SELECTION OF SOCIAL CHANNELS OF COMMUNICATION ON THE EXAMPLE OF AN AGRICULTURAL COMPANY

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A B S T R A C T

The paper selected the most efficient social communication channel in an agricultural enterprise. On this occasion, an innovative expert decision-making method was used, namely its fuzzy variant SiWeC and RAWEC. Ten criteria and six alternatives were set, and the results show that the criteria "Number of users", "User characteristics" and "Feedback speed" have the greatest importance, while the most important (most favorable) social channel of communication is "facebook."The successful application of the method used was confirmed, as well as the importance of certain factors in the form of analyzed criteria, the number of which should be increased in future research, and the method itself should be further developed.

Introduction

In modern business processes, continuous correspondence with end consumers is unthinkable without social channels of communication. In addition to the fact that companies promote their products through them, they also establish a partnership with the end users of the services. Therefore, their selection, i.e. evaluation, which is the most favorable at the given moment, is also very important. As concluded by Camacho et al., (2020), social networks have become an indispensable tool for direct communication with consumers in a modern company. Without them, every company today cannot generate sufficient income from the sale of its products. (Maier and Wieringa, 2021). Cheung et al., (2020) believe that social networks (channels) have become a marketing channel recognized for their effectiveness in transmitting information, as a means of

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encouraging consumer and brand engagement, and knowledge of the brand (brand) itself. In this sense, Pour and et al., (2021) believe that marketing on social networks will grow exponentially in the future.

In recent years, we have witnessed a change, i.e. a transformation of the way companies operate on social networks (Appel et al., 2020; Sashi and Brynildsen, 2022). All these changes enable better adaptation and communication between consumers and service providers and vice versa. In addition, the strategic directions of companies' operations are changing, and relations with customers are becoming more and more partner-like, that is, they are getting stronger day by day. It can be said that social networks achieve globalization in the business of companies. Also, the same authors believe that the proper use of social networks can significantly reduce costs when designing marketing campaigns. Given that the target population is the younger generation who grew up on social networks, social networks are becoming the primary medium for marketing new products and services.

In addition to the advantages they offer in modern business, social communication channels also impose certain challenges that are reflected in their complexities, as well as the continuous commitment to their development, i.e. adaptability that is reflected in feedback from consumers. Jiuhardi, et al., (2022) believe that social channels of communication are particularly complex when it comes to the agribusiness sector, i.e. companies that sell agricultural products.

In the earlier period, some researchers tried to determine the relationship between the adopted social channel of communication and the potential benefits for farmers as suppliers/suppliers of products. (Miljković and Alačković, 2015; Mihajlov et al., 2023; Milanović et al., 2020; Kostić & Prdić, 2024; Michelson, 2013; La Torbe, 2001) In addition, many authors have analyzed sales channels and ways of communicating with users, i.e. tried to find the best methods of communication that would facilitate the path to consumers. (Dent, 2011; Milićević et al., 2024; Rosenbloom, 2012; Sigh, 2012; Thakran and Verma, 2013) Therefore, Stević et al., (2023) state that in the prevailing market environment, production is increasingly driven by consumer demand.

In order to successfully choose the appropriate communication channel with the end consumer, we use one of the methods in question. Thus, in some of their earlier research, some authors use these expert methods, showing that they can be used successfully, especially when it comes to agribusiness and agriculture. (Nedeljković et al., 2024; Puška et al., 2023; Nedeljković et al., 2023; Nedeljković et al., 2021; Stevanović-Tošović et al., 2020; Stević et al., 2023; Hatami et al., 2020).

In this sense, the subject of this paper is an agricultural company that markets its products on local and regional search sites, and by choosing the most profitable communication channel, i.e. social networks, it would improve its business and achieve higher profits. The choice of social network is a key factor in the success of the company, which improves its presence on the market and achieves direct communication with consumers.

