

EVALUATION OF IMPACT OF EXTERNAL COMMUNICATION FACTORS ON THE ADOPTION OF INNOVATIONS BY IT EMPLOYEES IN POLAND

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Purpose: The purpose of the study presented in this article is to assess the impact of selected external communication factors on the adoption of innovations by Polish IT employees at different stages. The study adopts a hypothesis: employees appreciate the importance of external contacts as a source of innovation.

Design/methodology/approach: The study used a proprietary questionnaire developed specifically for the purpose of this work. This tool explored the opinions on various external communication factors in the context of adoption of innovation. These factors were selected for the survey questionnaire based on literature research, desk research, opinions of panel participants (experts), and pilot studies conducted in IT companies.

Findings: In the group of factors related to external communication at each stage, the respondents saw the greatest influence on the adoption of the innovation in factors such as: good relations between company and/or service representatives and customers, and recognition of customers' requirements and needs in relation to products and services. The more advanced the innovation stage was, the lower the estimated impact in the adoption of this innovation of factors related to external communication, such as recognition of customers' requirements and needs toward products and services and analysis and interpretation of public opinion about the company and its products or services.

Research limitations/implications: The research presented in this article has some limitations. Firstly, it was carried out only in Poland, secondly only in the IT sector, and thirdly, only selected external communication factors were considered.

Practical implications: Demonstrate the importance of selected external communication factors in the innovation adoption process at its various stages.

Social implications: The results of the research should prompt companies to increase the development of diverse forms of external communication that build a lasting, positive relationship between the company and external stakeholders.

Originality/value: Assessment of the impact of selected external communication factors on the adoption of innovations by Polish IT employees at different stages.

Keywords: innovation, innovativeness, innovation adoption, innovation adaptation, external communication.

Category of the paper: Research paper.

1. Introduction

In today's highly dynamic environment, a factor that significantly affects the success of a company is its innovativeness. It can be defined as a company's collective openness to new ideas embedded in the corporate culture (Hurley, Hult, 1998). Another approach defines innovation as the willingness to challenge the status quo and provide support for new ideas in terms of technology, new product development, and also internal processes (Baker, Sinkula, 2009). Furthermore, the literature identifies it with an organisational climate that facilitates timely performance (Ruvio et al., 2013). Therefore, innovation has become a key nonfinancial objective of the firm and an important measure of organisational performance (Moos et al., 2010; Ober, Kochmanska, 2022). It is also worth noting that five dimensions of organisational innovation have been identified, namely creativity, openness, future orientation, risk taking, and proactivity (Ruvio et al., 2013).

Inherent in the concept of organisational innovation is the notion of innovation, since, as the subject experts point out, in many cases it has been operationalised as the number of innovations adopted by organisations (Ruvio et al., 2013).

Innovation can be defined as 'as the creation of new knowledge and ideas to facilitate new business outcomes, aiming to improve internal business processes and structures and to create products and services' (Plessis, 2007, p. 21). Innovation is also the implementation of a new or significantly changed product or process (Gault, 2018) and also the achievement of success through the application of something new (Granstrand, Holgersson, 2020). It can also be equated with progress (Weryński, Dolińska-Weryńska, 2021; Weryński, 2022). Innovation as an organisational phenomenon has been studied in many different fields (Quintane et al., 2011). Hence, among other things, their differentiated division results. Here, one can distinguish: process innovation, occurring, for example, in the form of the implementation of a streamed form of production (Wolniak, 2014), open innovation (perceived by organisations as highly relevant to future development strategy) (Kuzior et al., 2023), eco-innovation (Valdez-Juárez, Castillo-Vergara, 2021) or social innovation (Phillips et al., 2015).

In order to achieve the aforementioned success in adopting innovations, it is necessary to consider what factors can have a significant impact on this. One of the key elements belonging to this group is external communication, because as A. Potocki emphasises the integrative role of communication with the external environment determines the existence or demise of an organisation, as it functions in a specific environment (Potocki, 2009, p. 5). Therefore,

companies that not only actively focus on searching for external knowledge (especially technical knowledge), but acquire it, have an advantage over those organisations that decide to generate and implement innovations fully on their own (Zakrzewska-Bielawska, 2016).

