

# AGRI-ENTREPRENEURSHIP: MEASUREMENT AND EVALUATION OF INTELLECTUAL CAPITAL POTENTIAL

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## Abstract

In Central and Eastern European (CEE) business conditions, intellectual capital is becoming increasingly important as a form of intangible rather than tangible capital. The aim of this study is to determine the structure of intellectual capital, identify determinants and evaluate their values for agri-entrepreneurship development. Thereby, potentials are identified and strategic guidelines are created. The research methodology is based on a measurement and evaluation process using calculations of importance weights and ratings and values of all attributes and determinants. It is recognized as human, structural and consumer capital with different attributes and descriptions. Four research questions are tested through research and analysed with a primary focus on the measurement and evaluation of attributes. The results show a predominant value for entrepreneurs' abilities in human capital. Agri-entrepreneurs are found to have the greatest potential in the organizational structure for structural capital. The distribution channel has the highest value in consumer capital. Moreover, the study shows that human capital has the highest value and potential for agri-entrepreneurship development compared with consumer and structural capital. A strategic analysis is applied to connect the proposed guidelines. This research on intellectual capital potential establishes guidelines for strategic goals on which entrepreneurs should focus to increase their competitiveness on the market.

**Implications for Central European audience:** Research on agri-entrepreneurship has been increasing but is still lacking in the CEE region, especially in countries where agriculture is one of the most important economic branches. This conceptual research model is an attempt to formulate an empirical evaluation of the determinants of intellectual capital. It aims to recognize weaknesses and form strategic goals for the production value growth and operations of economic entities in agriculture. The model focuses on intangible capital and its components, which are crucial for small- and medium-sized enterprises in the agricultural sector.

**Keywords:** Intellectual capital; agri-entrepreneurship; agribusiness

**JEL Classification:** L26, O34

## Introduction

The implementation of agri-entrepreneurship focuses on contributing to long-term growth and sustainable development of family farms and agriculture at the regional and national levels. The phenomenon of creating sustainable competitiveness, on the one hand, as a constant and, on the other hand, as a dynamic adaptation, highlights the role of people-entrepreneurs who design, innovate and implement adaptation activities to sustain family farm businesses.

Agri-entrepreneurs should manage the agricultural entity in a profitable and sustainable way and flexibly adapt to the rapidly changing business environment. An agrarian manager differs from an agrarian entrepreneur. The agrarian manager leads the business by planning, plan implementation, controlling production and managing risks. The agri-entrepreneur is an incubator of new ideas, identifies business opportunities, creates visions for business growth, applies innovations and consciously takes risks (Kahan, 2013; Drejeris et al., 2021).

The competitiveness of a business is directly related to knowledge and innovative ability as key attributes for sustainable competitiveness (Bischoff et al., 2011). Therefore, measuring intellectual capital and its value is a precondition for the application of innovation processes. Research and scientific knowledge emphasize the importance of human resources for business growth and development. Owing to labour and capital limitations in the production process, growth cannot be achieved quickly. For that reason, it is necessary to evaluate intellectual capital in the development of a knowledge-based economy. Knowledge, abilities, skills and experience as human resources are the drivers of entrepreneurial activities in agriculture. They contribute to the growth and development of the business competitiveness of economic entities. Geraldo Campos et al. (2020) clarified that human capital must be shared, disseminated and internalized in all processes that involve structural and relational capital to achieve goals for business success. Gupta et al. (2002) emphasized not only the importance but also the complex nature of using knowledge, which consists of people's personalities, the means of storing and transferring information, the effects of learning new knowledge and applicability in practice. These intangible resources can only be successfully measured and managed using the potential of the overall intellectual capital.

Human and structural capital have been distinguished. Human capital is based on experience, skills and knowledge. By contrast, structural capital consists of two parts: customer capital (customer base, customer relationships, customer potential) and organizational capital. Organizational capital describes the difference between innovation and process capital (Edvinsson & Brünig, 2013). Huszák and Gittins (2012) observed a lack of specific human capital in relation to innovation-focused sectors. A preference for general training and development by start-up entrepreneurs suggests the shifting of focus towards general human capital development, consistent with digitization trends. Thus, the changing nature of human capital flows may be instigated by entrepreneurs themselves.

Research on the influence of intellectual capital on the business efficiency of private hospitals showed that the most effective relationship with the development of business value is related to human capital as an element of intellectual capital (Ali & Anwar, 2021; Chernov, 2023).

The development of agricultural production is linked to activities of complementary support institutions and their development projects. In this way, a more favourable business environment is systematically created in which entrepreneurs can more easily and quickly recognize new business opportunities for the development of their farms. Guidelines for entrepreneurship development should be recognized comprehensively. By strengthening the entrepreneurial human potential of producers, production structures can be changed from traditional to innovative ones, which increases demand on the market (Deže et al., 2016).

Previous studies have dealt with research on intellectual capital measurement methodologies. These studies revealed the following shortcomings of existing formulations and measurements of intellectual capital: human resource accounting, economic value added, balanced scorecard, the Skandia Navigator, value-added intellectual capital (Lock Lee & Guthrie, 2010; Sahari & Jais, 2021; Vashishtha, 2022). They described a research method successfully used in the study of intellectual capital and flows in a highly networked and global market sector.

Furthermore, a systematic and comprehensive analysis using the VAIC model revealed that human capital has a positive effect on business profitability, whereas structural capital has no significant impact on business performance. Intellectual capital is a valuable basis for the sustainable development of the manufacturing sector on the Asian market (Xu & Liu, 2000).

Thus, the aim of the present research is to identify the determinants and attributes of intellectual capital, evaluate their values and recognize their potential for the development of agri-entrepreneurship. The research is designed in three parts. First, the attributes of the human capital determinant are evaluated. Then, the determinant attributes of structural capital are evaluated. Finally, the evaluation procedure is carried out with consumer capital.

## 1 Methodology and Data Collection

The empirical part of this research is related to the results that determine the structure of intellectual capital identify determinants and assess the value and potential of each determinant for the development of agri-entrepreneurship. The research questions are as follows:

*RQ1: Which attribute of the human capital determinant is the most valuable to agri-entrepreneurs?*

*RQ2: Which attribute has the greatest value in the structural capital determinant?*

*RQ3: Which attribute has the highest level of satisfaction with the state of the consumer capital determinant?*

*RQ4: Where are the most important potentials in intellectual capital, and what development strategy should agri-entrepreneurs use?*

The research aim is to determine the structure of intellectual capital and to evaluate its values and potential for the development of agri-entrepreneurship. In accordance with the established aim, an online survey was conducted using a Google form sent to registered participants of the Fifth Fair of Family Farms held on 20 October 2022 at the Faculty of Agrobiotechnical Sciences Osijek, Josip Juraj Strossmayer University in Osijek, Croatia.

