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Intangibles (un)equality between manufacturing and service enterprises

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***Abstract**: Even though intellectual capital (IC) represents the crucial element of enterprises' high-above performance and sustainable competitive advantage, there is a lack of systematic approach to understanding whether there are significant differences in the IC of manufacturing and services enterprises. The research analysis is performed using data collected from 224 respondents representing managers in enterprises of the Republic of Srpska, Bosnia and Herzegovina. Exploratory factor analysis (EFA), as an applied statistical technique, identifies the IC components. To address the research question, the statistical difference in means was tested for each IC component in manufacturing and service enterprises using appropriate parametric t-test and non-parametric Mann-Whitney U test for two independent samples. The research results reveal that service enterprises have higher human, relational and renewal capital than manufacturing enterprises. Structural capital has a more pronounced role in manufacturing enterprises. As enterprises move towards service orientation, they need to rearrange their approach to IC stocks and management, and acknowledging that differences between manufacturing and service enterprises are present represents the first step. Research findings shed new light on the differences between these enterprises in IC possession and management.*

***Keywords:** Human Capital, Relational Capital, Structural Capital, Renewal Capital, EFA, IC Stocks*

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(Ne)jednakost neopipljivih resursa među proizvodnim i uslužnim preduzećima

***Apstrakt**: Iako se intelektualni kapital (IK) smatra ključnom determinantnom ostvarivanja iznadprosječne uspješnosti i održive konkurentske prednosti, prisutan je nedostatak sistematičnog pristupa razumijevanju da li postoje značajne razlike u IK među proizvodnim i uslužnim preduzećima. Analiza se zasniva na podacima prikupljenim od 224 ispitanika menadžera preduzeća u Republici Srpskoj, Bosni i Hercegovini. Eksploratorna faktorska analiza (EFA) je korištena radi identifikovanja IK komponenti. Radi dobijanja odgovora na istraživačko pitanje, ispitana je značajnost razlika prosječnih vrijednosti komponenti IK između proizvodnih i uslužnih preduzeća primjenom odgovarajućeg parametarskog t-testa i neparametarskog Men-Vitnijevog U testa za dva nezavisna uzorka. Dobijeni rezultati pokazuju da uslužna preduzeća bilježe više vrijedosti ljudskog, relacionog i obnovljivog kapitala u poređenju sa proizvodnim preduzećima. Strukturni kapital ima više naglašenu ulogu u proizvodnim preduzećima. S obzirom da preduzeća nastoje da budu orijentisana ka pružanju usluga, nužno je da mijenjaju svoj pristup zalihama IK i njegovom upravljanju, a uočavanje razlika među proizvodnim i uslužnim preduzećima predstavlja prvi korak ka tome. Rezultati istraživanja naglašavaju spoznaju da postoje razlike među proizvodnim i uslužnim preduzećima u domenu posjedovanja i upravljanja IK.*

***Ključne reči**: ljudski kapital, relacioni kapital, strukturni kapital, obnovljivi kapital, EFA, zalihe intelektualnog kapitala*

1. Introduction

The economic value creation has intangible resources and capabilities such as IC as a base (Edvinsson & Malone, 1997; Sveiby, 1997). It applies to the production of goods where knowledge and innovation have a crucial role. However, the IC is also significant for service enterprises. Services have a major part in reproductive activities in industrialized economies to the extent that the current economy can be regarded as a service economy (Chesbrough & Spohrer, 2006). Understanding the role of IC and its characteristics is crucial. There is debate over whether there is any reason to separate products from services in the current environment in which they can become easily intertwined (Kianto et al., 2010). Identification of differences between products and services seeks deeper analytic inspection of services. Key service differences as opposed to manufacturing the products are as follows: close interaction