Referring to the above considerations, the main objective of the study presented in this article is to assess the impact of selected external communication factors on the adoption of innovations by Polish IT employees at different stages. The study adopts a hypothesis: employees appreciate the importance of external contacts as a source of innovation.

The structure of the remainder of the article begins with a review of the literature on the adoption of innovations (with a view to, among other things, introducing the Technology Acceptance Model) and the factors relating to external communication are characterised within the company that potentially affect innovation adoption. This is followed by a description of the methodology used in this study and the results of the analysis and discussion. Finally, conclusions from a scientific perspective and suggestions for further research are presented.

2. Theoretical background

An interesting approach to innovation adoption can be found in the literature. M. Pichlak emphasises that "adopting an innovation essentially means that it is new to the adopting organisation. The adoption of an innovation can result from changing organisational conditions (adoption of a new strategy, structure, or employee remuneration system) or external conditions. Regardless of the internal or external source of change, innovation adaptation creates change in the organisation - it is a tool that determines the flexibility of its operation" (Pichlak, 2010, p. 378). According to A. Drews, in small domestic companies, middle- and lower-level employees are increasingly participating in the creation and adaptation of innovations (Drews, 2018).

At this point, it is worth taking a closer look at one of the main models that tries to explain the motives of human behaviour in the context of innovation adoption, namely the Technology Acceptance Model. This model is most commonly described in studies related to information systems and ICT in relation to innovation adoption (Otieno et al., 2016). Its creator was F.D. Davis. The model was developed in the 1980s. Until modern times, it has been one of the most important justifications for an individual's use of new technologies and provides a reference point for explaining the use of information technologies in different social contexts. F.D. Davis assumes that the determinant for the use of new information technologies is the intention to use. This in turn is explained by a certain attitude towards the use of a given technological solution and its perceived usefulness for the potential user. The next important factor in the model discussed above is the perceived ease of use of the technology in question, which determines the development of the user's attitude towards the new technology (Davis,

1989). This model also did not take into account extrinsic and demographic factors that influence the attitude to use.

Therefore, it is all the more justified to isolate external factors within a company that potentially influence the adoption of innovations. The research undertaken focusses on one of the key areas in this regard, namely external communication. Within this framework, five factors were identified. The first is the formation and maintenance of a good corporate image (referred to as employer branding). Employer branding can also be defined as “as the process of building identifiable and unique employer identity” (Backhaus, Tikoo, 2004, p. 502) which also has a significant impact on current and potential employees. Over the past two decades, academic interest in this concept has grown significantly (Theurer et al., 2018). As J. Ober points out, “an increasing number of companies are emerging in global markets to provide EB services, and consulting more broadly has long had this type of advice on offer” (Ober, 2016, p. 347). Another factor is the information about the company's mission and achievements presented to customers and suppliers. This can be achieved through a large-scale information campaign using a variety of media. In addition, highlighting the company's mission, most often contained in codes of ethics (i.e., documents that deal with general principles of conduct and are presented in the form of orders and prohibitions, intended to be strictly applied) (Kuzior, 2021) demonstrates the company's emphasis on meeting ethical standards. Identifying customers' requirements and needs for products and services is also an important element. This can be done by using social media platforms, which have to some extent already replaced customer service offices (Brzezińska-Waleszczyk, 2015). This is also alluded to by D. Buchnowska, who believes that social networks are a source of information about customers' expectations, behaviour, opinions, or plans (Buchnowska, 2017). When analysing external communication factors, it is also worth paying attention to the analysis and interpretation of public opinion about the company and its products/services. It is crucial because the company, by maximising customer satisfaction, should aim to maximise profit (Marcinkiewicz, 2011). All factors ultimately lead to the development of good relationships between company and/or service representatives and customers.

3. Materials and Methods

3.1. Research tool

A proprietary questionnaire developed specifically for the purposes of this work was used in the study. This tool made it possible to explore the opinions on various external communication factors in the context of adoption of innovation. These factors were selected for the survey questionnaire based on literature research, desk research, opinions of panel

participants (experts), and a pilot study conducted in IT companies, between the beginning of September and the end of December 2018 (Ober, 2022).

