

PROPOSAL OF THE E-SERVICES QUALITY SCALE – PRELIMINARY RESULTS

doi: 10.2478/czoto-2023-0018

Date of submission of the article to the Editor: 06/11/2023

Date of acceptance of the article by the Editor: 06/12/2023

Manuela Ingaldi¹ – *orcid id: 0000-0002-9793-6299*

¹Czestochowa University of Technology, **Poland**, *manuela.ingaldi@wz.pcz.pl*

Abstract: Quality plays a crucial role in both e-commerce and online stores because customers expect not only convenient shopping but also satisfaction with products and services. High-quality services and products contribute to increased customer loyalty and the establishment of a positive company image in the competitive online market. In the case of e-commerce, the main attributes considered when evaluating quality are those related to the functioning of the website through which the customer orders products. The main goal of the study was an attempt to compile attributes that would reflect the quality of a specific e-service, especially an e-commerce store, and influence customer satisfaction. Based on the list of attributes, an effort was made to identify those most important to customers. The research results, the importance of individual attributes and groups, further demonstrate what customers pay particular attention to in e-shops and what matters to them. Emphasizing the fulfillment of these attributes is crucial.

Keywords: e-service, service quality, quality scale, attributes

1. INTRODUCTION

The rapid advancement of technology, the concept of Industry 4.0, and the COVID-19 pandemic have led to the rapid development of various online services, opening up new markets for customers and making what seemed impossible to buy readily available (Stareček et al 2023). As noted by the authors (Baryshnikova et al., 2021), in addition to the era of Industry 4.0, the COVID-19 pandemic has introduced new consumer trends, necessitating accelerated digitization and automation of production, restructuring of supply chains, and defining the need for innovative manufacturing strategies (Suzuki et al. 2023).

Currently, e-commerce is the most common form of trade, and it is expected to be the primary sales strategy for both retail and wholesale businesses in the near future. The growing popularity and global success of e-commerce have also transformed existing support and distribution structures (Corejova et al., 2022). It allows customers to purchase goods from different parts of the world regardless of their current location.

Not only did customers have to adapt to changes in distribution channels, but these changes largely affected businesses that had to adjust create these channels for their customers (Ulewicz, 2018, Ingaldi and Ulewicz 2019). The key to operating businesses in today's market is the concept of flexibility, which is primarily associated with adapting to

the rapidly changing customer requirements (Mazur & Momeni, 2019; Mazur & Momeni, 2018; Ingaldi, 2022). It is precisely in the context of diverse distribution channels and opening up to international markets that flexibility is crucial when it comes to e-commerce. Furthermore, it should be emphasized that in recent years, the global economy has been dominated by the development of Industry 4.0, which is revolutionizing the technological aspect of industrial operations (Gajdzik, 2022; Fobel and Kuzior 2019). This means that practically every business, in order to meet market demands, must choose to follow this path.

Digital technologies have become an essential part of people's lives across all generations. This is evident in various areas, such as interpersonal communication, which has rapidly transitioned to electronic means, and the way we shop, which can now be considered much more advanced (Fedorko et al., 2018). This is particularly noticeable in the case of younger individuals, who cannot function without the internet, handle even the smallest matters online, and a significant part of their lives takes place in the digital realm. In the face of ongoing market changes, multi-faceted quality analyses contribute to ensuring production continuity, enhancing the quality of products offered, and maintaining a stable market position (Ulewicz et al., 2023; Krynke, 2019). Therefore, in the case of e-services, particularly in e-commerce, new methods for conducting research on their quality are being sought.

The increasing popularity of e-services among service providers and customers has led to extensive research on methods for assessing quality. It has been noticed that traditional quality models are not applicable in this context, which has led many researchers to develop their own models that can directly address the quality of e-services. One such model is the hierarchical model, which was developed by Blut and his colleagues (Blut et al., 2015) and later refined by Blut himself (Blut, 2016). Based on the conducted research, attributes that, according to the authors, should be considered when assessing the quality of e-services have been identified and verified. Four groups of attributes were distinguished: website design (9 attributes), content (3), customer service (2), security/privacy (2). It is noteworthy that the developed model includes attributes not covered in existing scales. One very important detail to be emphasized is that this model dedicates a significant portion of the assessment to the website itself, which often influences whether a customer decides to purchase a service from a particular store. It considers not only the appearance of the website but also the content it contains and how it is used. All the attributes included in the model can be considered as factors to be considered when assessing quality.