between a provider and a consumer of the service in a service-delivering process; simulations of production and consumption; multilayer nature of created and exchanged knowledge; knowledge combination into valuable systems; inability to store; use of information-communication technologies and transparency and intangibility (Namasivayam & Denizci, 2006; Ritala et al., 2023). According to these characteristics, service enterprises are reliant on knowledge activities. The IC as a value driver is likely to be significant in this sector. The significance of IC is different between manufacturing and service enterprises. In contrast to the production process based on automatic activities, consultancy services are labour-intensive and require real-time knowledge (Nijssen et al., 2006). Even though both types of activities require highly specialized knowledge and skills, services largely depend on tacit knowledge, organizational as well as individual skill and abilities. These differences are crucial for IC possession, management, development, and protection. However, there is a lack of research findings on IC characteristics in the service sector. Several studies focused on the examination of IC components in areas such as the finance sector (Bontis & Fitz-enz, 2002), competence management in professional service organizations (Chang & Birkett, 2004), banking sector (Ordonez de Pablos, 2004), high- and low-tech enterprises (Buenechea-Elberdin et al., 2018), etc. There are many fewer studies investigating IC in service enterprises. Some of them have examined the role of human capital in the service sector as part of IC (Namasivayam & Denizci, 2006), IC development in the manufacturing and the service sector in Malesia (Bontis et al., 2000), and managers' perception of IC development in the service sector (Lim & Dallimore, 2004).

Previous studies have not discussed IC characteristics that differ between service enterprises compared to other enterprises, especially in small transition economies. There is a need to conduct such research to emphasize the presence of differences between manufacturing and service enterprises from an IC point of view. The objective is to, to some extent, fill the present gap in the IC research stream and to empirically test the level of development of the IC components in manufacturing and service enterprises in a small transition economy. This research aims to detect the IC differences and similarities between these types of enterprises. Therefore, the research question is as follows:

RQ: What are the main differences between IC components of manufacturing versus service enterprises?

The present study focuses on the comparison of the IC components between manufacturing and service enterprises in general. The research sample contains 224 enterprises of different sizes in the Republic of Srpska, Bosnia and Herzegovina. According to the author's knowledge, this kind of research

represents the first attempt to determine IC characteristics within the proposed research context, thus enabling the future comparison with other countries with a similar level of development. Based on the literature review, this is the first analysis that investigates similarities and differences in the IC components between manufacturing and service enterprises in a small transition economy, such as the Republic of Srpska, Bosnia and Herzegovina.

Research findings suggest that human, relational, and renewal capital are more developed in service than manufacturing enterprises.

To achieve this research's aim, Section 2 starts with an IC definitions and classifications. Section 3 details all the research methodology used to deliver the empirical evidence. Section 4 presents the data analysis, results, and discussion of the results, and Section 5 summarizes the findings and gives some guidelines for managers on how to efficiently and effectively manage IC to identify a key aspect of IC to enhance the value creation process.

2. Literature review

2.1. Intellectual capital – definitions and classifications

The vague difference between IC and intangible asset is present in a contemporary literature. An intangible asset can be defined as goodwill, whereas IC is a part of goodwill. Recently, several IC classifications have emerged that additionally clarify definitions of these terms. IC was defined as a concept comprised of: external capital, internal capital, and human capital (Edvinsson & Malone, 1997; Sveiby, 1997; Stewart, 1997; Roos et al., 1998; Edvinsson & Stenfelt, 1999).

The term IC is often used as a synonym for intangible or knowledge assets. According to the OECD (1999) definition, IC could be treated as the "economic value of two categories intangible assets such as organizational and human capital". Organizational capital consists of protection systems of intellectual property, distributional networks, and supply chains, while human capital comprises internal human resources and external organizational resources such as customers and suppliers. This definition of IC emphasizes differences between the terms IC and intangible assets, thus defining IC as a subset of the overall intangible asset owned by an enterprise. There are intangible elements that do not belong to the enterprise's IC such as reputation as a side product of the decision to use IC, despite the fact that reputation is not an element of IC.

There is no widely accepted definition of IC (Cañibano et al., 2000; McDowell et al., 2018). Some authors (Edvinsson & Malone, 1997) state that IC consists

of knowledge, technology, customer relationships, and professional skills of employees. Frequently used IC classification is on human, structural and physical capital or financial capital. Human capital represents a core of IC that determines its capital growth and overall performance. It includes skills, knowledge, and employee expertise (McDowell et al., 2018). Structural capital refers to work environment and internal research and development (Guthrie et al., 2012). Structural capital could include strategic plans, patents and intellectual property rights, and relation capital that encompasses relationships with customers and suppliers (Bontis, 2004). Table 1. summarizes IC definitions.

