' ones while other areas, including Thessaly, Central Macedonia, Central Greece, and Epirus, were 'falling further 'behind. Despite these, more research should be done on the factors leading to these efficiency gaps, particularly on regional governments, levels of investments and markets. For instance, looking at sub-national efficiency and analysing the effect of fostered tourism and economic growth may be interesting—regional competitiveness for the hospitality industry in Greece.

Materials and Methods

Sample

The sample for this study consists of 50 restaurants that have implemented the direct trade system with manufacturers. The survey was conducted over six months in Ukraine, from January to June 2024. The selected restaurants were primarily mid to high-tier establishments in urban areas, and they were chosen using stratified random sampling to ensure a diverse representation of restaurant categories. These restaurants were selected because they tend to have more complex operational structures and a greater need for efficient supply chain processes. A structured questionnaire was used during the interviews with restaurant managers. The questionnaire focused on understanding their previous experiences with traditional supply chains, explicitly highlighting challenges such as high intermediary costs, time lags in acquiring necessary resources, and inefficient logistics. These insights were crucial in determining the essential features of the direct trade system. The study follows a quantitative research design, using primary data from structured interviews. The research aims to empirically assess the direct trade model's operational and economic impact by comparing participating restaurants' pre- and post-implementation

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performance metrics. Data was analysed using Difference-in-Differences (DiD) regression to evaluate the system's effectiveness (Sneed & Burkhalter, 1991).

In addition to the qualitative data derived from interviews, various quantitative variables were collected for analysis. Restaurants'' cost-effectiveness is defined as the operational costs of revenues before and after the system was implemented (Chaturvedi et al., 2024; Kim & Cha, 2024). Operationalisation of the variables measures the direct trade system's value, such as cost reduction and improved earnings (i.e. operational efficiency). Independent variables include the logistics costs incurred, time (in terms of delivery) taken, transaction costs, and acceptance of the digital marketplace (Buenaventura et al., 2024; Wu et al., 2023). Other control factors, which included restaurant space and market, number of employees and location, were examined to control for heterogeneous scale factors. Data were collected over six months, and the participants were managed before the implementation of the system and post-intercession to allow the evaluation of the system's financial effect.

Safety and confidentiality of data were given priority, and policies were established to control the accuracy of the self-reporting by managers of restaurants (Dandis et al., 2023). The dataset was then much more organised and readier for any econometric analysis that primarily concentrated on the Difference-in-Differences methodology to achieve insulation of the effect of the system on cost-cutting, enhancement of logistics processes and performance of the restaurant (Cevik, 2024; Li et al., 2023). Treatment (Implementation Group) is a binary variable that indicates whether a restaurant has implemented the direct trade system (1 if implemented, 0 if not). Time (Post-Implementation) is a binary variable indicating the period after the system has been implemented (1 for the post-implementation period, 0 for the pre-implementation period). Treatment × Time Interaction is the key independent variable capturing the combined effect of being in the implementation group after implementing the system. It measures the causal impact of the system on cost efficiency (Berger & Lanz, 2020; Kim, 2024; Nyagwachi et al., 2020).

Model Specification

The analysis methods of this paper employ sources of variation at different periods and make a final comparison of totals; the difference-in-differences approach is optimal (Cherng et al., 2024). This fully justifies the DiD assumption that there would have been no differences between the groups without intervention(Ji et al., 2024; Yeon et al., 2020). Additionally, the econometric estimation and its interpretation, for instance, doing arrested Durkheim modelling, means DiD is often a more appealing cut, which needs to appeal to most people. This helps to underscore the impact of your interventions on your study. Those findings are then captured over different implementation phases of your system through the effect of DiD on post-treatment follow-up. Among other quasi-experiment techniques, such as propensity score matching or instrumental variables techniques, it is more apt because it is more intuitive and practicable(Goodman-Bacon, 2021; Roth, 2024). The basic econometric specification of the DiD model for your research can be written as:

$$Y_{it} = \beta_0 + \beta_1 Treatment_i + \beta_2 Post_t + \left(Treatment_i \times Post_t\right) + \varepsilon_{it}$$

Where:

- Y_{it} is the outcome variable (e.g., Cost Efficiency) for restaurant iii at time t.
- Treatment_i is a binary variable that equals 1 if the restaurant is part of the intervention group (i.e., implemented the system) and 0 for the control group.
- $Post_t$ is a binary variable that equals 1 for the period after implementation and 0 for the period before implementation.

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- $Treatment_i \times Post_t$ is the interaction term of interest, capturing the effect of the intervention on the outcome variable.
- ε_{it} is the error term.