A second, very simple conceptual model related to e-services is the model created and verified by Sharma (2017). The first part of the model concerns the factors that motivate e-satisfaction in the online environment. The variables include website design, customer service, and trust. In this case, these variables act as dependent variables, with e-satisfaction acting as the independent variable. Furthermore, the quality of e-services acts as a dependent variable of e-satisfaction. E-loyalty is another independent variable. The author demonstrated the connections between the individual factors influencing customer e-satisfaction.

In the literature, you can find studies containing proposals for new dimensions of quality. For example, Yoo and Donthu in their work (2001) proposed the Sitequal methodology for assessing websites used for online shopping. Through their research, they suggested a set of attributes that can be used in such situations. Webb and Webb (2004) presented

their list of attributes within the Sitequal methodology, taking into account attributes related to service quality as well as data quality. Similar research was conducted by Wolfinbarger and Gilly (2003) when they developed their own list of attributes within the eTailQ methodology. The challenge here is the length of the list. Additionally, Ghosh (2018) presented another example of quality dimensions for e-services within the E-S-QUAL methodology. In these studies, the credibility of four groups of attributes was confirmed: performance, fulfillment, system availability, and privacy.

There are many interesting studies on the subject, but it can be observed that the various approaches and dimensions developed in these studies differ from each other. One important issue is the limited number of works by Polish researchers that also consider the specifics of the e-service market in Poland and Eastern Europe. The demographics of internet users may be different in Poland, where digital exclusion is still a phenomenon. Additionally, many global e-commerce businesses entered the Polish market with a delay. The results obtained may provide an alternative when it comes to the e-service quality model or a set of attributes that can help reflect the quality of e-services.

The author, during her research, in collaboration with other researchers, assessed the quality of e-services, with a particular focus on e-commerce. A relatively wide range of methods was used, including Servqual, IPA, Kano, and CIT. As a result, the author gained experience in conducting research in this area. This also allowed for the identification of certain patterns in the attributes of e-services. Furthermore, a review of the literature on this topic sparked the desire to conduct additional research on the dimensions of e-service quality based on the specifics of the Polish and European market.

2. MATERIALS AND METHODS

An analysis of the available literature on e-service quality assessment was conducted. The Web of Science database and the ResearchGate platform were used for this purpose. Articles containing the words "e-service" in the title or keywords, as well as the names of methods used to assess e-service quality, such as E-Servqual, WebQual, Sitequal, Piruqal, IRSQ, .comQ, E-TailQ, E-S-QUAL, E-SQ, e-RecS-Qual, E-A-S-Qual, eTransQual, eSelfqual, E-SQual-ERec-SQual were sought. The search was limited to the period 2010-2021.

In this manner, 620 publications were initially identified (e-service 581, E-Servqual 1, WebQual 15, Sitequal 0, Piruqal 0, IRSQ 0, .comQ 0, E-TailQ 1, E-S-QUAL 11, E-SQ 8, e-RecS-Qual 1, E-A-S-Qual 0, eTransQual 2, eSelfqual 0, E-SQual-ERec-SQual 0) (as of 10th February 2020). However, after reviewing the abstracts and availability of articles in open access or on the ResearchGate platform, 53 publications were selected (e-service 26, e-Servqual 1, WebQual 11, E-TailQ 1, E-S-QUAL 7, E-SQ 5, e-RecS-Qual 1, eTransQual 1). Since there were relatively few publications found in the Web of Science database that focused on specific methods and dimensions, this process was repeated using the Scopus database, resulting in the selection of 42 publications (E-Servqual 5, WebQual 12, Sitequal 2, IRSQ 2, E-TailQ 2, E-S-QUAL 9, E-SQ 6, e-RecS-Qual 1, eTransQual 2, E-SQual-ERec-SQual 1).

In the next step, an analysis of e-service attributes was conducted, with particular emphasis on e-commerce platforms used for purchases. This led to the creation of a list of attributes used for this purpose. The content of each attribute was written in a way that would be understandable to the average person. The entire process of providing e-services was considered, which included attributes related to the moment of delivery (not

necessarily online) and after-sales service. In Poland, there are appropriate legal regulations that protect consumers' rights and facilitate the return of goods purchased online. However, it's important to remember that there are also websites of foreign businesses in the market, which unfortunately operate under their own regulations, making the return of purchased items and refunds often very difficult or even impossible. The attributes were compiled to reflect the quality of e-services. Subsequently, the attributes were grouped as follows (Ingaldi, 2022):

Website appearance

1. The internet platform is visually attractive.
2. The internet platform is impressive.
3. The internet platform looks professional.