The fair of family farms was held five times from 2019 to 2022 (spring and autumn). It was not held for one year in 2021 because of the COVID-19 pandemic. The main goal of the organizers is to gather and promote agri-entrepreneurs who are previous agronomy students. A systematic data collection resulted in a database of 72 agri-entrepreneurs from the entire Croatian territory. During the 2022 fair, the aim of the research was explained to the participants individually, and they were invited to participate in the survey. All 33 participants confirmed their participation and completed the questionnaire. A database was created from the 33 respondents, who were managers and entrepreneurs of family farms. The questionnaire consisted of three determinants with associated attributes. Each determinant consisted of an equal number of attributes (15) that identified and described 45 characteristics. The determinants of human capital are knowledge, abilities, skills and experience of human resources. Structural capital is related to the following attributes: organizational structure, management systems, level of connectivity/network in the system, and application of computerization. Consumer capital is a component of intellectual capital and is described according to the following attributes: contractual relations, cooperation with the external environment, customer loyalty and distribution channels (Kozera, 2011). On the basis of the determinants, a questionnaire was designed with 45 claims/opinions divided into three groups, with 15 claims/opinions in each group. Each attribute was measured on a Likert scale (Elliott, 2021).

The Likert scale was applied as a psychometric scale of claims/opinions that are used in questionnaires and surveys to determine participants' preferences, whether they agree with a statement or a set of statements. The Likert scale measures only one attribute. Respondents are asked to indicate their level of agreement with a given statement on the scale. The agreement is most often expressed on a 5-level scale, from strongly disagree to strongly agree. Each level on the scale is assigned a numerical value starting at 1, which increases with each new level. The answer for each claim can be analysed separately or summed for a group of opinions (Aasa et al., 2021). Data on the knowledge, abilities, skills and experience of entrepreneurs/managers were collected through online communication, creating a database for the analysis of human capital determinants. In the analysis of the determinants of structural capital, the following attributes were measured: organizational structure, management system, connections and networks, and information systems. Growth and development are the basis for survival; therefore, the attributes of consumer capital were measured: cooperation with the external environment, contractual relations, distribution channels and customer loyalty. On the basis of the data analysis results, the attributes and their ratings were weighted to obtain the values of the determinants. The determinants were quantified using the average ratings of each individual attribute. The values of the determinant ( $\bar{x}$ ) were calculated as follows, using a specified formula where  $x_i$  is the rating and  $p_i$  is the importance weight:

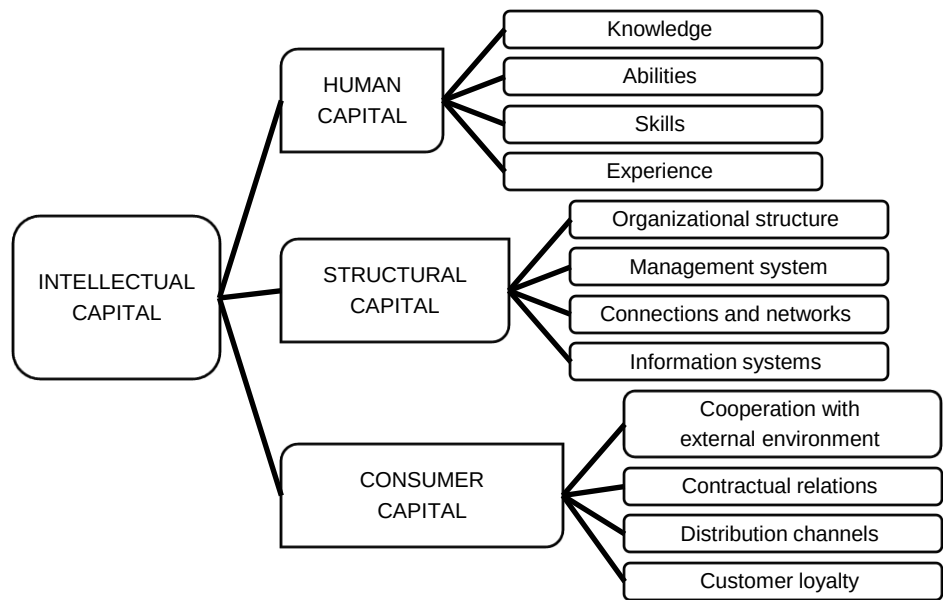
$$\bar{x} = \frac{\sum_{i=1}^n x_i p_i}{\sum_{i=1}^n p_i} = \frac{x_1 p_1 + x_2 p_2 + \dots + x_n p_n}{p_1 + p_2 + \dots + p_n} \quad (1)$$

By using this formula, the values of human, structural and consumer capital were calculated, the total of which can be used to express the overall value of intellectual capital (Gutić & Rudelj, 2012). The researchers' aim in this study was to assess the state and tendency of IC elements, not to measure economic values. The respondents assessed the importance of each segment for their business using a Likert scale (7-1) and weighted averages. The subjects assessed the importance of each factor to their enterprises by using weights ranging from 3 to 1, and the value of each factor was expressed as a weighted mean (Chen et al., 2004). An analysis of variance and Tukey's pairwise comparison was performed between the attributes of each observed determinant (human, structural and consumer capital) to determine significant differences between the determinants and their attributes. A SWOT matrix of intellectual capital was constructed with the following components: strengths (S), weaknesses (W), opportunities (O) and threats (T). It was used as a diagnostic tool for strategic planning and management because it reveals the weak points of the business and enables the verification of strategic goals and identifies the weaknesses and strengths of the organizational system. By using the matrix and the results obtained with the measuring instruments, strategic options were identified to contribute to the definition of strategic goals in the realization of entrepreneurial potential in agriculture (Deže, 2020).