Table 1. Intellectual capital definitions

Author(s)	Definition
Edvinsson & Malone (1997)	IC can be treated as knowledge converted into value.
Bassi (1997)	IC contains all forms of knowledge. IC components are human capital, structural capital, and customer capital.
Sveiby (1997)	IC refers to the internal structure like organizational process and external structure of an enterprise.
Roos et al. (1998)	IC consists of assets mainly not indicated in the balance sheet including knowledge in employees' minds and knowledge retained in enterprises after employees leave the enterprise.
Bontis (1998)	IC includes human capital, structural capital, and RC.
Petty & Guthrie (2000)	IC represents intangible assets value possessed by employees and enterprise.
Ordonez de Pablos (2004)	IC is a sum of knowledge resources that determine market competitiveness.
Subramaniam & Youndt (2005)	IC refers to knowledge resources used to ensure competitive advantage.
Zerenler et al. (2008)	IC is a sum of human capital, structural capital, and RC that belongs to enterprises and employees.
Martin-de-Castro et al. (2011)	The terms IC and intangible assets or knowledge asset can be used interchangeably. It contains knowledge stocks or knowledge funds, intangible resources and abilities that allow main organizational process development and competitiveness advantage.

Source: Author's elaboration

The IC differs from the terms intellectual ownership and intellectual property. Intellectual asset refers to knowledge that creates value through patents and know-how. Intellectual property refers to knowledge that is legal property of enterprises through patents, licenses, trademarks, copyright, etc. IC represents knowledge with the potential to create value through employees', processes' and customers' knowledge.

2.2. Multidimensionality of intellectual capital – a static perspective

The earlier researches comprehensively discussed the IC concepts. The analysis of existing literature revealed some facts. To better understand IC concepts, researchers should use a multidimensional view of IC (Khalique et al., 2018; de Frutos-Belizón et al., 2019; Peñalba-Aguirrezabalaga et al., 2020). It seems that widely used is IC classification into three components: human, structural and, relational capital (Edvinsson & Malone, 1997; Stewart, 1997; Sveiby, 1997; Bontis, 1998; Roos et al., 1998; Bontis et al., 2000; Deltorn, 2017; McDowell et al., 2018).

Human capital (HC) is an essential ingredient of IC that determines its capital growth and overall performance enhancement (McDowell et al., 2018). HC includes knowledge, skills, education, and employees' organizational characteristics (Edvinsson & Malone, 1997). HC cannot be owned by the enterprise because it refers to knowledge and skills of each individual member that can leave the enterprise at any time (Roos et al., 1998).Despite that, HC represents the key IC component (Osorio et al., 2015). It represents a set of values, attitudes, and abilities that result in competitive advantage and value creation in the enterprise. HC is the know-how, experience, and talents of employees and managers. (Massaro et al., 2020). It is of great importance because it represents the most valuable aspect of IC (F-Jardón & Martos, 2009), where the economic value of HC does not to be proven anymore (Stewart, 1998). However, the greater knowledge accumulation of individuals does not affect IC except if it is observed along with organizational capital (Cabello & Kekäle, 2008). Some parts of HC are unique, while some are generic. Generic HC transmits between enterprises and includes formal education or years of working or managerial experience. Various skills and complex knowledge are more important for service enterprises. This fact leads to the acknowledgment that HC is more pronounced in these types of enterprises. Thus, holistically talented employees with excellent education and high-level skills possess enhanced cognitive capabilities that can lead to their high productivity and proficiency to improve enterprise's' working performance (Massaro et al., 2020; Palazzi et al., 2020; Ali et al., 2023). The focus should be on employees' creativity and emotional intelligence. Those characteristics influence stronger customers' perceived values.