Operation of the website

4. The internet platform is convenient to use.
5. The internet platform is very easy to use.
6. The online platform has features that are user-friendly.
7. The internet platform is organized in an intuitive way.
8. The organization and layout of the internet platform facilitate the search for products.
9. The internet platform does not crash.

Website content

10. The information contained on the internet platform is up-to-date and comprehensive.
11. The online platform describes the ordering process.
12. The regulations of the e-shop are accessible and understandable.
13. The internet platform includes the full offer of the e-service provider.
14. The internet platform contains appropriately selected product categories.
15. The internet platform is frequently updated with new products and information.
16. The internet platform has useful interactive functions (for example, the ability to look at the product from all sides, build the product, or virtually try on items).

Products

17. The online platform contains a wide variety of products.
18. The internet platform contains a wide variety of brands.
19. The internet platform contains an exact description of the products.
20. The online platform contains detailed product parameters.
21. The online platform contains detailed information on the materials of which the product is made.
22. The internet platform contains photos of the products.
23. The internet platform includes price information.
24. The internet platform contains information about the delivery date.
25. The products found on the internet platform are available.

Search engine

26. There is a product search engine on the internet platform.
27. Product search is easy.
28. The search includes options for filtering the results.
29. The online platform informs about the availability of products when searching.
30. The online platform has selection of personalization functions.
31. Access to search results is easy.
32. The online platform includes order history options.

Making orders

- 33. Registration on the internet platform is not obligatory to place an order.
- 34. The ordering process is simple.
- 35. The ordering process is very fast.
- 36. A purchasing decision can be made in a few steps.
- 37. E-service provider offers reasonable shipping and handling costs.

Contact with e-shop

- 38. The internet platform contains precise contact details with the e-service provider.
- 39. The internet platform includes a telephone number.
- 40. The internet platform includes a chat with a consultant.
- 41. Customer service personnel is ready and willing to respond to customer needs.
- 42. Customer service staff is always there to help.
- 43. Customer service staff responds promptly to your question.
- 44. The e-service provider offers after-sales support.

Payment methods

- 45. The online platform contains accurate banking details.
- 46. The customer can choose the payment method.
- 47. The customer can choose the payment option "on delivery".
- 48. The customer can choose various forms of electronic payments.
- 49. The transaction on this platform is fast and efficient.
- 50. The transactions on this online platform are error-free.
- 51. The transaction confirmation informs the customer of the total charges.

Delivery methods

- 52. The customer has the option to choose a shipper (courier).
- 53. The customer may choose a delivery within a specified day.
- 54. The customer may choose a delivery at convenient time.
- 55. The delivery schedule is clear.

Order fulfillment

- 56. The customer receives information about the date of order fulfillment.
- 57. The customer receives up-to-date information about the execution of the order.
- 58. The customer can track the status of the order.
- 59. The customer can track the sent package.
- 60. The customer has the option to change the order after its submission.
- 61. The customer has the option to cancel the order.

Delivery process

- 62. Products shipped to customers are securely packed.
- 63. The shipment contains relevant documents (invoice or bill and a document enabling the customer to return the goods).
- 64. The customer can assess the condition of the packaging of the delivered parcel.
- 65. The customer has the option to open the parcel upon receipt of the parcel.
- 66. The customer may refuse to accept the shipment in case of any non-compliance.
- 67. The shipment is in accordance with the order.
- 68. The ordered products are as described on the platform.
- 69. The quality of the products ordered is high.

After-sales service

- 70. The return policy on the online platform is described in detail.
- 71. The customer may return the ordered product.

72. Return of products is relatively simple.
73. The customer has the option to repair the product under the warranty.
74. After the purchase, the customer has the option to add an opinion about the purchase process.
75. The e-service provider introduces loyalty programs.

Safety

76. The company that owns the internet platform is legal.
77. The online platform has real offers.
78. The online platform requires a reasonable amount of personal data.
79. The online platform has a security system that protects all customer information.
80. Financial transactions on the internet platform are safe.
81. Customer credit / debit card information is secure.
82. The online platform protects all information about customer behavior when shopping online.
83. The online platform does not misuse the customer's personal data.
84. The internet platform does not transfer customer data to other websites.