The core survey was conducted from January to June 2019. Respondents were asked to estimate, using a 5-point Likert scale, the impact of individual external communication factors on the adoption of innovations, combined with an additional degree stating the total absence of the above-mentioned impact. Importantly and innovatively in the field of management and quality sciences, the aforementioned impact was determined separately for the three stages of the innovation process:

- Innovation initiation stage,
- stage of the decision to adopt the innovation,
- Innovation implementation stage.

To determine the reliability of the questionnaire, Cronbach's alpha internal consistency coefficients were calculated for each factor. It turned out that all the factors at each stage had very good reliability ($\alpha = 0,78$).

The above results authorise treating the developed groups of factors as subscales of the questionnaire and calculating the overall scores for them, while still being able to analyse individual factors separately.

3.2. Object of statistical analysis

The statistical analysis aimed to assess individual external communication factors and their groups in terms of their impact at different stages of the innovation process on the adoption of innovation.

The differences within each stage between the different groups of factors in terms of the average assessment of the shape of the impact on the adoption of innovation were also verified.

3.3. Methodology of statistical analysis

Before analysis, the database was checked for logicity and completeness of the responses in the database were checked prior to analysis. To select appropriate statistical tests to examine relationships, the fulfilment of all the necessary assumptions to use the individual statistical tests was verified (Stanisz, 2006), i.e:

- Normality of distribution using the Shapiro-Wilk test.
- Adequate sample size.
- Variables on an appropriate scale (quantitative or qualitative).
- Randomness of sampling (independence of study groups from each other).

3.4. Characteristics of the research sample

A total of 400 people participated in the survey, from 310 companies, including 72 women ($M_{Age} = 32,02$; $SD_{Age} = 9,83$) and 328 men ($M_{Age} = 29,28$; $SD_{Age} = 9,86$). The research questionnaire was distributed by email, in the form of separately separated links to complete the survey for each company, via the interankiety.pl programme.

In estimating the minimum sample size, the sample size formula for qualitative characteristics with a finite sample was applied (Mynarski, 2000). Thus, the minimum sample size was estimated to be 300 companies and 383 employees.

4. Results and Discussion

The first step of the analysis was to compare the different stages of the innovation process in terms of how the employees of the surveyed IT companies perceived the influence of external communication factors in the context of innovation adoption. For this purpose, a Mann-Whitney rank sum test analysis was performed. For the factors studied, there were no statistically significant differences between the different stages of the innovation in terms of perceived influence of the factors on innovation adoption. The majority of the respondents perceived the influence of each factor related to external communication on the adoption of innovation at each stage of innovation introduction. The percentages of those who perceived the influence of individual factors from the external communication group were very similar at each stage of innovation adoption (differences between stages in this respect ranged from 0,25% to 2,75%). The absence of statistically significant differences was confirmed by the Mann-Whitney U rank sum test. Detailed results are shown in Table 1.

Table 1.

Comparison of the stages of the innovation process in terms of respondents' perceptions of the impact of various external communication factors on its adoption

		Innovation initiation stage		Stage of decision to adopt innovations		Innovation implementation phase		Mann-Whitney U test	rg Glassa
		N	%	N	%	N	%		
Shaping and maintaining a good corporate image	Yes	298	74,50%	301	75,25%	306	76,50%	Z = -0,62; p = 0,536	-0,02
	Not	102	25,50%	99	24,75%	94	23,50%		
Information on the company's mission and achievements presented to customers and suppliers	Yes	303	75,75%	304	76,00%	304	76,00%	Z = -0,08; p = 0,938	0,00
	Not	97	24,25%	96	24,00%	96	24,00%		
Good relations between company and/or service representatives and customers	Yes	376	94,00%	377	94,25%	378	94,50%	Z = 0,29; p = 0,775	0,02
	Not	24	6,00%	23	5,75%	22	5,50%		

Cont. table 1.

Identifying customer requirements and needs with regard to products and services	Yes	393	98,25%	390	97,50%	384	96,00%	Z = -1,83; p < 0,067	-0,19
	Not	7	1,75%	10	2,50%	16	4,00%		
Analysis and interpretation of public opinion about the company and its products/services	Yes	377	94,25%	373	93,25%	366	91,50%	Z = -1,44; p = 0,151	-0,09
	Not	23	5,75%	27	6,75%	34	8,50%		

Source: own elaboration.