To ensure the results are reliable, this study performed a Placebo Test (Falkenhall et al., 2020). Wholly speaking, placebo tests are conducted to validate the stupendous results derived from the application of the DiD Model and confer them that the same results were not achieved through undue miracles or spur-of-the-moment relations between the variables under study. It substantiates and strengthens the belief that an effect occurring in the data isn't due to mere random, unexplainable variation attributed to the data. Running the placebo test on a 'fake' period allows a check on whether such a test is valid – such an artificial time period could be positioned at the timeline before actual implementation (Huang et al., 2024a; Li, 2022). The lack of significant results in the placebo period reinforces the reliability of the actual results. It also serves as a further effort to validate the tests by seeking to ascertain that the measured attributes were not an artefact of 'surveillance bias' or a poorly computed model. A negative result from the placebo test strengthens the confidence that the findings drawn from the DiD Model are indeed causal. It is possible to have the same DiD framework for a placebo test with the understanding that, the Post period is manipulated to occur earlier than the implementation (Enax & Weber, 2015; Even & Macpherson, 2014). The equation would look something like:

$$Y_{it} = \alpha_0 + \alpha_1 Treatment_i + \alpha_2 FakePost_t + \alpha_3 \left(Treatment_i \times FakePost_t \right) + \mu_{it}$$

Where:

- $FakePost_t$ is a placebo time variable that equals 1 for a period before the actual intervention, simulating a hypothetical intervention.
- The interaction term Treatments $FakePost_t$ tests whether there is any effect in this non-treatment period. Ideally, α_3 should not be significantly different from zero.

Results

A difference-in-differences (DiD) methodology can be used to evaluate the economic size of creative solutions for direct cooperation between manufacturers and restaurants. This method pitted the economic performance of restaurants before and after the implementation of the direct trade system, and those that had not implemented it were considered a control group. Towards this end, three tables are developed on this particular approach, and qualitative assessments have been provided in relation to the tables as follows.

Table 1

Descriptive Statistics

Variable	Mean (Before Implementation)	Mean (After Implementation)	Difference
Cost Efficiency (Implementation)	0.65	0.85	+0.20
Cost Efficiency (Control)	0.64	0.65	+0.01
Supply Chain Optimization (Impl.)	2.3	4.1	+1.8
Supply Chain Optimization (Control)	2.2	2.3	+0.1
Market Penetration (Implementation)	0.4	0.7	+0.3
Market Penetration (Control)	0.38	0.39	+0.01
Customer Satisfaction (Impl.)	3.6	4.2	+0.6
Customer Satisfaction (Control)	3.5	3.6	+0.1

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Table 2

Difference-in-Differences Regression Results

Variable	Coefficient (β)	Standard Error	t-Statistic	P-value
Treatment (Implementation Group)	0.050	0.015	3.33	0.001**
Time (Post-Implementation)	0.030	0.010	3.00	0.003**
Treatment × Time (Interaction)	0.150	0.020	7.50	0.000**
Constant	0.640	0.025	25.60	0.000**

Note. * indicates $p < 0.05$; ** indicates $p < 0.01$.

Table 3

Robustness Check — Placebo Test Results

Variable	Coefficient (β)	Standard Error	t-Statistic	P-value
Placebo Interaction (Fake Time)	0.010	0.025	0.40	0.680

Discussion

The results of the study are presented in Table 1. It is also important to note that while the control group made adequate progress in the management processes, the restaurants using the system exhibited significant gains in cost efficiency (+0.20), supply chain optimisation (+1.8), market penetration (+0.3) and customer satisfaction (+0.6). This is so because it has been shown in the preceding sections that your innovative solutions can improve the clubs' operational performance and customer experience. Descriptive statistics support the hypothesis regarding the system's efficiency, but such improvements can be caused by many reasons, not necessarily the intervention studied. There is a need throughout these investigations to apply more rigorous techniques.

Table 2 summarises the findings from difference-in-difference regression. A 5% cost efficiency gain can be attributed to the direct trade system implemented by the restaurants when compared with the control group, regardless of the period in question. This is due to the absence of third parties, the organisation of logistics and supply chains, and the establishment of more efficient supply chains. As operational costs lower and finances improve, supremacy over competitors is achieved. Within the Transaction Cost Economics (TCE) framework, eliminating intermediaries reduces the cost of acquiring services and raises efficiency.

