

INNOVATIVE ACTIVITY OF RESTAURANTS OPERATING IN THE LARGEST POLISH CITIES

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Abstract: *The skills of acquiring and processing information as well as creating innovations remain the key factor responsible for the market success of enterprises, one of the most important factors in gaining a competitive advantage on the market. It is also true for the tourism market of which catering services make an essential part. Hotel industry has been the subject of intensive research in this area for over 2 decades. Much less scientific attention has been paid to innovation in the restaurant sector. Therefore, the intention of the authors of this study was to analyse the process of creating innovations in restaurants operating in the largest Polish cities. The study identifies the factors responsible for the innovative activity of restaurants, perceived from the perspective of their managers. For this purpose, a multivariate method, in the form of classification trees, was used. The research material was collected in the course of a survey carried out in 250 restaurants. As a result of the applied research methods, the innovation factors were specified and 4 segments of innovative restaurants in Poland were identified. These segments are made up of 75% of restaurants applying pro-innovative activities, which for them represent an important aspect of market success. Pro-innovative activities are implemented more often by chain restaurants as well as the ones operating in hotel facilities. Small, family-run restaurants use innovations on a smaller scale. They refer to selected restaurants operating in the 6 largest Polish cities, which limits the possibility of making generalizations regarding other forms of catering establishments functioning in other geographical locations. Future research should cover a wider group of catering establishments, in various locations.*

Keywords: *Innovations, restaurant industry, entrepreneurs, multivariate methods, classification trees.*

JEL Classification: O31, L83, M31, C38.

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Introduction and Motivation

The interaction of two phenomena is observed in well-developed countries, i.e. the growing importance of the service sector (transition

to the service economy or the post-industrial society) and the increasing importance of knowledge, manifested in the creation of innovations (knowledge-based economy). We

live in an era when the skills of acquiring and processing information as well as creating innovations remain the key factor responsible for the market success of businesses. As indicated by Škare and Tomić (2014), the market position of enterprises, their further development and prosperity largely depend on their opening towards innovations (Burns & Stalker, 1961; Weerawardena & Mavondo, 2011; Baily et al., 2006; Sandvik et al., 2014).

The very idea of innovation was actually born in industry, however, the transition of the economic system to the one where services play a dominant or at least an equal role, resulted in the phenomenon of innovation spreading in the service sector as well (Schumpeter, 1934; Swann, 2009; Hjalager, 2010). The growing importance of the service sector in the global economy and the economies of individual countries contributed to an increasing interest of both practitioners and theoreticians in the problems of innovation covering this sector (Miles, 2005; Gallouj & Weinstein, 1997; Reid & Sandler, 1992; Djellal & Gallouj, 2001; De Jong et al., 2003; Becheikh et al., 2006). The increase of innovations in services results, among others, from (Letto-Gillies, 2002):

- progressive complementarity of goods and services;
- introducing new technologies along with changes in the organization of the production process and the provision of services;
- implementing new ICTs which contribute to economic growth, development and result in higher labour productivity.

The service sector, however, covers a huge range of different fields and, therefore, is subject to numerous and diverse influences. The particular types of service activities have their own specific nature (Orfila-Sintes & Mattsson, 2009; Miles, 2005; Hjalager, 2010; Ottenbacher, 2007; Keller, 2005; Pikkemaat & Peters, 2006). The specificity of services has impact on the ability to absorb innovations. In the service sector, living labour is the medium of value in use, whereas the means of work create conditions for the provision of services (Rogoziński, 2004; Hurley & Hult, 1998; Chang et al., 2012). Hipp and Grupp (2005) emphasize the importance of human factor in the process of creating innovation in services. The service sector is much more influenced by the efficiency of employees and their personal skills and

experience than the manufacturing sector and customer involvement.

The last two decades have seen an increasing importance of innovations in the tourism sector. Its significant and positive impact on the GDP and the economy of many countries contributed to an increased interest in the research addressing these problems (Jiménez-Zarco et al., 2011; Keller & Bieger, 2005; Kessler & Mair, 2009; Ottenbacher, 2007; Ottenbacher & Harrington, 2009a; Pikkemaat & Peters, 2006). In the conditions of expanding globalization and intensifying competition in tourism at the local, regional, national and international level, the importance of developing a competitive advantage through innovations continues to grow, thus encouraging the tourism sector businesses to expand their innovative activity (Keller, 2005; Pikkemaat & Peters, 2006; Pikkemaat & Weiemair, 2007). In individual areas of the tourism industry, where consumers expect highly personalized services, creating innovation can be the factor in building a competitive advantage (Novelli et al., 2006; Hult et al., 2004). The positive connection between innovation and success has been highlighted in many studies (Agarwal et al., 2003; Han et al., 1998). For over two decades, hotel industry has been the focus of research in this area (Hjalager, 2010; Orfila-Sintes & Mattsson, 2009; Sandvik et al., 2014). In turn, the conducted research was paying much less attention to innovations in the restaurant sector. The studies of restaurant innovation practices are limited to a descriptive overview of the product development process of fine dining and quick-service restaurants (Ottenbacher & Harrington, 2009b; Stierand et al., 2014). A significant gap is noticeable in the understanding of how innovation affects performance in small and mid-sized restaurants (Ottenbacher & Gnoth, 2005). Some publications also discuss the issue of innovation in relation to restaurants, focusing on innovations referring to the provided services or processes as well as the organizational and marketing ones (Hjalager, 2010). However, many restaurants which represent the SME sector have a limited access to the resources (e.g., high-quality products, qualified chefs) (Ottenbacher & Harrington, 2009b). For this reason, their innovative activity may be reduced to imitating other companies, rather than creating their own new products (Lee et al., 2016).