The list of attributes reflects the entire process of providing e-services, but it is too long to be fully utilized in the research process. Therefore, research should be conducted to reduce it and identify the most important attributes according to the customers.

To assess the utility of attributes and their groups as dimensions of quality, a survey was conducted among students. According to Yoo and Donthu (2001), this is a valuable research group for several reasons, even though it is limited, making it worthwhile to consider in such studies. Firstly, young people are one of the most active user groups of e-services. Students are often considered as research subjects in multidimensional studies. Additionally, consumer behavior studies have indicated that students and non-students exhibit similar behavior. In fact, students can effectively substitute for non-students or adults in various empirical studies, as demonstrated by Yavas (1994) and Lichtenstein and Burton (1989).

Respondents were initially tasked with identifying the top 3 e-commerce websites they most frequently use, providing their domain names. Subsequently, they were asked to rate the importance of each attribute for the specific stores on a seven-point Likert scale, where 1 represented "strongly disagree" and 7 represented "strongly agree." To avoid bias and not influence the research results, the attributes were presented in alphabetical order.

A total of 53 individuals participated in the study during the period from September to April 2021. Initially, it was planned that at least 50 individuals would take part in the study. Preliminary research results were presented in the work (Ingaldi, 2022).

The obtained responses were analyzed to determine the final set of attributes that, according to the respondents, reflect the quality of e-services. This group of attributes will be used to construct a model of e-service quality in the case of e-commerce.

3. RESULTS AND DISCUSSION

At the beginning, an analysis of the product profiles of the e-commerce websites indicated by the respondents was conducted (Table 1). Each respondent was tasked with evaluating the importance of individual attributes three times, i.e., for three different e-commerce websites. Initially, they had to provide the domain names of these websites, enabling their

identification and classification into groups. Respondents most frequently evaluated websites related to food and beverages, followed by those related to video games, books, CDs, DVDs, and clothes. Fourteen different categories were identified.

Table 1
List of e-shops in categories (own study)

E-shop categories	Percentage fraction %
Clothes	10.26
Shoes	7.69
Bags	4.49
Cosmetics	5.77
Jewelry	1.92
Home furnishings	2.56
Collectible products	3.85
Tickets for cinema, theater, and concerts	5.13
Insurance	8.97
Food and beverages	18.59
Video games	13.46
Books, CDs, and DVDs	12.18
Travel and reservations	3.85
Computer hardware	1.28

Then, a Cronbach's Alpha test was conducted for each group of attributes to assess the reliability of the scale data. The obtained results were interpreted according to the guidelines presented by Hair et al. (2003) and are presented in Table 2.

Table 2
Cronbach Alpha - interpretation (Hair et al., 2003)

Alpha coefficient range	Strength of association
< 0.6	Poor
0.6 to < 0.7	Moderate
0.7 to < 0.8	Good
0.8 to < 0.9	Very good
0.9 and more	Excellent

In Table 3, the results of the Cronbach's Alpha test are presented. Not all groups demonstrate consistency. In the case of website appearance and delivery of parcels, results below 0.6 were obtained, indicating poor consistency in the obtained results. These attributes should not be considered, and they can be excluded from the survey questionnaire. The remaining groups fall within the ranges of 0.7 to 0.8 or 0.8 to 0.9, which, according to the assumptions of Table 2, can undergo further analysis. Therefore, this study can be considered as an initial elimination of attribute groups.

It's also possible to examine how the Cronbach's Alpha test result would change if one of the variables were eliminated. If the elimination of a variable leads to an increase in the test result, then that variable should be completely removed from the group of attributes. However, if it leads to a decrease in the test result, that attribute should be retained. However, due to the small sample size, this analysis was not conducted. All attribute groups were also retained in further analysis for the same reason.