The aim of the work would be to enable the selection of the most suitable social communication channel in an agribusiness company, which would be based on the use of an innovative expert method. Due to the application of imprecise and unclear information, its fuzzy variant, i.e. logic, would be applied. This would also achieve certain specific goals in the work, such as: development of a multi-criteria decision-making model based on the selection of a social communication channel, determination of the importance of the given criteria that are necessary in the selection of the channel itself, testing the application of the innovative method of multi-criteria decision-making as well as giving the necessary guidelines and recommendations for the next potential research in this area, and using the obtained results in other similar companies in order to improve the communication strategy with consumers. Certainly, the contribution of this paper stems from all of this.

Methodology

As it was pointed out earlier, the subject of the research is a company from the field of agribusiness, which in terms of its volume of business belongs to a medium-sized company. It is located in the area of the territory of the city of Novi Sad and belongs to a relatively new company considering the year of establishment and start of work. In addition to the basic production (agricultural and vegetable crops), which is organized on several thousand hectares, the company also deals with the processing and sale of the obtained agricultural products. The company has a wide range of food products, and exports several thousand of its products to countries in the region and the world. These are food products of frozen and semi-frozen fruits and vegetables, as well as canned products such as jams, marmalades, compotes, etc. In this sense, the company wants to improve its business and focus special attention on the part that concerns communication with end consumers on the local and regional (wider) market. In the future, the company wants channels of communication with consumers, and it is necessary to make the most favorable choice for them and a model that would improve the company's sales and operations in the coming years.

The stages of the research flow consist of the following steps:

- Setting the main goal of the research,
- Selection of decision makers,
- Selection of important criteria for the selection of communication channels,
- Selection of potential social channels of communication to be chosen,
- Using research methods,
- Research results,
- Giving conclusions and recommendations.

The first phase refers to the setting of the main goal of the research, which in this case has already been pointed out earlier that it is the choice of the most favorable social channel of communication with consumers.

In the next phase, decision-makers were chosen, i.e. experts who evaluated the set criteria and based on them ranked the given alternatives in the form of social communication channels. The decision-makers were from the company in question, that is, six of them who were assigned to the positions of the commercial and management sectors in the company.

After their selection, the next stage was the selection of criteria of importance. In this case, the selected experts chose criteria for research that would be the most relevant influencing factors in the final choice of a social channel of communication with consumers in the field of agricultural products and their food items. After joint deliberations, the following criteria were selected, and we can see them in table 1.

Table 1. Overview of used criteria

ID	Criteria	Description
1	Number of users	The total number of active users who use a particular social network as a communication channel.
2	User characteristicS	Gender, age, education, geographical location of the user.
3	Interactivity	The possibility of simple communication between users.
4	Advertising price	All advertising costs.
5	Advertising security	Ensuring user communication and privacy.
6	Message content	Characteristics of messages and their adaptability to the target audience.
7	Compatibility	Integration with other existing communication channels.
8	Personalization of message content	Customizing messages for each user.
9	Feedback speed	Improvement through user experience and elimination of possible future disturbances.
10	Additional/specific features	Existence of certain, additional communication options (specific supplements for certain product groups).

Source: Authors

The next phase referred to the assignment of alternatives in the form of social channels of communication, the choice of which is made. After the previous research of the most frequent use of certain channels of social communication, eight alternatives were established for the purposes of this research, which are shown in the following table 2. In the given alternatives (communication channels), we can see that it is about some relatively older communication channels, but still no less popular even today. During the selection, it was necessary to take into account the most common ways of communication of specific users (providers and consumers of agricultural products and their processing products).