The intention of the authors of the study was to analyse the innovative activity of restaurants located in the largest Polish cities, constituting the basis for identifying the key areas of implementing innovations and determining the impact of factors significant for the innovation process. Restaurants constitute an important segment of the catering services market in Poland. This market is referred to in the source literature as the HORECA market and covers the hotel catering segment (Ho), the restaurant market (Re) and the catering market (Ca). In the years 2015–2019, the HORECA market showed a significant growth dynamics at the annual level of 6–7%. The coronavirus outbreak (COVID-19) interrupted this very positive period of this market development. In the second decade of the 21st century, however, the number of catering establishments was growing steadily, from 68.8 thous. in 2012 up to 75.0 thous. of these facilities in 2020 (PMR Market Experts, 2020). The presented figures apply to all catering establishments operating in Poland, i.e., both micro-enterprises and SMEs. In 2019, of the total number of catering establishments, restaurants accounted for 27.7% of all such facilities, bars 27.1%, canteens 6.3%, and food stands 38.9%, respectively. Over the last ten years, the share of restaurants in the total number of catering establishments has increased significantly (from 21.2% in 2010 to 27.7% in 2019) (Statistics Poland, 2021). In the same period, the share of bars declined by almost 10%. It is also worth noting that in 2000 the share of restaurants in the total number of catering establishments was only 10.1%. Positive changes in the number of catering establishments, along with the growing share of restaurants and food stands, are a consequence of the growing interest of Poles in catering services in the period 2003–2019. While in 2003, 35% of Poles (persons aged 15+) declared using these facilities at least once a year, this share went up to almost 60% in 2019.

The interest of the authors of the study in restaurants (Re segment) justifies the purpose of presenting some information referring to this particular segment of the Polish catering services market. In 2019, the restaurant segment covered 20,015 establishments, of which over 25% restaurants were employing over 9 people (the so-called SMEs Sector). It shows that the Re segment is dominated by micro-companies

(restaurants) employing up to 9 people. This certainly has impact on the innovative activity characteristic for these restaurants, i.e., due to limited access to the resources. This problem is highlighted by, e.g., Ottenbacher and Harrington (2009a). The research addressing the issue of innovations in the restaurant industry emphasizes their importance for creating the position of restaurants on the market, increased attractiveness for customers and higher profitability (Ottenbacher & Gnoth, 2005). The majority of innovations taking place in restaurants refer menu innovations, which has a major impact on customer decisions in terms of using their services. Along with improving service systems and applying modern technologies, restaurants attempt to capture the attention of potential customers through their offer (Stierand & Lynch, 2008). It turns out, however, that the modern innovative activity of restaurants cannot be limited to product innovations alone (menu innovations offered by these establishments). It should also apply to other areas of their operations, i.e., marketing, process and technological innovations. Ottenbacher and Gnoth (2005) highlight these areas of innovative activity in the restaurant sector. They are considered the tools for building customer loyalty and competitive advantage (Martínez & Rodríguez del Bosque, 2013; Schubert et al., 2010; Kim et al., 2019; Kim et al., 2021).

In the light of the above remarks, the intention of the authors of the study is to examine the level of innovation presented by restaurants operating in the largest Polish cities in relation to product, marketing, organizational and technological innovations. For this purpose classification trees were used (Breiman et al., 1984). Three following research hypotheses were formulated in the conducted study:

H1: Small group of factors has a significant impact on the innovative activity of restaurants.

H2: Innovative activity of restaurants shows a significant diversification, taking into account the basic types of innovation.

H3: Marketing and technological innovations are among the essential areas of innovative activity performed by the surveyed restaurants.

The study also attempts to answer the question whether and to what extent the owners of the surveyed restaurants follow the trends in innovative activity on the catering services market?

1. Theoretical Framework

It is widely recognized in the world literature that all kinds of innovations can contribute towards gaining a competitive advantage by economic entities. Quite frequently, the source literature on innovation focuses primarily on product and technological innovations (Weerawardena & Mavondo, 2011). It seems to be all the researchers agree upon. The discrepancies concern the definition and classification of innovations, as well as their manifestations. Nowadays, innovations remain a very important manifestation of the economic entities' activity. Rapid changes in customer preferences and expectations have a significant impact on the innovative activity carried out by an enterprise. This covers, to an increasingly greater extent, the entities operating in the catering industry.