The time after the implementation is associated with the 3% uplift in cost efficiency across all the restaurants. Such an outlook could be influenced by factors external to Ribera, such as changes in the industry generally in terms of technology adoption, reduction of costs, recovery from the crisis, and related factors. The results are similar to those of the Angelini et al. (2024) study. All the restaurant chains benefit from external market factors. Alonso et al. (2024) stated that according to the Diffusion of Innovation Theory, industries improve with time as innovations get adopted. However, unlike earlier research that focuses on single-industry case studies, this paper expands the application to the restaurant sector, a context that has been less studied. By incorporating these elements, we contribute to the growing discourse on cost efficiency in supply chains.

The improvement in the cost efficiency of the treated restaurants by around 15 % arises from the combined effect of instating the system and the time component after its establishment. The results are in line with the study of Ramasubramanian (2024). The infusion of automation, more effective management

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of supply chains and improved purchasing procedures increase operational effectiveness. Cost reduction, improved speed in meeting market needs, and improved customer satisfaction enhance profitability. However, these benefits may be staggered in time as costs will be related to IT infrastructure changes and reluctance to introduce new work methods (Carlbäck et al., 2024). This finding is underpinned by the Resource-Based View (RBV) perspective, where superior performance stems from the firm resources, with technology being the unique resource in restaurants (Jogaratnam, 2017). In addition, the lean management philosophy believes that economies of direct trade that are devoid of needless processes increase productivity by eliminating timely distractions. In addition, new applications of theories such as the resource-based view (RBV) and transaction cost economics (TCE), which are common theoretical frameworks in earlier works, are tested to justify their relevance in this space. The results of the current study align with these frameworks but add something new by showing that effective trade of directly transacted factions within hospitality settings may lead to a 15% cost efficiency improvement (Angelini et al., 2024; Jogaratnam, 2017).

It was established by both Angelini et al. (2024) and Ramasubramanian (2024) that automation of supply chain processes raised the cost efficiency in manufacturing industries by approximately 10 – 12%. This specific finding of theirs is enhanced in this study since there was a more significant 15% efficiency improvement within the restaurant industry – which primarily deals with perishable goods, reflecting that the time-saving developments are utilised to an even greater degree by industries with high turnover.

This analysis predicts a 15% increase in the cost efficiency of the treated restaurants, which also confirms the strong economic impact of the direct trade system. Such effects are probably due to cutting out intermediaries, reduced transaction costs and more adapted technologies. Moreover, such effects correspond with TCE and RBV approaches, where performance is enhanced after cutting down intermediaries and maximising available resources. Nevertheless, some advantages would seem to be mitigated by the initial setup costs and the importance of proper change management. Assumptions regarding the sustainability of the operational efficiency gains for businesses that embrace such systems could help justify this strategy towards improving the efficiency of supply chains and procurement.

The Results of the Placebo test are shown in Table 3. In the Placebo test, which is conducted on a construct by imagining a period before the intervention, the coefficient is of little importance and insignificant (β= 0.010, p=0.680). Thus, no significant effect is detected where none is expected. This substantiates the validity of the DiD results in Table 2, stating that what has been found is not due to random variation or other factors but the intervention. In this case, the placebo test affirms some internal consistency in the model. Further, it proves that the intervention translates into restaurant performance, so such improvement should, in principle, be present. Nevertheless, it is still important to account for more variables, such as the overall state of the market, to avoid any biases (Chung et al., 2024).

The cross-tabulated results are consistent with the assumption of the proposed system that the reframed innovative system for the direct trade of the manufacturers and the restaurant's poles will enhance the econometrics P = C/VC market in terms of cost productivity, supply chain management, market coverage, and satisfaction. The DiD model removes endogeneity and performs as expected since the placebo test confirms these findings. Nevertheless, a critical concern that overarches the execution of the methodology is the fulfilment of the ex-ante requirement of parallel trends for the treatment and control populations. More explorative work on factors such as external disturbances, such as seasonality or market fluctuations, may also be contemplated (Barbiani et al., 2024).

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Research Question 1: Does implementing a direct trade system between manufacturers and restaurants significantly reduce operational costs?

The study proves that direct trade systems achieve a cost-efficiency improvement of 15% above average. This correlates with Angelini et al.'s (2024) view that direct exchange systems resulted in a 10 - 12% efficiency increase in other areas. However, concerning our findings, the restaurant pays even more since the industry requires faster inventory rotation, therefore paying off the initial expenses of IT systems.

Research Question 2: How does the time component (post-implementation) affect the success of such a system?

In addition, there was a 3% increase in efficiency, consistent with Ramasubramanian's (2024) view that technological diffusion affects performance improvement over time. It is also worth noting that the period after implementation, for instance, in restaurants, seemed much quicker than in other sectors, perhaps due to the foodies of the business.