Table 2. Overview of used alternatives (social communication channels)

ID	Alternative	Description
1	Twitter (mreža x)	A social platform for exchanging short messages, news, quick interactions with users and monitoring trends.
2	YouTube	A social video platform, where video content is created, watched and shared. The product and the brand are advertised by video.
3	Instagram	A social communication channel for sharing photos and videos with generated chat options.
4	TikTok	Social platform for creating and sharing short videos and generated with different visual effects. Especially popular among the younger generation.
5	Facebook	A user network for sharing content and connecting with other users, enriched with a multitude of advertising tools as well as a wide range of interaction with targeted users.
6	Telegram	A social application for exchanging messages between users. It is characterized by speed and safety.
7	LinkedIn	A social network intended for business networking and advertising in the domain of business and professional events.
8	WhatsApp/viber	Popular applications for exchanging messages, pictures and videos. Suitable for personalizing messages, forming communication groups and quick contact with users.

Source: Authors

The next step concerns the application of the research method itself. For research purposes, we used innovative methods of multi-criteria decision-making SiWeC (Simple Weight Calculation) and RAWEC (Ranking Alternatives with Weights of Criterion) and their fuzzy variant. The concept of fuzzy logic was first introduced by Zadeh (1965) for the purpose of modeling uncertainty in natural language. Fuzzy logic is a generalized version of traditional logic and includes all theories that use fuzzy sets. According to traditional set theory, the elements of a set are either members of this set (1) or they are not (0). (Katranci et al., 2025)

The use of fuzzy logic imposes the application of a linguistic scale. It contains corresponding fuzzy numbers for each linguistic item that experts use when assessing the weight of given criteria. Based on the survey questionnaire and the linguistic assessment, the experts evaluated the criteria, which were transformed into fuzzy numbers after the corresponding scale. The following table 3 presents the linguistic scale with the associated fuzzy numbers.

Table 3. Linguistic scale and fuzzy numbers

Values	F-numbers
V. low -V-L	1, 1, 2
Low -L	1, 2, 4
M. low -M-L	2, 4, 6
Medium -M	3, 5, 7
M. good -M-G	5, 7, 9
Good -G	7, 9, 10
V. good -VG	9, 10, 10

Source: Puška et al., 2024

The paper uses the subjective Fuzzy SiWeC method, which was created to determine the weight of existing criteria in a simple way, taking into account the importance of employees' ratings (Puška et al., 2024). The phases in using this method are:

Phase 1. Evaluation of the weight of the criteria.

Phase 2. Transformation into fuzzy numbers:

$$\tilde{x}_{ij} = \left(x_{ij}^l, x_{ij}^m, x_{ij}^u \right)$$

Phase 3. Normalization of fuzzy numbers.

$$\tilde{n}_{ij} = \frac{x_{ij}^l}{max\ x_{ij}^u}, \frac{x_{ij}^m}{max\ x_{ij}^u}, \frac{x_{ij}^u}{max\ x_{ij}^u}$$

Where is $max\ x_{ij}^u$ the maximum value of alternatives.

Phase 4. Calculation of the value of the standard deviation for the experts' ratings $(st.dev_j)$

Phase 5. Weighting of normalized fuzzy scores with standard deviation values.

$$\tilde{v}_{ij} = \tilde{n}_{ij} \times st.dev_j$$

Phase 6. Calculating the sum of the weights.

$$\tilde{s}_{ij} = \sum_{j=1}^{n} \tilde{v}_j$$

Phase 7. Final Calculation of fuzzy values of criteria weights.

$$\tilde{w}_{ij} = \frac{s_{ij}^l}{\sum_{j=1}^n s_{ij}^u}, \frac{s_{ij}^m}{\sum_{j=1}^n s_{ij}^m}, \frac{s_{ij}^u}{\sum_{j=1}^n s_{ij}^l}$$

For the final ranking of the alternatives, we use the fuzzy RAWEC method.

The purpose of creating the method is to facilitate decision making and ranking of alternatives (Puška et al., 2024a). This subjective method uses the calculation of the deviation from the criterion weights. In this way, this method is specific compared to other methods. Below are the phases of the method namely:

Phase 1. Evaluation of alternatives through linguistic values.