Then, the evaluations of the shape of the influence of factors related to external communication were compared in terms of adoption of innovation at different stages of the innovation process. For this purpose, Spearman's rank-order correlation analysis was used. Among the factors related to external communication, differences were observed between the stages of innovation adoption in terms of assessments of the shape of the influence of factors such as the identification of customer requirements and needs for products and services and the analysis and interpretation of public opinion about the company and its products or services. As shown by Spearman's rank-order correlation analysis, the more advanced the stage of innovation introduction was, the less significantly the respondents perceived the influence of the above-mentioned factors in the adoption of this innovation, and this relationship is statistically significant (respectively: $R = -0,07$; $t(N-2) = -2,24$; $p < 0,05$ and $R = -0,07$; $t(N-2) = -2,44$; $p < 0,05$). The other factors in the external communication group were not statistically significantly related to the degree of innovation process. Detailed information is presented in Table 2.

Table 2.

Comparison of the stages of the innovation process in terms of the respondents' assessment of the shape of the influence of the various factors related to external communication on the adoption of innovations

		Descriptive statistics						Spearman rank order correlation
		Mean \pm Standard deviation	Median [Q25-Q75]	Min. - Max.	Confidence interval		Stand error	
					-95%	+95%		
Shaping and maintaining a good corporate image	Innovation initiation stage	3,86 \pm 0,82	4 [3 - 4]	1 - 5	3,77	3,96	0,05	R = 0,03; t(N-2) = 0,87; p = 0,385
	Stage of decision to adopt innovations	3,87 \pm 0,85	4 [3 - 5]	1 - 5	3,78	3,97	0,05	
	Innovation implementation phase	3,91 \pm 0,86	4 [3 - 5]	1 - 5	3,81	4,01	0,05	
Information on the company's mission and achievements presented to customers and suppliers	Innovation initiation stage	3,84 \pm 0,89	4 [3 - 5]	1 - 5	3,74	3,95	0,05	R = 0,01; t(N-2) = 0,22; p = 0,824
	Stage of decision to adopt innovations	3,83 \pm 0,85	4 [3 - 4]	1 - 5	3,74	3,93	0,05	
	Innovation implementation phase	3,86 \pm 0,89	4 [3 - 5]	1 - 5	3,76	3,96	0,05	

Cont. table 2.

Good relations between company and/or service representatives and customers	Innovation initiation stage	4,16 ± 0,9	4 [4 - 5]	1 - 5	4,07	4,25	0,05	R = 0,02; t(N-2) = 0,71; p = 0,481
	Stage of decision to adopt innovations	4,21 ± 0,84	4 [4 - 5]	1 - 5	4,13	4,30	0,04	
	Innovation implementation phase	4,22 ± 0,85	4 [4 - 5]	1 - 5	4,13	4,31	0,04	
Identifying customer requirements and needs with regard to products and services	Innovation initiation stage	4,32 ± 0,86	5 [4 - 5]	1 - 5	4,23	4,40	0,04	R = -0,07; t(N-2) = -2,24; p < 0,05
	Stage of decision to adopt innovations	4,25 ± 0,87	4 [4 - 5]	1 - 5	4,16	4,33	0,04	
	Innovation implementation phase	4,2 ± 0,86	4 [4 - 5]	1 - 5	4,11	4,28	0,04	
Analysis and interpretation of public opinion about the company and its products/ services	Innovation initiation stage	4,07 ± 0,91	4 [3 - 5]	1 - 5	3,98	4,16	0,05	R = -0,07; t(N-2) = -2,44; p < 0,05
	Stage of decision to adopt innovations	3,99 ± 0,92	4 [3 - 5]	1 - 5	3,90	4,08	0,05	
	Innovation implementation phase	3,9 ± 0,95	4 [3 - 5]	1 - 5	3,80	4,00	0,05	

Source: own elaboration.