## 2 Results and Discussion

Intellectual capital implies the creative application of intangible resources in production or other creative activities. It is the ability to transform invisible assets into products and services that bring added value. In the business environment, human resources are a form of intellectual capital, and they form the basis for the growth and development of production and business. To take advantage of the entrepreneurial opportunities that occasionally arise in the environment, it is necessary to determine the potential for their realization. Hence, it is useful to monitor, measure and evaluate the determinants of human, structural and consumer capital. The respondents in this study expressed their opinions using a Likert scale. The determinants with their associated attributes are shown in Figure 1.

Figure 1 | Determinants of IC with their associated descriptive features and attributes



Source: authors, based on Kozera (2011)

## 2.1 Evaluation of human capital determinants in agri-entrepreneurship

Increasing the level of knowledge, abilities, skills and experience as attributes of human capital allows greater efficiency of family farm production and enables innovation in the business system with better quality and longer term. New ideas and technologies provide the possibility to achieve a comparative advantage over competition. The entrepreneurial strength of human resources depends on all attributes. The respondents expressed their own opinions using a 5-level Likert scale by Elliott (2021), defined as follows: 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree. Table 1 shows the rating, shares and description of the attributes.

**Table 1 | Structure of attributes of human capital determinants (%)**

| Attribute         | No. | Attribute description                                      | 1  | 2  | 3  | 4  | 5  | Σ   |
|-------------------|-----|------------------------------------------------------------|----|----|----|----|----|-----|
| <b>Knowledge</b>  | 1   | Managing farm for more than 25 years                       | 0  | 3  | 9  | 27 | 61 | 100 |
|                   | 2   | Professional knowledge of production                       | 3  | 3  | 18 | 30 | 46 | 100 |
|                   | 3   | Successfully implementing plans                            | 0  | 0  | 12 | 52 | 36 | 100 |
|                   | 4   | Economic knowledge                                         | 3  | 3  | 21 | 39 | 34 | 100 |
|                   | 5   | High level of formal education                             | 0  | 9  | 9  | 33 | 49 | 100 |
| <b>Abilities</b>  | 6   | Hard work and patience are important                       | 9  | 18 | 36 | 18 | 19 | 100 |
|                   | 7   | Entrepreneurial behaviour is important                     | 3  | 6  | 3  | 52 | 36 | 100 |
|                   | 8   | I am able to apply innovations                             | 0  | 0  | 0  | 6  | 94 | 100 |
|                   | 9   | I am capable of making quality business decisions          | 0  | 0  | 3  | 9  | 88 | 100 |
| <b>Skills</b>     | 10  | I spent a lot of time studying                             | 0  | 0  | 9  | 33 | 58 | 100 |
|                   | 11  | I invested a lot of money to acquire new knowledge         | 0  | 0  | 6  | 39 | 55 | 100 |
|                   | 12  | I am good at using computers                               | 0  | 3  | 15 | 21 | 61 | 100 |
|                   | 13  | I speak a foreign language(s)                              | 0  | 6  | 36 | 36 | 22 | 100 |
| <b>Experience</b> | 14  | I acquired the farm with difficulty                        | 0  | 6  | 15 | 18 | 61 | 100 |
|                   | 15  | I have experience working on a farm for more than 10 years | 15 | 3  | 42 | 18 | 22 | 100 |

Source: authors' own calculations

The results for the knowledge attribute showed that 61% of the respondents strongly agreed with the claim of managing a farm for more than 25 years. The second attribute was evaluated on the basis of abilities. With the claim that they are capable of applying innovations, 94% of the respondents strongly agreed. The results for skills as a human capital attribute showed that 61% of the respondents strongly agreed that they are good at using computers. Experience was the last attribute that determines human capital, mainly through the level of difficulties in acquiring the farm and the level of experience in agriculture production and business. The evaluation of working experience revealed that 61% of the respondents strongly agreed with the claim of acquiring the farm with difficulty.

According to the results of the analysis of human capital presented in Table 1, the respondents rated the ability attribute at the highest level in relation to the other measured attributes. Table 2 shows the importance weights, ratings, the determinant values of the attributes and the total value of the human capital determinant.

**Table 2 | Weights, ratings and determinant values of human capital**

| Attribute                                       | No | Attribute description                                      | Importance weights | Ratings     | Determinant values | Median | SD   |
|-------------------------------------------------|----|------------------------------------------------------------|--------------------|-------------|--------------------|--------|------|
| Knowledge                                       | 1  | Managing farm for more than 25 years                       | 0.07               | 4.45        | 0.32               | 5      | 0.79 |
|                                                 | 2  | Professional knowledge of production                       | 0.07               | 4.12        | 0.27               | 4      | 1.02 |
|                                                 | 3  | Successfully implementing plans                            | 0.07               | 4.24        | 0.29               | 4      | 0.66 |
|                                                 | 4  | Economic knowledge                                         | 0.06               | 3.97        | 0.25               | 4      | 0.98 |
|                                                 | 5  | High level of formal education                             | 0.07               | 4.21        | 0.28               | 4      | 0.96 |
| <i>Knowledge attribute average value</i>        |    |                                                            | <i>0.07</i>        | <i>4.20</i> | <i>0.28</i>        |        |      |
| Abilities                                       | 6  | Hard work and patience are important                       | 0.05               | 3.18        | 0.16               | 3      | 1.21 |
|                                                 | 7  | Entrepreneurial behaviour is important                     | 0.07               | 4.12        | 0.27               | 4      | 0.96 |
|                                                 | 8  | I am able to apply innovations                             | 0.08               | 4.94        | 0.39               | 5      | 0.24 |
|                                                 | 9  | I am capable of making quality business decisions          | 0.08               | 4.85        | 0.37               | 5      | 0.44 |
| <i>Ability attribute average value</i>          |    |                                                            | <i>0.07</i>        | <i>4.27</i> | <i>0.30</i>        |        |      |
| Skills                                          | 10 | I spent a lot of time studying                             | 0.07               | 4.48        | 0.32               | 5      | 0.67 |
|                                                 | 11 | I invested a lot of money to acquire new knowledge         | 0.07               | 4.48        | 0.32               | 5      | 0.62 |
|                                                 | 12 | I am good at using computers                               | 0.07               | 4.33        | 0.30               | 5      | 0.86 |
|                                                 | 13 | I speak a foreign language/s                               | 0.06               | 3.73        | 0.22               | 4      | 0.88 |
| <i>Skill attribute average value</i>            |    |                                                            | <i>0.07</i>        | <i>4.26</i> | <i>0.29</i>        |        |      |
| Experience                                      | 14 | I acquired the farm with difficulty                        | 0.07               | 4.33        | 0.30               | 5      | 0.96 |
|                                                 | 15 | I have experience working on a farm for more than 10 years | 0.05               | 3.27        | 0.17               | 3      | 1.28 |
| <i>Experience attribute average value</i>       |    |                                                            | <i>0.06</i>        | <i>3.80</i> | <i>0.24</i>        |        |      |
| <b>Total value of human capital determinant</b> |    |                                                            | <b>1.00</b>        | <b>4.18</b> | <b>4.24</b>        |        |      |