Phase 2. Transformation of linguistic grades into fuzzy numbers.

Phase 3. Formation of the summary decision matrix.

Phase 4. Normalization of the aggregate decision matrix.

Maximum normalization:

$$n_{ij} = \frac{x_{ij}^l}{\max x_j^u}, \frac{x_{ij}^m}{\max x_j^u}, \frac{x_{ij}^u}{\max x_j^u} \; r_{ij} = \frac{x_{ij}}{\max_i x_{ij}} \;;$$

Minimum normalization:

$$n'_{ij} = \frac{\min x_j^l}{x_{ij}^u}, \frac{\min x_j^l}{x_{ij}^m}, \frac{\min x_j^l}{x_{ij}^l} \;;$$

Phase 5. Cumulative deviations from the values of the weights. In this step, the deviations are first calculated, and then the cumulative deviation is calculated for individual alternatives.

$$\tilde{v}_{ij} = \sum_{i=1}^{n} \tilde{w}_j \cdot \left(1 - \tilde{n}_{ij}\right)$$

$$\tilde{v}'_{ij} = \sum_{i=1}^{n} \tilde{w}_j \cdot \left(1 - \tilde{n}'_{ij}\right)$$

Phase 6. Defuzzification of cumulative deviation. In this step, fuzzy numbers are converted into ordinary values.

$$v_{ij \, def} = \frac{v_i^l + 4v_i^m + v_i^u}{6}$$

$$v'_{ij \, def} = \frac{v'^l_i + 4v'^m_i + v'^u_i}{6}$$

Phase 7. Calculating the value of the RAWEC method.

$$Q_i = \frac{v'_{ij} - v_{ij}}{v'_{ij} + v_{ij}}$$

Results

After the selection of the criteria used for the research, their expert evaluation by the already mentioned six experts followed. On the basis of the survey questionnaire filled out by the experts, the linguistic values (grades) of certain criteria were given (table 4), which were again converted into fuzzy numbers based on the previous scale from table 3. After that, through the methodological steps of the fuzzy SiWeC method, the weights of the criteria were obtained, which can be seen in the following table 5.

Table 4. Expert assessment

	Cr.1	Cr.2	Cr.3	Cr.4	Cr.5	Cr.6	Cr.7	Cr.8	Cr.9	Cr.10
E1	V-G	V-G	M	G	M-G	M-G	M-G	G	V-G	G
E2	V-G	G	M-G	G	G	M-G	G	G	V-G	G
E3	G	V-G	M-G	M-G	G	M-G	G	M-G	G	M-G
E4	V-G	G	M-G	V-G	G	M-G	M-G	G	V-G	M
E5	G	V-G	M	G	M-G	M-G	M	M-G	V-G	M
E6	VG	G	G	G	G	G	M-G	G	G	M-G

Source: Authors

The results from Table 5 show that criteria 1, criterion 2 and criterion 9, namely "Number of users", "User characteristics" and "Feedback speed" received the greatest weight. According to the expert evaluation, the criteria "Interactivity" and "Additional/specific features" showed the least significance.

Table 5. Weights

Criteria	Težina
Cr.1	0,09; 0,12; 0,16;
Cr.2	0,09; 0,12; 0,16;
Cr.3	0,05; 0,08; 0,13;
Cr.4	0,07; 0,11; 0,15;
Cr.5	0,07; 0,10; 0,15;
Cr.6	0,06; 0,09; 0,14;
Cr.7	0,06; 0,09; 0,14;
Cr.8	0,07; 0,10; 0,15;
Cr.9	0,09; 0,12; 0,16;
Cr.10	0,05; 0,08; 0,13;

Source: Authors

After the assessment of the weight of the criteria, there followed an expert assessment of the offered alternatives in the form of social communication channels that the company in question uses in its business. We can see the linguistic assessment of decision makers in the following table 6.