A multivariate cluster analysis was used to identify external communication factors that were similarly assessed at the different stages and therefore that together could provide guidance for the proper implementation of the innovation process in companies. This analysis considered two methods. First, the agglomerative method was used to visually identify the number of groups of factors (clusters) similar to each other in terms of assessments of the shape of influence on the adoption of innovations (distances between clusters were obtained using the single bound method). Then, using a nonhierarchical factor clustering method, the so-called k-means clustering, clusters and their elements were extracted, guided by the number of clusters identified by the previous method. This method assumes that initially each object (factor) is a separate cluster; it then gradually combines the closest objects into new clusters until a single cluster is achieved. In addition, by analysing the identified clusters, the descriptive statistics of each cluster were verified to assess the differences between the clusters. These analyses were performed for each stage.

Factors related to external communication - according to the results of the multidimensional cluster analysis performed using the agglomeration method - in terms of assessing the impact on the adoption of innovation in its first stage of introduction, i.e. the initiation of innovation, formed three clusters. The first comprised factors such as: shaping and maintaining a good corporate image and information on the company's mission and achievements presented to customers and suppliers. The second cluster contained the factors: good relations between company representatives and/or service and customers, and recognition of customers' requirements and needs for products and services. The third cluster, on the other hand, was one

element and concerned the analysis and interpretation of public opinion about the company and its products or services. The following dendrogram shows a visualisation of the identified clusters (Figure 1).



Figure 1. Dendrogram obtained for the factors related to external communication in terms of their influence on the adoption of innovation at the initiation stage (results of cluster analysis using agglomeration).

Source: own elaboration.

The results of the agglomerative cluster analysis method were also confirmed when clustering using the k-means method, which means that the recorded clusters overlapped. Descriptive statistics of the elements included in the individual clusters indicate that good relations between company and/or service representatives and customers and the identification of customer requirements and needs for products and services constituted the group of factors most important for influencing the adoption of innovation in the first stage of its introduction (mean scores: $M = 4,2$; $SD = 0,88$). Second was the analysis and interpretation of public opinion about the company and its products or services ($M = 4,07$; $SD = 0,91$). In contrast, the group of factors consisting of the formation and maintenance of a good corporate image and innovations about the company's mission and achievements presented to customers and suppliers had, according to the respondents, the least influence ($M = 3,85$; $SD = 0,86$) on the adoption of the innovation in its initiation stage. Table 3 shows the detailed results.

Table 3.

Cluster elements for the factors analysed related to external communication in terms of their influence on the adoption of innovations in the initiation stage (results of cluster analysis using k-means clustering)

Elements of individual clusters		Distance	Descriptive statistics to assess the shape of the influence of the factors included in each cluster					Stand error
			Mean ± Standard deviation	Median [Q25 - Q75]	Min. - Max.	Confidence interval		
						-95%	+95%	
Focus 1	Shaping and maintaining a good corporate image	0,4341						
	Information on the company's mission and achievements presented to customers and suppliers	0,4341	3,85 ± 0,86	4 [3 - 4,5]	1 - 5	3,78	3,92	0,03
Focus 2	Good relations between company and/or service representatives and customers	0,4575						
	Identifying customer requirements and needs with regard to products and services	0,4575	4,24 ± 0,88	4 [4 - 5]	1 - 5	4,18	4,30	0,03
Focus 3	Analysis and interpretation of public opinion about the company and its products/services	0,0000	4,07 ± 0,91	4 [3 - 5]	1 - 5	3,98	4,16	0,05

Source: own elaboration.

In the case of factors related to external communication, a multidimensional cluster analysis performed using the agglomerative method identified three clusters in terms of assessing the impact on the adoption of the innovation at the adoption decision stage. The first of the aforementioned clusters included factors such as the formation and maintenance of a good corporate image and information about the company's mission and achievements presented to customers and suppliers, the second cluster included, respectively, good relations between company representatives and/or service and customers and the identification of customers' requirements and needs for products and services, while the third cluster was single element and concerned the analysis and interpretation of public opinion about the company and its products or services. Importantly, these groups fully overlapped with the identified groups of factors for the innovation initiation stage. The dendrogram below visualises the identified clusters (Figure 2).