Source: authors' own calculations

The calculated determinant values of the human capital attributes (Table 2) show that the ability attributes had the highest average determinant values ( $\bar{x} = 0.30$ ), followed by the skills attributes ( $\bar{x} = 0.29$ ), knowledge attributes ( $\bar{x} = 0.28$ ) and experience ( $\bar{x} = 0.24$ ). The overall determinant value of human capital was  $\bar{x} = 4.24$ . The determinant values were confirmed by a statistical test.



**Table 3 | Analysis of variance of attributes of human capital**

| Attribute  | Mean   | Grouping |
|------------|--------|----------|
| Knowledge  | 4.2000 | A        |
| Abilities  | 4.2727 | A        |
| Skills     | 4.2576 | A        |
| Experience | 3.8030 | B        |

\*Significant difference at 0.05 (95%) level by Tukey's pairwise comparison test.

Source: authors' calculations

*RQ1: Which attribute among the human capital determinants is the most valuable to agri-entrepreneurs?*

From the presented results, it was determined that abilities related to the importance of applying innovations during production and business were highly valued. The entrepreneurs were aware of the importance of applying biotechnological innovations, which was confirmed by the low coefficient value of the standard deviation (SD). At the same time, skills were also highly valued in relation to the time and money invested in acquiring new knowledge. The connection between innovation and entrepreneurial behaviour was investigated by Autade et al. (2023), who recognized the need to intensify educational efforts to expose farmers to innovative technologies and motivate them to acquire new knowledge.

Table 3 shows a statistically significant difference between the agri-entrepreneur experience in relation to other attributes ( $p \leq 0.007$ ). The abilities had the highest mean value, and experience had the lowest as an attribute of human capital.

In connection to the previous, Mathijs & Vranken (2001) and Akbar et al. (2023) explained the importance of human capital not only through age and education but also through gender, as agribusinesses with a higher proportion of women was found to be more efficient. Contracting with upstream processors increases efficiency by facilitating the adoption of technology and access to credits. Their study confirmed the superiority of family farms to corporate farms for crops but not for dairy produce.

Furthermore, Porzio et al. (2022) concluded that the steep increase in human capital during the 20<sup>th</sup> century has contributed to structural transformation by equipping a new generation of workers with skills. They emphasized two important implications. Firstly, while the theories of structural change typically focus on factors that decrease the demand for agricultural labour, supply-side changes in workforce composition and skills, which we call the "human side" of structural transformation, are quantitatively important. Secondly, to the extent that human capital growth can be promoted by increased access to schooling and educational reforms, these policies should be considered potential tools to accelerate the process of structural transformation.

## 2.2 Evaluation of structural capital determinant in agri-entrepreneurship

The structural capital determinant was evaluated on the basis of the following attributes: organizational structure, management system, connections and networks, and information systems. The respondents expressed their own opinions using a 5-level Likert scale by Elliott (2021), defined as follows: 1 = very poor, 2 = poor, 3 = good, 4 = very good, and 5 = excellent. The results were described on the basis of the data presented in Table 4.

All respondents had very good or excellent future production planning, which is related to their very good (52%) business plans.

Table 4 presents the measurement of the farm management system, with a claim on human resource management, long-term goals, investment and innovation management. Regarding long-term goal implementation, most respondents (79%) considered themselves as having excellent and very good goal management.

Special emphasis was placed on introducing innovations in the business, with only 49% of the respondents claiming that they were very good or excellent at introducing innovations.

**Table 4 | Structure of attributes of structural capital determinants (%)**

| Attribute                       | No. | Attribute description                                      | 1  | 2  | 3  | 4  | 5  | Σ   |
|---------------------------------|-----|------------------------------------------------------------|----|----|----|----|----|-----|
| <b>Organizational structure</b> | 16  | Organizational structuring of production and business      | 3  | 6  | 30 | 45 | 16 | 100 |
|                                 | 17  | Production development planning                            | 0  | 0  | 0  | 48 | 52 | 100 |
|                                 | 18  | Creation of business plans                                 | 0  | 3  | 27 | 52 | 18 | 100 |
|                                 | 19  | Strategic development planning                             | 0  | 0  | 12 | 42 | 46 | 100 |
| <b>Management system</b>        | 20  | Human resource management                                  | 0  | 0  | 0  | 52 | 48 | 100 |
|                                 | 21  | Managing implementation of long-term goals                 | 0  | 0  | 21 | 55 | 24 | 100 |
|                                 | 22  | Investment management                                      | 3  | 3  | 24 | 42 | 28 | 100 |
|                                 | 23  | Introducing innovations                                    | 0  | 12 | 39 | 36 | 13 | 100 |
| <b>Connections and networks</b> | 24  | Ways of accessing the market                               | 0  | 0  | 15 | 58 | 27 | 100 |
|                                 | 25  | Gathering information about suppliers and customers        | 6  | 15 | 48 | 12 | 19 | 100 |
|                                 | 26  | Cooperation and consultation with the external environment | 0  | 6  | 21 | 30 | 43 | 100 |
|                                 | 27  | Product quality control                                    | 6  | 12 | 33 | 33 | 16 | 100 |
| <b>Information systems</b>      | 28  | Production is computerized                                 | 12 | 15 | 30 | 27 | 16 | 100 |
|                                 | 29  | Level of digitization on the farm                          | 9  | 12 | 36 | 24 | 19 | 100 |
|                                 | 30  | Improvement of information infrastructure                  | 9  | 12 | 33 | 31 | 15 | 100 |

Source: authors' own calculations

The connections and networks attribute was analysed through four claims: the way of accessing the market, gathering supplier and customer information, cooperation and consultation with the external environment, and product quality control. Most respondents (85%) believed that they were very good or excellent at accessing the market.