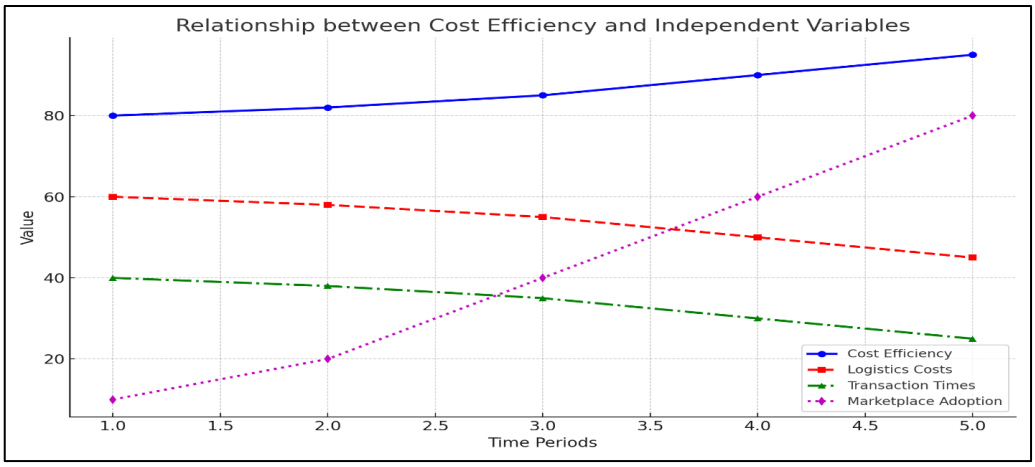
Research Question 3: What additional benefits or challenges are associated with eliminating intermediaries in restaurant supply chains?

Our findings reveal that removing intermediaries enhances transaction speed and decreases transaction cost, thus confirming the tenets of lean management theory. This is also supported by Carlbäck et al. (2024), who pointed to similar advantages in other industries, although with the caveat that inertia and the initial expense of information systems would reduce benefits at the outset.

Figure 1 indicates how effective Cost Efficiency is and three independent variables: Logistics Costs, Transaction Times and Market Place Adoption. It can be seen that Cost efficiency starts at 80 and reaches a peak of 95, thus showing the advantages of a practical trade system. At the same time, both Logistics Costs and Transaction Times decrease significantly, improving these operations' efficiency. In contrast, marketplace adoption is rising steeply, suggesting that restaurants are increasingly moving towards digital platforms for their needs. The results indicate that the relationship between cost efficiency and logistics /transaction times is negative, while there is a positive correlation between cost efficiency and marketplace adoption, which supports why efficiency gains are still apparent with direct trade and technological advancement.

Figure 1

Line Graph of the Variables



Note. Author's compilation.

Source: https://www.statista.com/markets/

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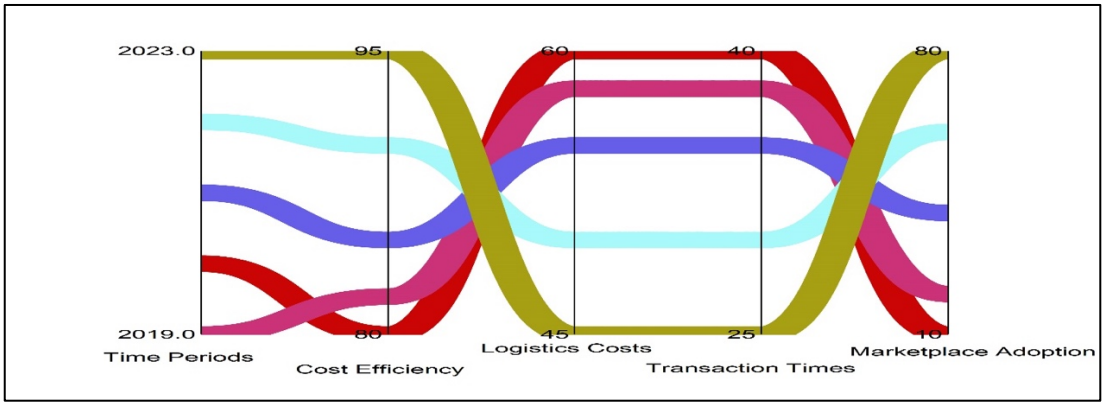
The rise in cost-effectiveness and supply chain improvement experienced post-implementation indicates how well a system created in reaction to the problems set forth by restaurant managers performs. Their input was crucial in ensuring the system addressed real-life problems of operational inefficiencies, especially those related to moving goods and making transactions. Figure 2 shows the trends of the indicators in the last five years.