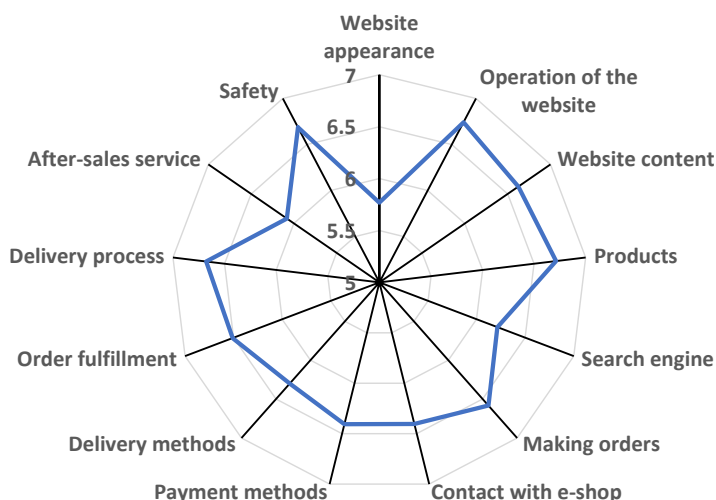
Table 3

Wyniki testu Cronbach Alpha (own study)

Dimensions	Cronbach alpha test
Website appearance	0.584
Operation of the website	8.610
Website content	0.764
Products	0.863
Search engine	0.716
Making orders	0.749
Contact with e-shop	0.924
Payment methods	0.712
Delivery methods	0.856
Order fulfillment	8.470
Delivery process	0.514
After-sales service	0.891
Safety	0.703

An analysis of respondents' assessment was conducted to illustrate the importance of both individual attributes and groups. For this purpose, a simple analysis of means was performed. This allowed for the observation of how important individual attributes are to the respondents. Analyzing the average importance assessments for individual groups of attributes, it can be observed that these values do not differ significantly from each other. Differences become more apparent in Figure 1 due to the scale enlargement. This means that all attribute groups are important to the respondents when using e-commerce websites.

The lowest average importance assessment was observed for the website appearance group (with a score below 6). It can be inferred that this group of attributes is of the least importance to respondents. Another group that received a low assessment is after-sales service. Two attributes, namely the ability to provide feedback after purchase and loyalty programs, contributed to the low rating. The low assessment for the search engine attribute group was also influenced by two attributes, the order history option, and choice personalization features. These attributes were discussed earlier.



Rys. 1. Average assessment of the importance of individual dimensions according to the respondents (own study)

The two attribute groups that received the highest ratings were website functionality and products. Respondents want the platform to work efficiently, be user-friendly, and offer a wide range of useful features. This is crucial because customers make their own purchases. They also want to receive as much information as possible about the products offered, which will help them make informed choices. To meet customer requirements, e-commerce websites need to pay particular attention to these two attribute groups. When conducting research on the evaluation of the quality of e-services, it is essential to include these two attribute groups in the research questionnaire. It's important to remember that in conducting such research, there's no need to use all the attributes within these groups. Researchers can limit themselves to those attributes that received the highest ratings or those that align with the specific nature of a particular e-commerce website.

The overall average rating for all attributes combined is 6.4. For respondents, the mentioned attributes are highly important when it comes to using e-services.

The average importance ratings for individual attributes have been calculated and are presented in Table 4.

Table 4

Average importance ratings of attributes according to respondents (own study)

No of attribute	Average assessment (max=7)	No of attribute	Average assessment (max=7)	No of attribute	Average assessment (max=7)
1	5.783	29	6.291	57	5.844
2	5.324	30	5.813	58	6.812
3	6.196	31	6.421	59	6.644
4	6.715	32	5.382	60	6.473
5	6.857	33	6.081	61	6.376
6	6.693	34	6.866	62	6.921
7	6.487	35	6.787	63	6.613
8	6.776	36	6.468	64	6.142
9	6.923	37	6.716	65	6.295
10	6.814	38	6.873	66	6.832
11	6.893	39	6.032	67	6.914
12	6.775	40	6.414	68	6.792
13	6.813	41	6.283	69	6.909
14	6.478	42	6.482	70	6.476
15	6.332	43	6.714	71	6.414
16	6.271	44	6.031	72	6.642
17	6.392	45	4.064	73	6.723
18	6.464	46	6.813	74	5.216
19	6.876	47	6.298	75	5.023
20	6.913	48	6.926	76	6.813
21	6.712	49	6.913	77	6.912
22	6.834	50	6.944	78	6.534
23	6.933	51	6.881	79	6.696
24	6.512	52	6.822	80	6.924
25	6.776	53	6.394	81	6.897
26	6.583	54	6.211	82	6.287
27	6.382	55	5.772	83	6.179
28	6.623	56	6.913	84	6.934

It can be observed that many attributes received an average rating of 6.9. As many as 19 attributes received this rating. Another 17 attributes received an average rating of 6.8. These are the attributes that are important to respondents and to which they pay special attention. This provides guidance for the person designing the research questionnaire on what to focus on when selecting attributes for the study.