The last attribute is the information systems, which was analysed according to three claims: production is computerized, the level of digitization on the farm, and improvement of information infrastructure. Less than one half of the respondents claimed that they were very good or excellent at implementing information infrastructure improvements (46%).

Finally, in the analysis of structural capital, the organizational structure received the highest rating from the respondents. On the other hand, the smallest proportion of respondents gave an excellent rating for information systems, which means that agri-entrepreneurs recognized the disadvantages of computerization, digitization and information infrastructure in general.

Table 5 presents the importance weights, ratings, determinant values of the attributes and total value of structural capital.

**Table 5 | Weights, ratings and determinant values of structural capital**

| Attribute No.            | Attribute description                                         | Importance weights | Ratings     | Determinant values | Median      | SD   |
|--------------------------|---------------------------------------------------------------|--------------------|-------------|--------------------|-------------|------|
| Organizational structure | 16 Organizational structuring of production and business      | 0.06               | 3.24        | 0.21               | 4           | 0.93 |
|                          | 17 Production development planning                            | 0.08               | 4.52        | 0.36               | 5           | 0.51 |
|                          | 18 Creation of business plans                                 | 0.07               | 4.24        | 0.31               | 4           | 0.76 |
|                          | 19 Strategic development planning                             | 0.08               | 4.33        | 0.33               | 4           | 0.69 |
|                          | <i>Organizational structure average value</i>                 |                    | <i>0.07</i> | <i>4.08</i>        | <i>0.30</i> |      |
| Management system        | 20 Human resource management                                  | 0.08               | 4.48        | 0.35               | 4           | 0.51 |
|                          | 21 Managing the implementation of long-term goals             | 0.07               | 4.03        | 0.28               | 4           | 0.68 |
|                          | 22 Investment management                                      | 0.07               | 3.82        | 0.26               | 4           | 0.96 |
|                          | 23 Introducing innovations                                    | 0.06               | 3.48        | 0.21               | 3           | 0.87 |
|                          | <i>Management system average value</i>                        |                    | <i>0.07</i> | <i>3.96</i>        | <i>0.27</i> |      |
| Connections and networks | 24 Ways of accessing the market                               | 0.07               | 4.12        | 0.30               | 4           | 0.65 |
|                          | 25 Gathering information about suppliers and customers        | 0.07               | 3.21        | 0.18               | 3           | 1.11 |
|                          | 26 Cooperation and consultation with the external environment | 0.07               | 4.09        | 0.29               | 4           | 0.95 |
|                          | 27 Product quality control                                    | 0.06               | 3.39        | 0.20               | 3           | 1.09 |
|                          | <i>Connectivity and network average value</i>                 |                    | <i>0.06</i> | <i>3.71</i>        | <i>0.24</i> |      |
| Information systems      | 28 Production is computerized                                 | 0.06               | 3.18        | 0.18               | 3           | 1.24 |

|                                                      |                                           |             |             |             |   |      |
|------------------------------------------------------|-------------------------------------------|-------------|-------------|-------------|---|------|
| 29                                                   | Level of digitization on the farm         | 0.06        | 3.30        | 0.19        | 3 | 1.19 |
| 30                                                   | Improvement of information infrastructure | 0.06        | 3.30        | 0.19        | 3 | 1.16 |
| Information system average value                     |                                           | 0.06        | 3.26        | 0.19        |   |      |
| <b>Total value of structural capital determinant</b> |                                           | <b>1.00</b> | <b>4.19</b> | <b>3.83</b> |   |      |

Source: authors' own calculations.

The evaluation of the structural capital attributes (Table 5) revealed that organizational structure attributes had the highest average determinant value ( $\bar{x} = 0.30$ ), followed by the management system ( $\bar{x} = 0.27$ ), connections and networks ( $\bar{x} = 0.24$ ), and information systems ( $\bar{x} = 0.19$ ).

The overall determinant value of structural capital was  $\bar{x} = 3.83$ . The statistical test confirmed the results of the determinant value.

**Table 6 | Analysis of variance of attributes of structural capital**

| Attribute                       | Mean   | Grouping |
|---------------------------------|--------|----------|
| <b>Organizational structure</b> | 4.0827 | A        |
| <b>Management system</b>        | 3.9621 | AB       |
| <b>Connections and networks</b> | 3.7121 | B        |
| <b>Information systems</b>      | 3.2550 | C        |

\*Significant difference at the 0.05 (95%) level by Tukey's pairwise comparison test.

Source: authors' calculations

*RQ2: Which attribute has the greatest value in the structural capital determinant?*

The results of the study on structural capital show that agri-entrepreneurs recognize that organizational structure has the greatest value in their business. According to the attribute description evaluation, most attention was focused on production development planning, which was also statistically confirmed by the smallest SD. This is related to strategic development planning, which is expected because the economic efficiency of a business depends not only on production results but also on the long-term planning of the entire business.

Table 6 shows a statistically significant difference ( $p \leq 0.0001$ ) between the information systems and other attributes of structural capital. A statistically significant difference was also found between organizational structure and connections and networks. The organizational structure had the highest mean value, and information systems had the lowest.

Gogan et al. (2015) showed that the evaluation of intangible resources has been controversial over the past decades, but measuring structural capital can be considered a new concept. However, recognizing structural capital and its links with resources, processes and results is a new idea in the research sector. It can be concluded that if entities oversee the successful implementation of a proper structural capital evaluation model, they can gain a competitive advantage.

The results of the study on the impact of structural capital indicate a negative relationship between employed structural capital and asset turnover ratio. In fact, the efficiency of structural capital had little impact on the overall efficiency of operations (Chowdhury et al., 2019).

### 2.3 Evaluation of consumer capital determinants in agri-entrepreneurship

Consumer capital as a component of intellectual capital is the only determinant that, in addition to the internal influence of the business environment, influences the external market environment. Hence, it has a more complex measurement.

The attribute was measured on the basis of cooperation with the external environment, contractual relations, distribution channels and customer loyalty.

The respondents expressed their own opinions using a 5-level Likert scale by Elliott (2021), defined as follows: 1 = very dissatisfied, 2 = somewhat dissatisfied, 3 = neither dissatisfied nor satisfied, 4 = somewhat satisfied, and 5 = very satisfied.

Table 7 shows the distribution of ratings (%) according to the respondents' opinions on consumer capital attributes.