In relation to the restaurant sector, innovations can be perceived as "an idea, practice process, or product which puts into practice the ideas that solve problems and are perceived as new by the consumers" (Ottenbacher & Gnoth, 2005). Innovations in the catering services market are also defined as all novelties introduced by restaurateurs, regardless of whether they are absolute or relative novelties, consisting in the recreation or adaptation of products or services offered by the competitors (Linton, 2009; Johannessen et al., 2001). The research on innovation in the restaurant industry emphasizes that they make restaurants more attractive to customers and appeal to guests, which has a significant impact on their profitability (Ottenbacher & Gnoth, 2005; Ottenbacher, 2007).

The vast majority of innovations occurring in restaurants refer to the offer (menu innovations), which is supposed to convince customers to take advantage of their services. Restaurateurs should introduce menu innovations taking into account the current trends on the catering services market and provide customers with the menu meeting their expectations. This means offering dishes which contain ingredients perceived by customers as healthier, such as whole grain cereals, organically grown food, low-energy, low-fat and gluten-free food (Gagić, 2016; Poulston & Yiu, 2011; Rowe, 2010). Product innovations, however, require the involvement of various elements of the entire food and beverage system. As Capitanio et al. (2010) note, it is about the system: "from developing new ingredients to formulating

new food products, improving preservation method from food to new forms of packaging". The research covering the sample of 300 respondents, consumers using the services of restaurants located in 5 largest cities in Poland, shows that about 2/3 of customers accept the offered novelties, are eager to try new dishes and express interest in menu innovations. Only every fifth respondent sometimes decides to try a new dish in a visited restaurant (Rapacz & Gryszel, 2020). In turn, the market success of restaurants depends not only on an innovative offer (providing new dishes and drinks), but also on other types of innovations implemented to a different extent by these establishments (Lee et al., 2016; Hjalager, 2010).

Marketing innovations are also gaining an increasing importance in the functioning of restaurants. It refers to implementing new marketing concepts or strategies that differ from the marketing methods previously used in restaurants. They include significant changes to the designed products, promotion, distribution and pricing methods. They also concern developing new relationships between restaurants and customers as well as the micro and macro entities (Camisón & Monfort, 2012). An expression of changes in this area is the concept of building relations with customers (Salai et al., 2007). The examples of marketing innovations in restaurants include using social media to communicate with customers and promote these establishments, create restaurant identity and position the brand in customers' awareness, develop guests' trust or implement loyalty programs (Abimbola & Vallaster, 2007; Hwang et al., 2011). Marketing innovations affect profits earned by restaurants through stimulating the consumption of the offered products (Gunday et al., 2011). As Hwang et al. (2011) point out, a well-designed website and the skilfully used social media can support restaurateurs in developing their brand and attracting new clients.

Process innovations remain an important area of innovative activities carried out by restaurants. They consist in the implementation of new or significantly improved methods for preparing dishes in restaurants and new or improved methods of providing services. They also include new or significantly improved techniques and technologies used in culinary production, procurement or customer service (Peters, 2008; Oslo Manual, 2005). Process

innovations increase profits for the organizations through improved efficiencies and reducing costs (Johne & Davies, 2000; Robinson et al., 2005). Different types of innovations and their perception are presented in Fig. 1.

2. Research Methods and Findings

Taking into account the specific features of service operations, i.e., the restaurant industry and various approaches to the issue of innovations in services, the problem of measuring the level of innovation still remains open. Gomezelj Omerzel (2016) presented a comprehensive review of the research findings in the area of innovation in tourism and hotel industry. The author analyses the content of over 150 publications, however, among them does not distinguish those referring directly to the restaurant industry, which is treated as part of the hotel industry.

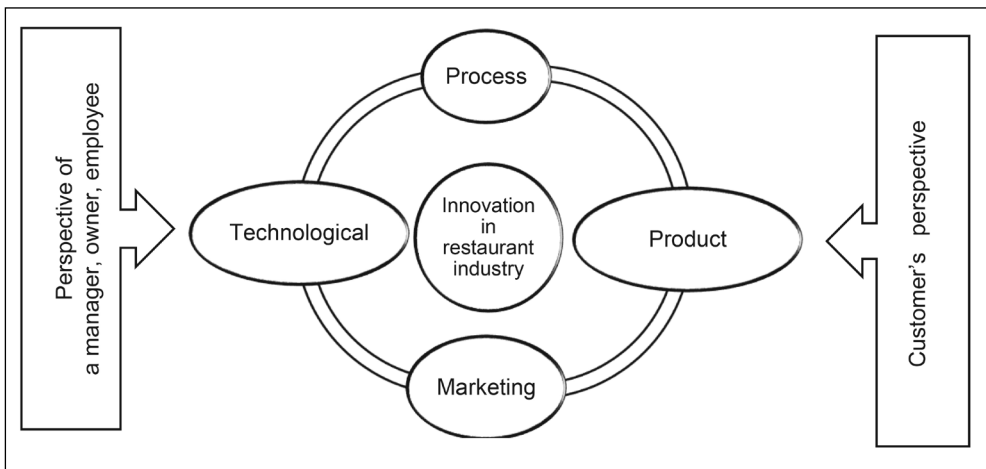
Innovation in the catering services market can be measured from the supply perspective, including employees, managers and owners of catering establishments, and also from the demand viewpoint, i.e., customers (Fig. 1). An example of the list of publications addressing this subject matter was presented by Kim et al. (2018). It shows that the innovations in tourism enterprises were examined much more often from the supply perspective than from the demand one. Similar results are provided by Gomezelj Omerzel (2016) – the author