It's essential to examine the attributes that received the lowest ratings. One attribute that stands out is attribute 45, concerning the accuracy of the e-commerce website's banking details on the internet platform, with a rating of 4.1. An increasing number of people, especially the younger generation, prefer various types of online transactions. Older individuals, who were not included in the survey, might be wary of online transactions and often opt for cash-on-delivery payment when the delivery is in a traditional form.

Attributes 74, concerning the addition of reviews about the purchasing process, and 75, related to loyalty programs, are also of low importance to the respondents. Both of these attributes are not highly important to the respondents. Concerning the ability to add reviews about the e-commerce website and purchases, it might be because such reviews can be added on various consumer review websites. The low rating for loyalty programs is somewhat surprising, especially since respondents were asked to indicate the importance of individual attributes for three e-commerce websites of their choice, which they most frequently use.

Attributes 30, which relate to choose personalization, and 32, concerning order history, are also not highly important to customers. Similarly, to loyalty programs, it's challenging to explain this, especially the low importance given to choose personalization features by customers who frequently use a particular e-commerce website.

The last attributes to pay attention to are attribute 1, concerning visual attractiveness, and attribute 2, related to making an impression by the e-commerce website's internet platform. For customers, the appearance of the platform, including its color scheme, is not of great importance. It may attract attention visually, but it doesn't necessarily mean that the platform functions correctly, or that it's easy to find what they're looking for and make e-purchases.

It can be inferred that the low importance of these attributes to customers means that they don't pay much attention to them. Therefore, during the evaluation of e-service quality, they may not need to be included in the research questionnaire.

4. CONCLUSION

In recent years, digital technologies have become an integral part of people's lives, impacting various aspects, including communication and shopping. E-commerce has emerged as a dominant form of trade, accessible to customers worldwide. The Industry 4.0 revolution has compelled businesses to adapt to technological changes to meet market demands. Younger generations are particularly reliant on the internet for daily activities, and multi-aspect quality analyses are essential for maintaining production continuity, enhancing product quality, and staying competitive in the evolving market, especially in the context of e-services like e-commerce.

The obtained results should be treated as preliminary results because they require further analysis and confirmation, especially the need for the elimination of individual attributes or two attribute groups. However, it can be assumed that there may not be a significant need to include them in survey questionnaires related to service quality evaluation.

The initial goal was to create a new set of quality dimensions for e-services, considering the specific characteristics of the Polish and Eastern European market. However, the small sample size may not be representative, and conducting an attribute reduction analysis and creating such a list of dimensions could be associated with a high degree of error. There are plans to continue the research and gather additional data to conduct principal component analyses that will allow the elimination of some attributes and indicate those that will ultimately be included in the new set of quality dimensions. However, given that the aim of this study was to demonstrate the role of the customer and their satisfaction in shaping and leveling service quality, and methodologically, to develop a methodology for selecting quality attributes for service quality research, the decision was made to present the research results at this stage.

The collected and grouped attributes in this manner can be a tool for designing a quality assessment study for specific e-services. When creating a survey questionnaire, businesses can use this list to select the attributes that directly relate to their operations and the functioning of their internet platform through which customers place orders for offered e-services. They won't have to go through numerous scientific publications, compile attributes, compare lists, and waste their valuable time. This list is important for another reason as well. It can be used not only for assessing the quality of e-services but also for designing an internet platform for an e-shop and the service delivery process carried out through it. The research results, the importance of individual attributes and groups, further demonstrate what customers pay particular attention to in e-shops and what matters to them. Emphasizing the fulfillment of these attributes is crucial.

ACKNOWLEDGEMENTS

Publication financed from statutory research of the Czestochowa University of Technology.