Table 6. Expert assessment of alternatives

DM 1	Cr.1	Cr.2	Cr.3	Cr.4	Cr.5	Cr.6	Cr.7	Cr.8	Cr.9	Cr.10
Al.1	L	V-L	VL	M-L	M-L	M-L	V-L	V-L	V-L	L
Al.2	G	M	M	M	M-G	V-G	M	M-G	M-G	M
Al.3	M	M-L	M	M	M	M-G	M-L	G	G	M
Al.4	L	V-L	M-L	V-L	M-G	M-G	M-L	M-G	M-G	M-L
Al.5	V-G	M-G	V-G	G	G	M-G	M	M	V-G	M-G
Al.6	V-L	M-L	V-L	M-L	M-L	M-G	L	M-G	M-G	M-L
Al.7	L	V-L	M-L	M	M-L	M	L	M-G	G	L
Al.8	G	V-G	G	VG	G	G	M	V-G	V-G	M
DM 2	Cr.1	Cr.2	Cr.3	Cr.4	Cr.5	Cr.6	Cr.7	Cr.8	Cr.9	Cr.10
Al.1	L	M-L	M	M-L	M-L	M	V-L	M-L	L	M-L
Al.2	M	G	G	M	M-G	M-G	M	M-G	M-G	M
Al.3	M	M-L	M-G	V-L	M-G	G	M-L	M	G	M
Al.4	L	M-G	M	M	M	M-G	M-L	M-G	M-G	M-L
Al.5	V-G	G	G	V-G	G	G	M-G	M	G	M-G
Al.6	V-L	M	G	V-L	V-L	M-G	L	M-G	M-G	M-L
Al.7	L	M	M	G	L	V-L	L	M-G	G	L
Al.8	V-G	V-G	M-G	G	G	G	M	G	M	M
DM 3	Cr.1	Cr.2	Cr.3	Cr.4	Cr.5	Cr.6	Cr.7	Cr.8	Cr.9	Cr.10
Al.1	V-L	V-L	M	M-L	M-L	M-L	V-L	V-L	M	M
Al.2	G	M	G	M-L	V-G	M-G	M-L	M	M-G	M
Al.3	M	M-L	M-G	M-G	M-G	V-G	M-L	M	G	M
Al.4	V-L	M-G	M	V-L	G	M-G	M-L	M-G	M-G	M
Al.5	G	V-G	G	V-G	V-G	M-G	M-G	M	G	G
Al.6	V-L	M	G	M	M-L	M-G	V-L	M-G	M-G	M-L
Al.7	M	M	M	G	V-L	V-L	M	M-G	G	L
Al.8	V-G	M	MG	MG	G	G	M	V-G	M	M
DM 4	Cr.1	Cr.2	Cr.3	Cr.4	Cr.5	Cr.6	Cr.7	Cr.8	Cr.9	Cr.10
Al.1	V-L	V-L	M	M-L	V-L	M-L	V-L	L	V-L	M
Al.2	M	M	G	G	M-G	M-G	M-L	M	M-G	M
Al.3	M-L	M-L	M-G	M-G	M-G	V-G	M-L	M	G	M
Al.4	L	M-G	M	M	G	V-G	M-L	M-G	MG-	M
Al.5	G	G	G	V-G	G	M-G	V-G	M	G	M-G
Al.6	V-L	M-L	G	M	V-L	M	V-L	V-G	M-G	M-L
Al.7	L	V-L	M	G	M-L	M-G	M	M-G	G	V-L
Al.8	V-G	V-G	M-G	M-G	V-G	G	V-G	V-G	M	V-L
DM 5	Cr.1	Cr.2	Cr.3	Cr.4	Cr.5	Cr.6	Cr.7	Cr.8	Cr.9	Cr.10
Al.1	L	M-L	M	V-L	V-L	M	V-L	L	L	M
Al.2	G	V-G	G	M-G	G	M-G	M-L	M	M-G	M
Al.3	M-L	M-L	M-G	M-G	M-G	V-G	M	M	G	M
Al.4	M-L	V-L	M	M-L	G	V-G	M-L	G	M-G	M
Al.5	V-G	G	G	V-G	G	M-G	G	G	G	M-G
Al.6	M-L	M-L	G	V-L	M-L	V-L	V-L	G	M-G	M-L
Al.7	M-L	V-L	M	G	M	V-L	M	M-G	V-G	L
Al.8	M-L	G	V-G	M-G	V-G	M-G	V-G	G	M-G	M
DM 6	Cr.1	Cr.2	Cr.3	Cr.4	Cr.5	Cr.6	Cr.7	Cr.8	Cr.9	Cr.10