Table 7 | Structure of attributes of consumer capital determinants (%)

| Attribute                             | No. | Attribute description                                             | 1  | 2  | 3  | 4  | 5  | Σ   |
|---------------------------------------|-----|-------------------------------------------------------------------|----|----|----|----|----|-----|
| Cooperation with external environment | 31  | Cooperation with suppliers                                        | 9  | 9  | 33 | 30 | 19 | 100 |
|                                       | 32  | Cooperation with competitors                                      | 9  | 12 | 21 | 27 | 31 | 100 |
|                                       | 33  | Communication with consumers                                      | 3  | 3  | 21 | 30 | 43 | 100 |
| Contractual relations                 | 34  | Level of contracted sales                                         | 6  | 6  | 24 | 30 | 34 | 100 |
|                                       | 35  | Contracts with new customers                                      | 0  | 3  | 6  | 39 | 52 | 100 |
| Distribution channels                 | 36  | Doorstep sales                                                    | 0  | 3  | 9  | 36 | 52 | 100 |
|                                       | 37  | Sales at markets                                                  | 0  | 3  | 9  | 15 | 73 | 100 |
|                                       | 38  | Wholesale                                                         | 3  | 6  | 15 | 15 | 61 | 100 |
|                                       | 39  | Contracted sale                                                   | 3  | 9  | 21 | 21 | 46 | 100 |
|                                       | 40  | Export                                                            | 0  | 3  | 12 | 33 | 52 | 100 |
| Customer loyalty                      | 41  | Continuity in connection with regular customers                   | 3  | 12 | 6  | 18 | 61 | 100 |
|                                       | 42  | Connection between producers and consumers without intermediaries | 27 | 12 | 21 | 18 | 22 | 100 |
|                                       | 43  | Existence of a database of contact with customers                 | 24 | 21 | 21 | 12 | 22 | 100 |
|                                       | 44  | Estimated level of customer satisfaction                          | 18 | 9  | 24 | 18 | 31 | 100 |
|                                       | 45  | Loyalty of existing customers                                     | 45 | 24 | 16 | 9  | 6  | 100 |

Source: authors' own calculations

Regarding cooperation with the external environment, 73% of the respondents were very satisfied or somewhat satisfied. Contractual relations as an attribute of consumer capital showed the highest ratings, very satisfied or somewhat satisfied, for contracts with new customers (91%). Regarding the distribution channels, 88% of the respondents were very satisfied or somewhat satisfied with doorstep sales and sales at markets. Customer loyalty was measured on the basis of five attributes. High ratings, very satisfied or somewhat satisfied, were given to continuity in connection with regular customers (79%).

To identify significant differences between the attributes of consumer capital, a statistical analysis was performed using a comparison test. The results are presented in Table 8.

**Table 8 | Analysis of variance of attributes of consumer capital**

| Attribute                             | Mean   | Grouping |
|---------------------------------------|--------|----------|
| Cooperation with external environment | 3.6770 | B        |
| Contractual relations                 | 4.0910 | AB       |
| Distribution channels                 | 4.2970 | A        |
| Customer loyalty                      | 3.0790 | C        |

\*Significant difference at the 0.05 (95%) level by Tukey's pairwise comparison test.

Source: authors' calculations

Table 9 presents the importance weights, ratings and determinant values in the consumer capital evaluation.

**Table 9 | Weights, ratings and determinant values of consumer capital**

| Attribute No.                                           | Attribute description           | Importance weights | Ratings     | Determinant values | Median | SD   |
|---------------------------------------------------------|---------------------------------|--------------------|-------------|--------------------|--------|------|
| Cooperation                                             | 31 Cooperation with suppliers   | 0.06               | 3.39        | 0.21               | 3      | 1.17 |
|                                                         | 32 Cooperation with competitors | 0.06               | 3.58        | 0.23               | 4      | 1.30 |
|                                                         | 33 Communication with consumers | 0.07               | 4.06        | 0.29               | 4      | 1.03 |
| <i>Cooperation attribute average value</i>              |                                 | <i>0.07</i>        | <i>3.68</i> | <i>0.24</i>        |        |      |
| Contract. relations                                     | 34 Level of contracted sales    | 0.07               | 3.79        | 0.26               | 4      | 1.17 |
|                                                         | 35 Contracts with new customers | 0.08               | 4.39        | 0.34               | 5      | 0.75 |
| <i>Contractual relationship attribute average value</i> |                                 | <i>0.07</i>        | <i>4.09</i> | <i>0.30</i>        |        |      |
| Distribution channels                                   | 36 Doorstep sales               | 0.08               | 4.36        | 0.34               | 5      | 0.78 |
|                                                         | 37 Sales at markets             | 0.08               | 4.58        | 0.35               | 5      | 0.79 |
|                                                         | 38 Wholesale                    | 0.08               | 4.24        | 0.32               | 5      | 1.12 |
|                                                         | 39 Contracted sale              | 0.07               | 3.97        | 0.28               | 4      | 1.16 |
|                                                         | 40 Export                       | 0.08               | 4.33        | 0.33               | 5      | 0.82 |

|                                                     |    |                                                                   |             |             |      |        |
|-----------------------------------------------------|----|-------------------------------------------------------------------|-------------|-------------|------|--------|
| <i>Distribution channel attribute average value</i> |    | <i>0.08</i>                                                       | <i>4.30</i> | <i>0.32</i> |      |        |
| <b>Customer loyalty</b>                             | 41 | Continuity in connection with regular customers                   | 0.08        | 4.21        | 0.32 | 5 1.19 |
|                                                     | 42 | Connection between producers and consumers without intermediaries | 0.05        | 2.94        | 0.15 | 3 1.52 |
|                                                     | 43 | Existence of a database of customer contact information           | 0.05        | 2.85        | 0.14 | 3 1.48 |
|                                                     | 44 | Estimated level of customer satisfaction                          | 0.06        | 3.33        | 0.20 | 3 1.47 |
|                                                     | 45 | Loyalty of existing customers                                     | 0.04        | 2.06        | 0.08 | 2 1.25 |
| <i>Customer loyalty attributes average value</i>    |    | <i>0.05</i>                                                       | <i>3.08</i> | <i>0.18</i> |      |        |
| <b>Value of consumer capital determinant</b>        |    | <b>1.00</b>                                                       | <b>3.74</b> | <b>3.84</b> |      |        |

Source: authors' own calculations.