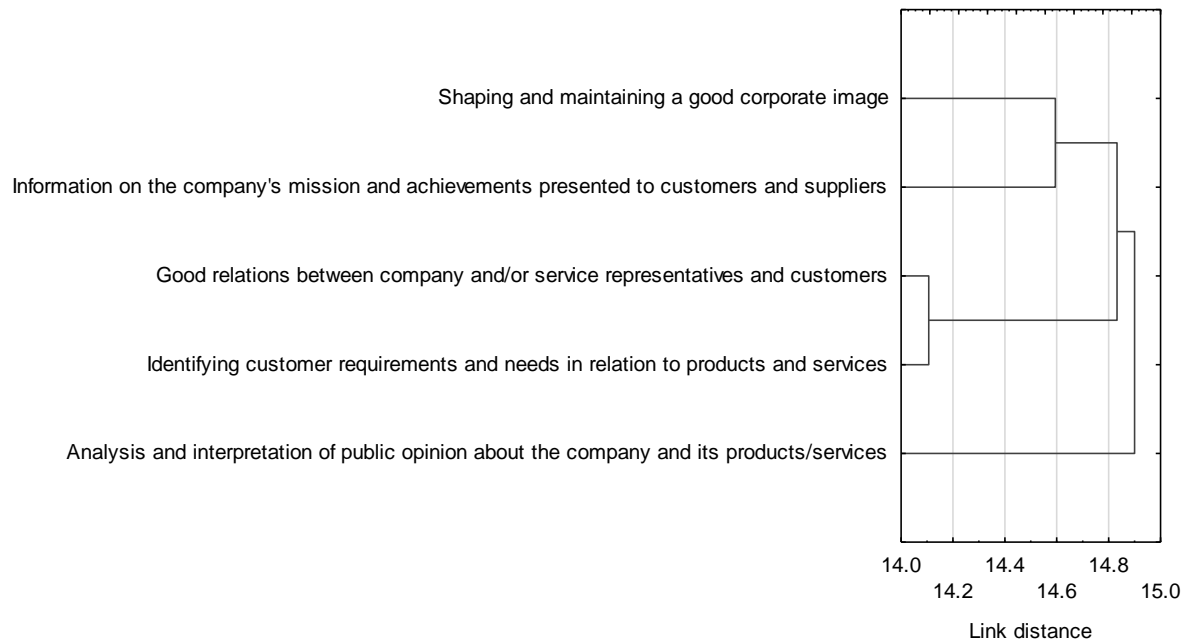


Figure 2. Dendrogram obtained for the factors related to external communication analysed in terms of their influence on the adoption of an innovation at the stage of the decision to adopt it (results of cluster analysis using agglomeration).

Source: own elaboration.

The results obtained using the clustering of k-means were in complete agreement with those obtained using the previous method. The analysis of descriptive statistics, on the other hand, showed that, as at the innovation initiation stage, good relations between company and/or service representatives and customers and the identification of customers' requirements and needs for products and services constituted the group of factors most important for influencing the adoption of the innovation at the first stage of its introduction (mean scores: $M = 4,23$; $SD = 0,85$). Furthermore, as in the previous introduction stage, the group of factors consisting of the formation and maintenance of a good corporate image and information on the mission and achievements presented to customers and suppliers had, according to the respondents, the least impact ($M = 3,85$; $SD = 0,85$) impact on the adoption of innovation at the decision-making stage of its adoption. The one-item group on the analysis and interpretation of public opinion about the company and its products or services was placed in the middle between the above-mentioned groups mentioned above in terms of its impact assessment on the adoption of innovation at the above-mentioned stage mentioned above ($M = 3,99$; $SD = 0,92$). Detailed results are presented in Table 4.

Table 4.

Group elements for the analyzed factors related to external communication in terms of their influence on the adoption of innovations at the adoption decision stage (results of cluster analysis using k-means clustering)

Elements of individual clusters		Distance	Descriptive statistics to assess the shape of the influence of the factors included in each cluster					
			Mean ± Standard deviation	Median [Q25 - Q75]	Min. - Max.	Confidence interval		Stand error
						-95%	+95%	
Focus 1	Good relations between company and/or service representatives and customers	0,4341	4,23 ± 0,85	4 [4 - 5]	1 - 5	4,17	4,29	0,03
	Identifying customer requirements and needs with regard to products and services	0,4341						
Focus 2	Shaping and maintaining a good corporate image	0,4491	3,85 ± 0,85	4 [3 - 4,5]	1 - 5	3,79	3,92	0,03
	Information on the company's mission and achievements presented to customers and suppliers	0,4491						
Focus 3	Analysis and interpretation of public opinion about the company and its products/services	0,0000	3,99 ± 0,92	4 [3 - 5]	1 - 5	3,90	4,08	0,05

Source: own elaboration.