REFERENCES

- Baryshnikova, N., Kiriliuk, O., Klimecka-Tatar, D. 2021. *Enterprises' strategies transformation in the real sector of the economy in the context of the COVID-19 pandemic*, Production engineering Archives, 27(1), 8-15.
- Blut, M. 2016. *E-Service Quality: Development of a Hierarchical Model*, Journal of Retailing, 92(4), 500-517.
- Blut, M., Nivriti, C., Vikas, M., 2015. *Brock C. E-Service Quality: A Meta-Analytic Review*, Journal of Retailing, 91(4), 679-700.
- Corejova, T., Jucha, P., Padourova, A., Strenitzerova, M., Stalmachova, K., Valicova, A. 2022. *E-commerce and last mile delivery technologies in the European countries*, Production Engineering Archives, 28(3), 217-224.
- Fedorko, R., Fedorko, I., Riana, G., Rigelský, M., Oleárová, M., Obšatníková, K. 2018. *The impact of selected elements of e-commerce to e-shop recommendation*, Polish Journal of Management Studies, 18(1), 107-120.
- Fobel, P., Kuzior, A., 2019. *The future (Industry 4.0) is closer than we think. Will it also be ethical?*, AIP Conference Proceedings, 2186, 080003
- Gajdzik, B. 2022. *Key directions in changes from steelworks 3.0 to steelworks 4.0 with analysis of selected technologies of digitalizing the steel industry in Poland*, Management Systems in Production Engineering, 30(1), 46-53.

- Ghosh, M. 2018. *Measuring electronic service quality in India using E-S-QUAL*, International Journal of Quality & Reliability Management, 35(2), 430-445.
- Hair, J.F.Jr., Babin, B., Money, A.H., Samouel, P. 2003. *Essential of business research methods*. John Wiley & Sons, United States of America.
- Ingaldi, M. 2022. *Rola satysfakcji klienta w kształtowaniu i poziomowaniu jakości usług*. Wydawnictwo Politechniki Częstochowskiej, Częstochowa, Poland
- Ingaldi, M., 2022. *E-service quality assessment according to hierarchical service quality models*, Management Systems in Production Engineering, 30(4), 311-318.
- Ingaldi, M., Ulewicz, R. 2019. How to Make E-Commerce More Successful by Use of Kano's Model to Assess Customer Satisfaction in Terms of Sustainable Development. Sustainability, 11, 4830, DOI: 10.3390/su1118483
- Krynke, M., 2019. Managing the tasks of employees in the construction industry, Construction of optimized energy potential, 8(1), 137-145, DOI: 10.17512/bozpe.2019.1.15
- Lichtenstein, D.R., Burton, S. 1989. *The Relationship Between Perceived and Objective Price-Quality*, Journal of Marketing Research, 26(4), 429-443.
- Mazur M., Momeni, H. 2019. *Lean production issues in the organization of the company – results*, Production Engineering Archives, 22(22), 50-53.
- Mazur, M., Momeni, H. 2018. *LEAN Production issues in the organization of the company - the first stage*. Production Engineering Archives, 21(21) 36-39. <https://doi.org/10.30657/pea.2018.21.08>
- Stareček, A., Babel'ová, Z., Vraňaková, N. Jurík, L., 2023. The impact of Industry 4.0 implementation on required general competencies of employees in the automotive sector. Production Engineering Archives, 29(3) 254-262. DOI: .30657/pea.2023.29.29
- Sharma, G. 2017. *Service Quality, Satisfaction and Loyalty on Online Marketing: An Empirical Investigation*, Global Journal of Management and Business Research: E Marketing, 17(2), 57-66.
- Ulewicz, R., Czerwińska, M., Pacana, A. 2023. *A Rank Model of Casting Non-Conformity Detection Methods in the Context of Industry 4.0*, Materials, 16(2), 723.
- Ulewicz, R. 2018, Customer satisfaction survey in the furniture industry, Increasing the Use of Wood in the Global Bio-Economy - Proceedings of Scientific Papers, 19–29
- Webb, H.W., Webb, L.A. 2004. *SiteQual: an integrated measure of Web site quality*, The Journal of Enterprise Information Management, 17(6), 430-440.
- Wolfenbarger, M., Gilly, M.C. 2003. *eTailQ: Dimensionalizing, Measuring and Predicting E-tail Quality*, Journal of Retailing, 79 (3), 183-198.
- Yavas, U. 1994. *Research Note: Students as Subjects in Advertising and Marketing Research*, International Marketing Review, 11 (4), 35-43.
- Yoo, B., Donthu, N. 2012. *Developing a Scale to Measure the Perceived Quality of an Internet Shopping Site (SITEQUAL)*, Quarterly Journal of Electronic Commerce, (1), 31-47.