states that 59.21% of the studies focused on the research addressing innovation from the supply perspective, whereas only 4.61% from the demand (customer's) point of view. The authors of the presented article follow this trend in their research by investigating restaurant innovations from the supply perspective.

Considering the methodology of the conducted research addressing innovation in tourism, it should be indicated as follows (Gomezelj Omerzel, 2016):

- 9.87% of the studies are of theoretical nature written in the form of a discussion, where source literature reviews as well as syntheses, project descriptions and their findings are presented;
- 36.84% of the studies are based on qualitative methods, in which, in addition to source literature reviews, only such methods as semi-structured in-depth interviews, focus groups, ethnographic research, case studies, action research or more than one of these methods were used;
- 45.39% of the studies are based on quantitative methods where, apart from source literature reviews, only quantitative methods were used, including questionnaires or, in some cases, secondary data;
- 7.89% of the studies are qualitative and quantitative ones, in which apart from source literature reviews also qualitative

Fig. 1: The complex nature of innovation in restaurant industry



Source: own

methods were used, followed by quantitative methods. In most cases, qualitative methods such as interviews or focus groups were carried out in the first phase to obtain sufficient information and knowledge on the research in order to develop an appropriate and reliable questionnaire which was used in the second phase of the research.

When analysing innovations in tourism and hotel industry, the authors applied very different research approaches. The majority of studies discussed a specific type of innovation – process, marketing, product or a technological one. Only 10.53% of the analyses presented a comprehensive approach to innovation and examined various types of innovations simultaneously (Gomezelj Omerzel, 2016). A holistic approach to innovation in the restaurant industry requires the use of more advanced and complex methods for its measurement. Such measures were applied by, e.g., Kim et al. (2018) and previously Kunz et al. (2011), and Sandvik et al. (2014).

Kim et al. (2018) measured customer perceptions of restaurant innovativeness (CPRI) using exploratory and confirmatory factor analysis. Similarly, Kunz et al. (2011) developed the model of perceived firm innovativeness (PFI). In our approach, innovation in the restaurant sector is considered from the perspective of restaurant managers. Similar studies were conducted by Lee et al. (2016) for Australian restaurants and Sandvik et al. (2014) for Norwegian hotels. They analysed innovations from the managerial perspective using structural equation modelling (SEM). Structural equation modelling was also applied by Čivre and Gomezelj Omerzel (2015) to investigate the innovative behaviour of the Slovenian tourism enterprises.

Moreover, a multivariate method in the form of classification trees was applied in this study to analyse the innovative activity of restaurants operating in six largest cities in Poland, perceived from the perspective of their managers.

In the absence of a reliable sampling framework, it was decided to use non-probability sampling techniques (Mellenbergh, 2019; Valliant et al., 2018). Usually three non-probability strategies can be used for online surveys: convenience sampling, volunteer opt-in panels, and snowball sampling (see Sue & Ritter, 2007).

Sue and Ritter (2007) provide some guidelines and recommendations regarding the size of a non-probability sample in non-exhaustive research:

- there is seldom justification for sample sizes less than 30 or larger than 500;
- within the limits of 30 to 500, select a sample of about 10% of the parent population;
- in multivariate research, sample size should be at least 10 times larger than the number of variables being studied.

The study of restaurant innovativeness, covering the largest cities in Poland, was conducted in December 2019 on a sample of 250 respondents included in the volunteer opt-in panels of the BioStat Research and Development Centre based in Rybnik. The research was carried out applying the CAWI (Computer-Assisted Web Interview) method using an interactive questionnaire form (Van Selm & Jankowski, 2006).

The study covered restaurants operating in six largest, in terms of population, cities in Poland: Warszawa (42 restaurants), Kraków (42), Łódź (41), Wrocław (41), Poznań (42), and Gdańsk (42). The so-called small catering outlets, cafes and other types of catering establishments were excluded from the research.