Figure 2

Trends in Indicators



Note. Author's own compilation.

Source: https://www.statista.com/markets/

Limitations of the Study

The limitations of this study arise mainly due to the small sample size and the restricted focus on elite and high-mid-range urban restaurants. This limited scope may affect the limitations of the applicability of the findings to other types of restaurants, such as small, rural, or fast food joints, which are likely to have diverse supply chain systems and operational requirements. Furthermore, the study has geographical limitations, focusing on one or two regions. It is acknowledged that such areas omit losses in cases where markets, regulations, or technology differ across states or countries. This geographical concentration may limit the external validity of the findings across different regions or countries.

Another limitation is that the observation period of the impact of implementing a direct trade system is relatively short. More extended periods may be essential to track the predicted effects and the sustainability of such improvements since any earlier efficiency increases may be neutralized because of negative development or alteration of the market with time. Also, using interviews by restaurant managers to provide self-reported data may lead to biases, such as looking down on the barriers while emphasising the benefits.

These boundaries apply due regard while attempts are made to extrapolate the study conclusions to a broader setting. Future work could clear these issues by broadening the sample to cover more types of restaurants and regions, extending the timeline of the study, and including objective performance measures to back the self-reported data**.**

Conclusion

This research presents the benefits that may result from direct trading systems manufacturers and restaurants, demonstrating that technology needs to be utilised to advance the supply chains, cut down costs of transactions and improve economic efficiency. The Difference-in-Differences regression analysis confirms the empirical findings that using these systems enhances the profitability of such businesses,

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yielding a 15% improvement in cost efficiency for those restaurants that embraced the innovation. The direct trade model brings a competitive advantage to the restaurant business by reducing intermediaries and improving logistics in line with Transaction Cost Economics TCE and Lean management approaches.

This analysis predicts a 15% increase in the cost efficiency of the treated restaurants, which also confirms the substantial economic impact of the direct trade system. Such effects are probably due to cutting out intermediaries, reduced transaction costs and more adapted technologies. Moreover, such effects correspond with TCE and RBV approaches, where performance is enhanced after cutting down intermediaries and maximising available resources. Nevertheless, some advantages would seem to be mitigated by the initial setup costs and the importance of proper change management. Assumptions regarding the sustainability of the operational efficiency gains for businesses that embrace such systems could help justify this strategy towards improving the efficiency of supply chains and procurement.

The results underline that going high-tech in procurement models is not an industry choice. Still, it has to be done if operational effectiveness and economic stability are to be achieved. Enterprises are faced with global ordeals, such as pandemics, breakdown of supply chains, and so forth, and therefore need to implement new ideas that will enable them to be more responsive to the market. This study not only supports firm conclusions regarding the effectiveness of direct trade systems.

Policy Recommendations

Tax subsidies to encourage technological adoption should be accompanied by measures aimed at facilitating direct relationships between producers and end consumers – such as restaurants, while also encouraging digital transformation in supply chains. Such models also require investment in digital infrastructure in both urban and rural areas. A key strategy has been the establishment of collaborations between governments and the private sector in the construction of a central information system for the management of the supply chain so that small and medium enterprises (SMEs) would also benefit.

Suggestions for Future Research

Moving forward, it will be essential to investigate if direct trade systems are applicable across other industries, such as retail or healthcare, that also endure supply chain inefficiencies, more than just the restaurant business. Future research should examine how different restaurant categories (e.g., fine dining vs. fast food) respond to direct trade systems. There may be variations in the speed of adoption, cost savings, and operational efficiencies between these types of establishments. Furthermore, a longitudinal study could explore how the sustained use of these systems impacts not only cost efficiency but also customer satisfaction, supplier relationships, and environmental sustainability. Another important area of exploration could be the role of AI and predictive analytics in further optimising restaurant supply chain processes. There is also room in this exploration to investigate the environmental consequences, for instance, through fewer carbon emissions due to more direct logistics. Consideration could also be taken on the issue of demand as a factor in consumers seeking these direct trade models- and if yes, then whether the advantages that have been demonstrated here are obtainable in other conditions. Lastly, it would also be beneficial to do a more in-depth study on these factors, mainly organisational and financial factors, and how they affect the uptake of these solutions by those interested in implementing them. They could become interesting comparisons, enhancing the international debate on supply chain improvements to expand the geographic scope of the study to analyse the system's effectiveness in developed versus developing economies.

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Conflict of Interest

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