*RQ3: Which attribute has the highest level of satisfaction with the state of the consumer capital determinant?*

Table 9 shows the determinant values of the consumer capital attributes. Distribution channels had the highest average determinant value ( $\bar{x} = 0.32$ ), followed by contractual relations ( $\bar{x} = 0.30$ ), cooperation with the external environment ( $\bar{x} = 0.24$ ) and customer loyalty ( $\bar{x} = 0.18$ ). The overall consumer capital average determinant value was  $\bar{x} = 3.84$ .

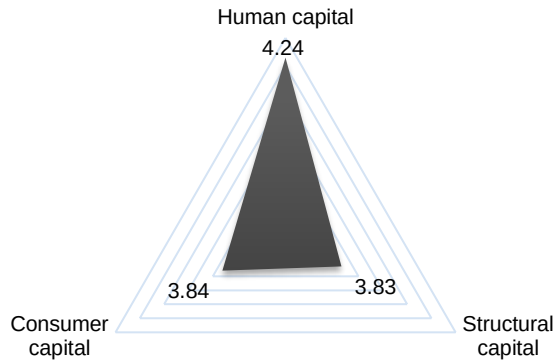
The analysis of consumer capital revealed a statistically significant difference ( $p \leq 0.0001$ ) between customer loyalty and the other attributes. A statistically significant difference was also found between cooperation and distribution channels. Distribution channels had the highest mean value, and customer loyalty had the lowest as an attribute of consumer capital.

Duffy (2000) measured customer capital and emphasized its importance by indicating that customers' contributions to current and future revenues are fundamental in assessing how successful an organization is in turning customer relationships into a sustainable competitive advantage. The new business environment requires that companies shift from being product-centric to being customer-centric. Generally, this shift affects all business processes.

*RQ4: Where are the most important potentials in intellectual capital, and what development strategy should agri-entrepreneurs use?*

The original data were collected by surveying respondents' attitudes and opinions. Their answers were shaped in the research process as descriptive attributes and then linked to different determinants: human, structural and consumer capital (Figure 2).

**Figure 2 | Values of intellectual capital determinants**



Source: authors, based on research results

The weighting method was used to obtain the value for each attribute of the determinants and the overall determinant value, which objectively reflects the importance of each measured segment. Regarding the synthesized evaluation results and rankings of the values of the intellectual capital determinants of agri-entrepreneurs, human capital had the highest value (4.24), followed by consumer capital (3.84) and structural capital (3.83).

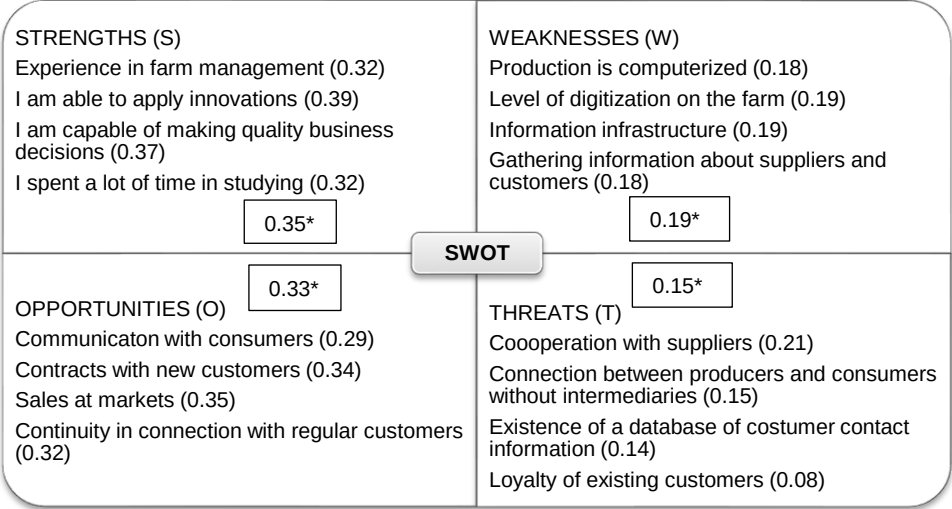
These results were confirmed by Tukey's pairwise comparison test, which statistically significantly separated ( $p \leq 0.0001$ ) the human capital determinant ( $A = 4.1859$ ) in relation to the other two groups: consumer capital ( $B = 3.7394$ ) and structural capital ( $B = 3.7879$ ).

The purpose of the IC measurement is not in the financial sense but in its ability to provide managers with timely feedback that allows them to adjust their IC strategy. In this way, they create a long-term competitive advantage based on the collection and use of knowledge (Chen et al., 2004).

To formulate strategic guidelines for strengthening the weaker determinants of intellectual capital, the SWOT matrix was used as a conceptual framework for the systematic analysis to compare external threats and opportunities with internal weaknesses and strengths, as shown in Figure 3. On the basis of the results on the attribute values, strengths and weaknesses as elements of the internal environment and the opportunities and threats in the external environment were identified.



Figure 3 | SWOT analysis of intellectual capital in agri-entrepreneurship



\*Average values.

Source: authors, based on research results

The SWOT analysis of intellectual capital in agri-entrepreneurship revealed the strengths of the internal environment and a determinant value of 4.24 for human capital. Specifically, the attributes of agri-entrepreneurs that were identified were knowledge, abilities, skills and experience.

The analysis of the strengths (S) of agri-entrepreneurs revealed comparative advantages based on the following human internal resources: many years of experience in farm management (0.32), the ability to apply innovations (0.39), the capability of making quality business decisions (0.37), and continuous acquisition of new knowledge (0.32).

The internal weaknesses (W) of agri-entrepreneurs are the attributes in which the competition can achieve a comparative advantage. The research identified weaknesses that had lower values related to structural capital, more specifically to information systems, including computerized production (0.18), level of digitization on the farm (0.19), information infrastructure (0.19) and gathering information about suppliers and customers (0.18).

Entrepreneurial opportunities (O) are business potentials for growth and development. They appear in the external business environment and must be identified and applied before competitors do. They are related to the attributes of consumer capital. Opportunities are found in the development of communication with consumers (0.29), contracts with new customers (0.34), sales at markets (0.35) and continuity in connection with regular customers (0.32).

Entrepreneurial threats (T) are found in attributes related to the conditions of the changing, uncertain and risky external business environment. In general, cooperation with the external environment is insufficient, mostly in cooperation with suppliers (0.21), the connection

between producers and consumers without intermediaries (0.15), followed by the existence of a customer database (0.14) and customer loyalty (0.08).