Among 250 restaurants, innovative and non-innovative ones were distinguished (innovative dependent variable taking the values: no or yes). Restaurants were considered innovative if they marked, in the survey questionnaire, at least one of the two responses regarding pro-innovative activities – we follow new trends and introduce novelties to our offer or sometimes launch menu innovations, whereas the restaurants which marked the answer “we do not introduce innovations, we stick to the well proven menu” were considered non-innovative. The restaurants were characterized using 9 explanatory variables (3 categorical and 6 metric variables):

- type: organizational and legal form of the restaurant ($T1$ – private ownership enterprise – sole proprietorship; $T2$ – limited liability company; $T3$ – partnership);
- place: organization of the provided catering services ($P1$ – independent catering establishment; $P2$ – corporate restaurant (chain, franchise); $P3$ – establishment in a hotel facility);
- employed: number of employees in the restaurant ($E1$ – up to 9 employees; $E2$ –

10–49 employees; E3 – 50–249 employees; E4 – 250 and more employees);

- year: number of years of the restaurant operation;
- seats: number of consumer seats in the restaurant;
- product: number of product innovations introduced in the restaurant in the last three years (values from 0 to 8) – selection from the catalogue of possible answers in the survey questionnaire (new dishes or modified dishes; other national cuisines; seasonal dishes; changes in the appearance of dishes; new services, e.g., concerts, literary meetings, readings, lectures, live music; box diet; new, special dishes – for allergy sufferers, vegetarians, vegans, people on a diet, healthy food; other activities);
- marketing: number of marketing innovations introduced in the restaurant within the last three years (values from 0 to 9) – selection from the catalogue of possible answers in the survey questionnaire (significant changes in the form, colour and surroundings of the catering establishments; activity on the Internet, social networks, websites, website sales, e.g., *pyszne.pl*; outdoor advertising; new company logo; promotional events organized by the company, e.g., animations, tastings; new manufacturer's display devices; loyalty programs, sponsorship, pricing strategies; new location, new opening hours; other activities);
- organization: number of organizational innovations introduced in the restaurant in the last three years (values from 0 to 7) – selection from the catalogue of possible answers in the survey questionnaire (changes in the way of ordering and receiving dishes, e.g., partial self-service system, online applications, payment method; new equipment on the premises, e.g., table arrangement, kid's corner, garden, etc; quality of clothing, aesthetics of the service; open kitchen, preparation of dishes in front of customers; catering, dishes with home or company delivery; food truck during fairs, festivals and events; other activities);
- technology: the number of technological innovations introduced in the restaurant in the last three years (values from 0 to 8) – selection from the catalogue of possible answers in the survey questionnaire

(replacement of kitchen equipment, purchase of new kitchen appliances; introduction of a new type of tableware; environmentally-friendly approach to equipment, e.g., resignation from using plastic; new software to operate the sales system; sales application; new recipes and technology for preparing dishes – fit, eco; new flavours; other activities).

The tree function of the package having the same name (Ripley, 2019) was used in the construction of the classification tree, applying the measure of heterogeneity proposed in the study (Ripley, 1996). First, a model was built in the form of a classification tree for all explanatory variables. 8 variables were used in the construction of the model (organization variable was not included in the structure of the tree). The tree consists of 16 terminal nodes. The residual mean deviance is 1.005 and the classification error is 24.4%, because 61 out of 250 observations were erroneously assigned to classes.

In the case of models in the form of classification trees, there is a problem of choosing such a form as to obtain cost-complexity pruning. Among the methods used for this purpose, the so-called pruning is applied. This procedure reduces the tree size by removing some of its fragments. It usually means eliminating less significant variables from the model. In the tree package the pruning is possible using the `prune.tree` function, which results in a tree with 9 terminal nodes. The pruned classification tree model for the restaurant data – see p.175.

Each line describes the individual tree node (nodes), the split variable (split), the number of observations (n), the deviance of the node (deviance), a majority class for classification trees ($yval$), and a vector of fitted probabilities for each response level of the innovative dependent variable ($yprob$). Asterisks (*) indicate terminal nodes of the tree, corresponding to the segments. As shown, 4 variables were used in the construction of the pruned model: marketing, technology, year, type. They have the greatest ability to discriminate, i.e. to define the division of this space into segments. Therefore, $H1$ research hypothesis has been positively verified. The classification tree shows that only four factors (variables) significantly affect the innovative activity of restaurants in Poland.

Classification tree:

Variables actually used in tree construction:

[1] "marketing" "technology" "year" "type"