Al.1	V-L	V-L	M	M-L	M	M-L	L	M-G	M	V-L
Al.2	M-L	M	G	M-G	G	G	M-G	M	M-G	M-G
Al.3	M-L	V-L	V-G	G	M-G	V-G	L	M	G	M
Al.4	M-L	V-L	M-L	G	G	M	M-L	G	M-G	M
Al.5	V-G	G	G	V-G	V-G	M-G	M	M	G	V-G
Al.6	M-G	M-L	G	V-L	M	M	V-L	G	M-G	V-L
Al.7	V-G	M-L	M	V-L	G	M-L	M	V-G	V-G	M-L
Al.8	V-G	G	V-G	M-G	V-G	M-G	M	M-G	M	V-G

Source: Authors

After the necessary steps in the calculation of the RAWEC method, we get the ranking order of the offered alternatives with the corresponding coefficient of value in the following table 7. Here we observe that the social network "Facebook" is the first choice for communication with consumers, while it is followed by the communication applications "WhatsApp or Viber". This result is also a consequence of the previous use of the social network Facebook, considering that the company managed to advertise and sell a good part of its products through this network. It included the largest group of active users of different ages and locations, and provided the fastest feedback. The worst ranked social network is Twitter (network X), which is not surprising because the company uses it on a very small scale due to the very nature of its activity. The social channel "You Tube" is ranked third. We note that the networks that are the most popular among young people today are rated the worst ("TikTok" and "Instagram"), which indicates that in a way the ultimate consumers of the company's products are the older generation.

Table 7. Ranking

Alternative		Q_i	Rank
Al.1	Twitter (X)	-0,171	8
Al.2	You Tube	0,286	3
Al.3	Instagram	0,231	4
Al.4	TikTok	0,136	5
Al.5	Facebook	0,453	1
Al.6	Telegram	0,111	6
Al.7	LinkedIn	0,105	7
Al.8	WhatsApp/Viber	0,443	2

Source: Authors

Conclusion

The modern character of business also requires adequate channels of communication with consumers, which with the development of social networks are slowly suppressing the conventional ones. The choice of a favorable communication channel is particularly complex in agribusiness due to the nature of the product itself. This raises the question of his proper selection. From the above in the paper, and on the example of a medium-sized agricultural company, we can conclude that in the given circumstances it is necessary

to apply the modern method of multi-criteria decision-making, and in conditions of uncertainty and incompleteness of information and its fuzzy logic.

On a practical example, the highest rated criterium related to the number of active users, as well as their characteristics, and the speed of feedback. In this sense, the social network "Facebook" is ranked best, while the social applications "WhatsApp and Viber" follow right behind it. The worse ranking of the networks used by the younger generation (Instagram and TikTok) is noticeable, as well as the lower evaluation of the "advertising price" criterion.

The contribution of the work is reflected in the indication of the importance of certain criteria in influencing the choice, a solid basis for using examples in other similar companies, and the justified role of the used method SiWeC-RAWEC.

What is needed in the future period of is the inclusion of more criteria as well as the development of the existing methodology on top of the expansion of the existing market and the popularization of the previously less used social channels of communication with consumers.

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Conflict of interests

The authors declare no conflict of interest.

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