A large number of matrices show the relationships between the elements in the analysis. As a result, four strategies were developed on the basis of the SWOT analysis results: the WT strategy is aimed at minimizing weaknesses and threats, the WO strategy minimizes weaknesses and maximizes opportunities, the ST strategy maximizes strengths while minimizing threats and the SO strategy is the most desirable, in which entrepreneurs use their strengths to take opportunities. When businesses have weaknesses, they try to overcome them and turn them into strengths. When businesses face threats, they should focus on opportunities (Weihrich & Koontz,1994).

**Figure 4 | Matrix of intellectual capital potential in agri-entrepreneurship**

|                                |                |                                                                  |                 |
|--------------------------------|----------------|------------------------------------------------------------------|-----------------|
| Intellectual capital potential | Strengths (S)  | SO<br>0.35/0.33                                                  | ST<br>0.35/0.15 |
|                                | Weaknesses (W) | WO<br>0.19/0.33                                                  | WT<br>0.19/0.15 |
|                                |                | Opportunities (O)                                                | Threats (T)     |
|                                |                | The business environment for the entrepreneurship implementation |                 |

Source: authors, based on research results

The research results are based on the SWOT analysis (Figure 4). The ST strategy would be the most acceptable owing to the most significant differences between strengths and threats. The ST strategy is based on the strengths of organizations in dealing with threats from the business environment. Thus, agri-entrepreneurs should use their own knowledge, abilities, skills and experience in production and management to overcome the threats from their cooperation with suppliers, connection between producers and consumers without intermediaries, and contractual relations. A customer database is required, and activities to increase customer loyalty must be implemented. These threats arise from the external business environment, which is influenced by local, regional and national communities. Different forms of producer associations enable agri-entrepreneurs to deal with threats more easily. Despite the numerous forms of horizontal and vertical associations of agricultural producers (cooperatives, associations and producer organizations), their involvement is insufficient.

Negotiations with buyers/suppliers are more efficient and successful if more producers are involved. Furthermore, there is a need for the improvement and greater use of digital technology for growth and development. Producers must strengthen their systems of

knowledge and innovation in agricultural production to increase their competitiveness. For this purpose, they should make greater use of the possibility of financing the programme as part of EU measures. Such activities have been created by the national government towards the Agriculture Strategy until 2030 in the Republic of Croatia (GRC, 2022). Intervention measures are aimed at unifying agricultural knowledge and innovations by strengthening links with scientific institutions, advisory services and local entrepreneurial and development institutions. As the results showed insufficient digitization and informatization of farms, the development guidelines were also defined in the aforementioned strategic document through the development of a central agricultural information system, digitization of the information flow and encouragement of innovation partnerships.

## Conclusion

All economic entities in the agricultural sector can benefit from this measurement. These benefits are twofold: the efficiency of their own business is improved, and with their example of good practice, they become leading exemplary entrepreneurs. In this study, the evaluation, measurement and recognition of entrepreneurial potential in agribusiness were performed.

The research procedure consisted of the selection of attributes for measuring entrepreneurial potential in a specific agribusiness. The applied model tested the potential of 45 attribute descriptions in the areas of human, structural and consumer capital, which together constitute the value of intellectual capital. First, the human capital determinant was tested through the values of the following attributes: knowledge, abilities, skills and experience. Agri-entrepreneurs recognized their abilities as having the greatest development potential, which was confirmed by the applied model and statistical testing in relation to the other attributes. The second determinant was structural capital, which was measured using the values of the following attributes: organizational structure, management system, connections and networks, and information systems. As confirmed by the evaluation of the agri-entrepreneurs and statistical tests, the organizational structure had the highest value. Consumer capital was the third measured determinant of intellectual capital. It was measured using the values of the following attributes: cooperation with the external environment, contractual relations, distribution channels and customer loyalty. Distribution channels had the highest value among all the measured attributes, which was statistically confirmed. Potential testing also contributed to the recognition of human capital as the most significant element of intellectual capital in relation to structural and consumer capital.

The relatively simple identification of the greatest potential has no basic purpose if these results are not useful for the entrepreneur, for the manager, and for making strategic decisions. Therefore, according to the real and current situation, a SWOT analysis was performed and revealed that the ST strategy was the most acceptable for the agri-entrepreneurs, which means that they can use their strengths to deal with threats from the environment. Thus, agri-entrepreneurs should use human resources with abilities and skills to overcome the threats from their cooperation with suppliers and the connection between producers and consumers. Despite the numerous forms of horizontal and vertical linking of farmers, their involvement is insufficient. Negotiations with buyers/suppliers are more efficient and successful if more producers are involved.

On the basis of the research results and overall guidelines, we identified the strategic goals on which agri-entrepreneurs should focus to achieve competitiveness. Primarily, it is necessary to work on the improvement and greater use of digital technology for growth and development. Producers should strengthen their systems of knowledge and innovation in agricultural production to create comparative advantages using the possibilities of European financing programmes and funds. To introduce innovations in production and business, it is necessary to strengthen connections with scientific institutions, advisory services and local entrepreneurial and development agencies. As the results showed insufficient digitization and informatization of farms, development guidelines should be directed towards developing a central agricultural information system, digitizing the information flow and encouraging innovation partnerships.

This study, like many similar ones, has limitations. The sample of respondents should be much larger and equally distributed territorially. Furthermore, there were limitations in the database in that not all attributes were equally represented in their descriptions. The attribute descriptions as instruments for measurement were based on previous research, but they were classified into attribute groups according to the researchers' subjective assessment. The results mostly provided quantitative information without emphasizing other less valuable attribute descriptions. To improve the quality of this research, weighting was used, but statistical tests were also necessary. Study limitations were related to the time period, which could be overcome by applying a longitudinal research design.

The applied research model can be used as a comparative model based on the calculation of the values of the intellectual capital segments in combination with a SWOT analysis to determine strategic development guidelines. It is a model for comparing the relative efficiency of human, structural and consumer resources and their capacities. By measuring and evaluating the efficiency of intellectual capital, latent potentials for the development of entrepreneurship in agriculture were observed. In general, this research represents a methodological concept for measuring and evaluating the entire intellectual capital as a key catalyst of change management in the direction of growth and agribusiness development.

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