Number of terminal nodes: 9

Residual mean deviance: 1.127 = 271.6 / 241

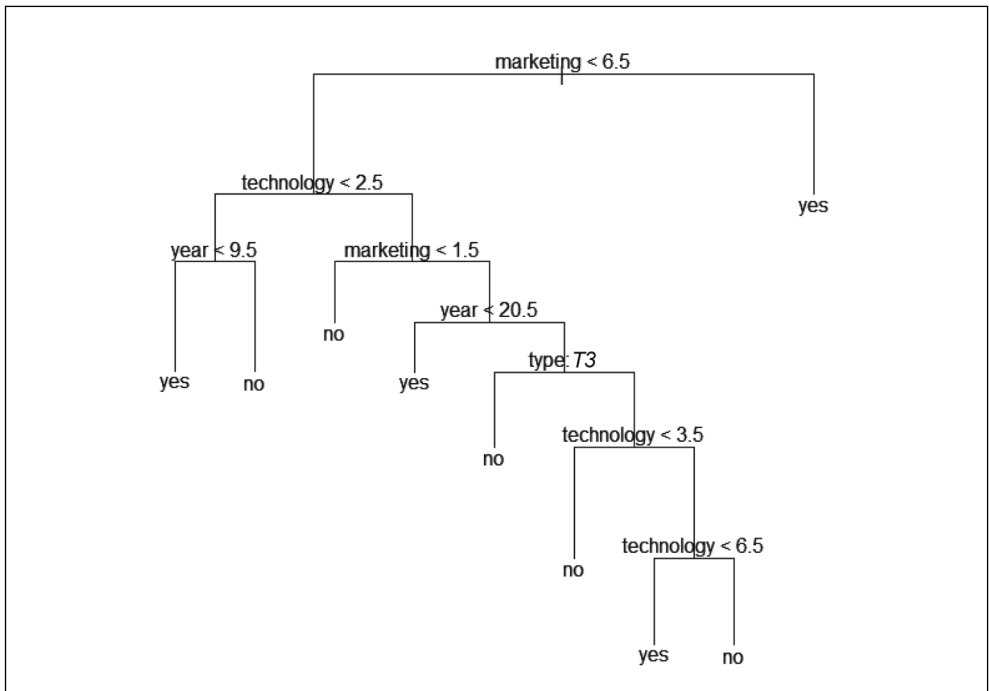
Misclassification error rate: 0.264 = 66 / 250

node). split. n. deviance. yval. (yprob)

* denotes terminal node

- 1) root 250 339.500 yes (0.4160 0.5840)
- 2) marketing < 6.5 198 273.800 yes (0.4697 0.5303)
- 4) technology < 2.5 29 35.920 no (0.6897 0.3103)
 - 8) year < 9.5 10 12.220 yes (0.3000 0.7000) *
 - 9) year > 9.5 19 12.790 no (0.8947 0.1053) *
- 5) technology > 2.5 169 231.100 yes (0.4320 0.5680)
- 10) marketing < 1.5 10 10.010 no (0.8000 0.2000) *
- 11) marketing > 1.5 159 215.100 yes (0.4088 0.5912)
- 22) year < 20.5 111 143.900 yes (0.3514 0.6486) *
- 23) year > 20.5 48 66.210 no (0.5417 0.4583)
- 46) type: T3 10 6.502 no (0.9000 0.1000) *
- 47) type: T1.T2 38 52.260 yes (0.4474 0.5526)
 - 94) technology < 3.5 6 0.000 no (1.0000 0.0000) *
 - 95) technology > 3.5 32 41.180 yes (0.3438 0.6562)
 - 190) technology < 6.5 17 12.320 yes (0.1176 0.8824) *
 - 191) technology > 6.5 15 20.190 no (0.6000 0.4000) *
- 3) marketing > 6.5 52 53.660 yes (0.2115 0.7885) *

Fig. 2: Pruned classification tree for the restaurant data



Source: own using R environment (R Core Team, 2021)

The tree consists of 9 terminal nodes, which means space division into 9 segments. The residual mean deviance is 1.127 and the classification error is 26.4%, because 66 out of 250 observations have been erroneously assigned to classes. The pruned classification tree model has a slightly larger classification error, however, still acceptable.

H_2 was positively verified. The innovative activity of restaurants shows a considerable diversification. Four segments of innovative restaurants were identified (terminal nodes marked as 'yes' in Fig. 2) and 5 segments of non-innovative restaurants (terminal nodes marked as 'no' in Fig. 2) in Poland.

Fig. 2 shows the classification tree using 4 explanatory variables.

The classification tree generates classification rules being the conjunction of conditions in the tree nodes from the root to the terminal node:

IF (condition_1) AND (condition_2) AND ... THEN class

Based on the research carried out for the classification tree (see Fig. 1), 4 segments of restaurants operating in the largest Polish cities were identified, simultaneously showing a significant innovative activity. The set of these restaurants covers as follows:

a. Segment 1 (52 restaurants):

IF marketing $\in \{7, 8, 9\}$ THEN innovative = yes;

b. Segment 2 (10 restaurants):

IF marketing $\in \{0, \dots, 6\}$ AND technology $\in \{1, 2\}$ AND year < 9.5 THEN innovative = yes;

c. Segment 3 (111 restaurants):

IF marketing $\in \{2, \dots, 6\}$ AND technology $\in \{3, \dots, 8\}$ AND year < 20.5 THEN innovative = yes;

d. Segment 4 (17 restaurants):

IF marketing $\in \{2, \dots, 6\}$ AND technology $\in \{4, 5, 6\}$ AND year ≥ 20.5 AND type $\in \{T1, T2\}$ THEN innovative = yes.