For factors related to external communication in the innovation implementation stage, the situation has changed slightly compared to the first two stages. The factors relating to good relations between company and/or service representatives and customers and the identification of customer requirements and needs in relation to products and services remained in one group as the most similar in terms of influence ratings on innovation adoption. More distant from the above-mentioned factors (at the same time at this distance) were the formation and maintenance of a good corporate image and information on the company's mission and achievements presented to customers and suppliers. On the other hand, even further away in the ratings was the analysis and interpretation of the public's opinion of the company and its products or services, which was a separate one-element cluster. The below dendrogram illustrates the distances between the different groups and the factors included in them (Figure 3).



Figure 3. Dendrogram obtained for the factors related to external communication in terms of their influence on the adoption of innovation in the implementation phase (results of cluster analysis using agglomeration).

Source: own elaboration.

The clustering results obtained by the k-means method were not consistent with those obtained by the previous method. Only the clustering consisting of two factors, such as good relations between company and/or service representatives and customers and recognition of customers' requirements and needs for products and services, was repeated. At the same time, the results of the descriptive statistics indicate that this was the group of factors rated highest in this category in terms of influence on the adoption of innovations (mean score: $M = 4,24$; $SD = 0,86$). Second in terms of the aforementioned ratings was the focus (shaping and maintaining a good image; $M = 3,91$; $SD = 0,86$), while the lowest impact was attributed to information about the company's mission and achievements presented to customers and suppliers and to the analysis and interpretation of public opinion about the company and its products or services (mean score: $M = 3,88$; $SD = 0,92$). Table 5 shows the detailed results.

Table 5.

Cluster elements for the factors analysed related to external communication in terms of their influence on the adoption of innovations in the implementation phase (results of cluster analysis using k-means clustering).

Elements of individual clusters		Distance	Descriptive statistics to assess the shape of the influence of the factors included in each cluster					Stand error
			Mean \pm Standard deviation	Median [Q25 - Q75]	Min. - Max.	Confidence interval		
						-95%	+95%	
Focus 1	Shaping and maintaining a good corporate image	0,0000	3,91 \pm 0,86	4 [3 - 5]	1 - 5	3,81	4,01	0,05
Focus 2	Good relations between company and/or service representatives and customers	0,4277	4,24 \pm 0,86	4 [4 - 5]	1 - 5	4,20	4,27	0,02
	Identifying customer requirements and needs with regard to products and services	0,4277						
Focus 3	Information on the company's mission and achievements presented to customers and suppliers	0,4864	3,88 \pm 0,92	4 [3 - 5]	1 - 5	3,81	3,95	0,04
	Analysis and interpretation of public opinion about the company and its products/services	0,4864						

Source: own elaboration.

5. Conclusions

Summarising the results of the research, it can be concluded that differences were more often observed between the different stages of the innovation in terms of perceived influence of individual factors on the adoption of innovations than in terms of assessing the shape of this influence.

In the group of factors related to external communication at each stage, respondents saw the greatest impact on the adoption of innovations in factors such as good relations between company and/or service representatives and customers and the identification of customer requirements and needs in relation to products and services.

The more advanced the innovation stage was, the lower the estimated impact in the adoption of this innovation of factors related to external communication, such as the identification of customers' requirements and needs for products and services and the analysis and interpretation of public opinion about the company and its products or services.

The research presented in the article has some limitations. First, it was conducted only in Poland, second only in the IT sector, and thirdly, only selected external communication factors were taken into account. The authors intend to conduct them on a much larger scale in other

industries both at home and abroad, and to carry out a comparative analysis in the discussed scope.

Undoubtedly, however, the conclusions drawn from the analysis of the research should encourage companies to develop diverse external communication channels (using advanced technologies for this purpose), which not only enable the creation of lasting relationships with the environment, but also have a positive impact on the process of innovation adoption.

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