When interpreting the above findings, it is impossible to ignore that among innovative activities performed by the analysed restaurants, two types of innovations are the dominating ones, i.e. marketing and technological innovations. This applies, in particular, to the third segment (111 restaurants constituting 44.4% of their total number and 58.4% of those restaurants whose restaurateurs described themselves as observing new trends in the catering industry and introducing menu innovations). It is worth

highlighting that this segment of restaurants includes the establishments operating on the catering services market for over 20 years, hence the understandable interest of their owners in innovations allowing them to maintain their position on the competitive market.

The characteristics of the four identified innovative restaurant segments and the classification tree (Fig. 1) show that H_1 and H_3 have been positively verified. Out of 9 factors (explanatory variables) describing the innovative activity of restaurants in the largest Polish cities, 4 factors were ultimately included in the construction of the tree and thus a small group of factors had a significant impact on the innovativeness of the surveyed restaurants. Their innovative activity is predominantly related to the actions carried out in the sphere of marketing and technology.

3. Discussion

The article presents the research findings on the innovative activities carried out by restaurants operating in the largest Polish cities. These problems have been addressed by Polish researchers very rarely (Kowalska, 2018; Rapacz & Gryszel, 2020). Much more often the issues under study were addressed by the researchers from other countries (e.g., Ottenbacher & Harrington, 2009b; Kunz et al., 2011; Sandvik et al., 2014; Stierand & Lynch, 2008; Gagić, 2016; Lee et al., 2016; Kim et al., 2018; Abbate et al., 2019). The aforementioned authors investigated specific types of innovations in their analyses (e.g., product, marketing, technological and process innovations), however, this subject matter was relatively seldom examined considering all these innovation types jointly (Gomezelj Omerzel, 2016). Having the above in mind, the authors of this study analysed all types of innovations, attempting to determine which of them are preferred by the owners of restaurants located in the largest Polish cities. For this purpose the multivariate method of classification trees was used.

The declarations made by restaurateurs regarding three aspects describing the discussed phenomenon in general were the starting point for the assessment of the innovative activities performed by the surveyed restaurants (the total of 250 establishments). It referred to the following declarations: observing new trends in the catering services sector, introducing menu innovations, lack of interest in innovations and

Tab. 1: The structure of restaurants taking into account their innovativeness level

Innovation intervals (%)	Innovation level	Number of restaurants	Share of restaurants (%)
0–30	Very low	8	3.2
30–50	Low	75	30.0
50–70	Average	132	52.8
70–90	High	33	13.2
90–100	Very high	2	0.8

Source: own

sticking to a proven offer. It turned out that 76% of all surveyed restaurateurs declared taking innovative actions. It should be emphasized that it refers to the restaurants located in the largest Polish cities characterised by high competition in the restaurant industry (Re), and simultaneously featuring a significant demand presented by consumers (including tourists) as well as growing expectations regarding, i.e., changes in the restaurant offer, the range of provided services or the application of new technologies (e.g., in the customer service process).

The next step in analysing restaurant innovativeness was to determine its diversification level. For this purpose the total number of innovations implemented in four areas of this activity (in the field of products, marketing, processes and technology), i.e., 32 types of activities were taken into account. It allowed identifying five levels of innovative activities carried out by the surveyed restaurants (percentage share of the number of innovations undertaken in their total number). The results are presented in Tab. 1.

Low level of innovation refers to those restaurateurs who implemented between 30% and 50% of all activities listed in the catalogue (the aforementioned 32 activities). This group covers 75 restaurants, i.e., 30% of all the surveyed establishments. These restaurants which implemented from 50% to 70% innovations make up the largest group of establishments (over 52% of their total number) and represent the average level of innovation. The entities presenting a high level of innovation are definitely less numerous (13.2% of all surveyed restaurants).

An important element of the restaurant innovativeness was to determine which explanatory variables (9 were considered)

have a decisive impact on the implementation of product, marketing, organizational and technological innovations. The model in the form of a pruned classification tree for a set of innovative restaurants allowed concluding that marketing and technological innovations are of essential importance for them. The remaining two types of innovations (e.g., product and organizational ones) are of interest to all the surveyed restaurants, however, the distinguishing feature of the pro-innovative restaurants is their activity in the area of marketing and technology. It applies to 190 restaurants, i.e., 76% of all the respondents. In this group, the most numerous representation is formed by the restaurants implementing between 2 and 6 marketing innovations (out of 9 listed in the catalogue for this type of activities) and from 3 to 8 technological innovations (out of 8 possible). It refers to 58.4% of all innovative restaurants. A relatively large group of restaurants is made up by the ones focusing their innovative activity on marketing innovations (implementing from 7 to 9 innovations out of the catalogue of 9 selected ones). In this case, it is the group of 52 restaurants, i.e., 27.4% of the pro-innovative establishments.

When analysing the innovative activity of restaurants included in the group of pro-innovative establishments (covering 190 entities), the impact of the restaurant organizational and legal form on this type of activity was also determined. It referred to the restaurants operating as independent entities or as part of chain establishments and also functioning within hotel facilities. It was found that 90% of the restaurants connected with the hotel industry actually implement innovations. The respective high share also applies to chain restaurants (88.7% of all these restaurants),

and definitely a lower one to the restaurants run by independent restaurateurs (65% of this group). This high share of restaurants operating in hotel facilities (hotels and guest-houses) as well as chain establishments results from, i.e., the implementation of systemic solutions, higher organizational culture, managers' creativity, having more funds assigned to this purpose or pressure exerted by the customers of these establishments. In the case of independent restaurants, the lack of ideas on the part of restaurateurs, lower education level, insufficient experience, as well as financial limitations and a gap in research conducted among customers were identified. Innovations in the restaurant sector represent a certain array of activities and procedures requiring a pro-market approach from both restaurateurs and managers, making decisions involving a specific degree of risk at the right time, coming up with new ideas and ways to create value, which is easier in chain and hotel restaurants.

In the context of the presented remarks, the opinions of restaurateurs on the sources of ideas and innovative solutions in the surveyed restaurants should be considered interesting. The research findings indicate, however, the absence of significant differences between the analysed three types of restaurants taking into account the basic sources of innovative ideas. The most important sources were listed in the following order: we come up with and implement new ideas ourselves (the percentage share of this indication ranged between 84.5–86.0%), we listen to the opinions and comments of our customers (81.1–84.0%), we observe market trends (74.6–82.0%), and we develop ideas and innovative solutions together with the staff (74.0–77.5%). It seems that this issue requires in-depth research, since the previous findings indicate higher innovative activity, primarily of the restaurants operating in hotels and chain establishments.

Having recognized that the innovations implemented by restaurateurs constitute an opportunity for gaining or maintaining the competitive advantage of restaurants, an increased market share, sales and profit, the owners of the surveyed establishments were asked whether the situation of their business changed following the introduction of new ideas and solutions. It turned out that about 40% of restaurateurs (regardless of the organizational and legal form of their restaurants) did not notice

any major changes after the introduction of innovations, i.e., the restaurants retained their existing position on the market. In turn, other surveyed restaurateurs explicitly indicated the positive effects of implementing innovations, i.e., improving their competitive position, attracting larger number of customers, better revenues and improved image of the establishment. However, it is worth paying attention to the higher share of such declarations related to chain restaurants and the ones run by independent restaurateurs, along with the significantly lower share of hotel restaurants. In the case of the latter, it is certainly justified by a more extensive profile of hotel facilities (accommodation services, recreational services, spa & wellness). Catering services represent an important element of these facilities offer, but their market success is determined by the comprehensive offer provided by these entities.

Conclusions

The research results presented in the study enrich the existing source literature in two ways. On the one hand, they indicate the diversified interest of restaurateurs in the particular types of innovations. Although innovation is perceived as the essential factor responsible for developing and maintaining a strong market position, the focus is predominantly on marketing and technological innovations. When examining the sources of innovative ideas, it turned out that restaurateurs (regardless of the organizational and legal form of the establishment, i.e., its type) show a high level of entrepreneurial self-efficacy (ESE) and believe in their own abilities related to the discussed area. This issue is highlighted by Hallak et al. (2011).

On the other hand, the study is a contribution to the debate on innovation in the catering industry. The latter covers a wide spectrum of catering establishments characterised by different levels of innovative activity. In the case of the surveyed restaurants operating in the largest Polish cities and representing three types of establishments, i.e., independent, chain and connected with hotel facilities, the level of such activity remains diversified. Further research should cover the entire catering sector, because only in this way is it possible to generalize the findings, identify the incentives for the innovation process and, consequently, achieve market success of the establishments providing catering services.

Although this study presents interesting findings addressing the approach of restaurateurs (owners and managers) to the practice of implementing innovations, it still has some limitations. These results should be interpreted with due caution. They refer to selected restaurants operating in the six largest Polish cities, which limits the possibility of making generalizations regarding other forms of catering establishments functioning in other geographical locations. Future research should cover a wider group of catering establishments (not only restaurants), in various locations, paying attention, e.g., to the implications resulting from introducing innovations in the sphere of public health (product innovations), sustainable development (organizational and technological innovations). It also refers to the role of organizational culture in implementing innovations and customer participation in this process. It seems that restaurateurs should present pro-innovative behaviour more frequently than previously and stimulate the staff to create innovations generating, among others, new and unique experiences for customers. The research results should also be confronted with the perception of innovation by consumers. Only then will it be possible to present a full picture of innovation in gastronomy. Nevertheless, the results of the conducted research should also be disseminated in popular trade magazines so that they can reach a wider group of catering managers and serve them as a helpful source of data in making strategic decisions regarding the implementation of innovative activities.

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