Structural capital (SC), opposite to HC, is comprised of knowledge retained in enterprises regardless of the presence of employees (Roos et al., 1998). Individual knowledge could be retained through knowledge transfer and codification processes (Nonaka & Takeuchi, 1994; Hammad Ahmad Khan et al., 2016; Buenechea-Elberdin et al., 2018). SC includes documents, databases, defined procedures, etc. These represent the outputs of knowledge

conversion processes. The intellectual properties, a part of the SC dimension, include trademarks, trade secrets, copyrights, and patents (Hammad Ahmad Khan et al., 2016). A sophisticated information system facilitates access to valuable data that could serve as a base for decision-making that results in enhanced competence and higher overall performance (Ali et al., 2023). SC includes the enterprise systems and configurations that enable the enhancement of employees' productivity (Khalique et al., 2018; Cabrilo & Dahms, 2020; Ali et al., 2023). As described by some authors (Ali et al., 2023), SC could be seen as a mean to add efficiency to HC to achieve high performance. The SC equips HC to seek new opportunities (Chowdhury et al., 2018). HC represents knowledge owned by employees which depicts the main difference between humans and SC. SC refers to knowledge made by HC that belongs to the enterprise. Enterprises with undeveloped SC might have difficulties creating value based on HC. Organizations with inadequate systems and processes cannot achieve defined goals. So, organizational value-producing actions may be more effective if it has robust structural assets (Al-Jinini et al., 2019). However, an enterprise with well-developed SC has a supportive culture that encourages its employees to learn new knowledge that enhances the overall performance (Xu & Wang, 2018). The value creation process is the transformation process of HC into SC while simultaneously SC supports the HC value creation process. Effective utilization of the human and SC enables the development of good relationships with stakeholders through RC. It is impossible to accumulate and store services, in contrast to physical products. So, this leads to the conclusion that the SC is more pronounced in manufacturing enterprises.

Relational capital (RC) refers mainly to customer relationships as the essence of this type of capital despite the increasing presence of networking such as research and development collaborations and university-business sector cooperations (Kianto et al., 2010). RC refers to diverse ways of interactions like horizontal, vertical, downstream, and upstream, thus reflecting the various types of cooperation and collaboration mechanisms within different settings (Aureli et al., 2019; Ali et al., 2023). RC development reflects the capacity of its employees and depth of communication between them (Bontis et al., 2018). Multiple RC studies reveal that enterprises benefit from actively nurturing networks with their most loyal customers (Al-Jinini et al., 2019). Some authors (Cabrilo et al., 2018) define RC as the integration of all the relationships within an organisation as internal relationships between management and employees, relationships between employees as well as relationships with external parties. RC represents the ability of enterprises to interact with other external parties to use the potential of value creation of other IC components such as human and SC. It enables learning processes based on communication with external stakeholders, gathering relevant inputs for innovation process, satisfaction of

market expectations and identification of market opportunities and competition dynamics, leverage of external potentials and finally, maintaining competitive business performances (Martin-de-Castro et al., 2011; Ali et al., 2023). However, RC is less investigated than the human and SC because its characteristics are more complex, heterogeneous, and less predictable. The RC depends on a combination of various partners or stakeholders. Such external relationships and perceptions can change (Martin-de-Castro et al., 2011). These characteristics of RC led to the conclusion that this type of capital is potentially more important for service enterprises than manufacturing enterprises. Frequently, the service enterprises adjust their service offers to be in line with customers' needs and wants, to a wider extent, to gain and retain satisfaction and loyalty of customers. The service providing process typically depends on closer interaction between customers, suppliers and enterprises, characterised by mutual understanding and quality relationships to a greater extent (Kianto et al., 2010; Andreeva et al., 2021).

The standard approach to defining IC is to classify it into three components: human, relational, and SC (Subramaniam & Youndt, 2005; Reed et al**.,** 2006). The recent research stream has also acknowledged a renewal capital (RNWC) as an important part of the IC (Kianto et al**.,** 2010; Paoloni et al., 2015; Inkinen et al., 2017; Buenechea-Elberdin et al., 2018; Rehman et al., 2021; Ritala et al., 2023). Many researchers have addressed the term organizational renewal using various terms such as: organizational change and development (Weick & Quinn, 1999), knowledge creation (Nonaka & Takeuchi, 1995), dynamic capabilities (Eisenhardt & Martin, 2000), and organizational renewal (Kianto, 2008). RNWC comprises the resources related to organizational growth and research and development (Bontis, 2004). RNWC represents the ability of enterprises to respond to unexpected challenges and changes in the market (Edvinsson & Malone, 1997). In turbulent and changeable environment, possession of unique quality knowledge and capabilities is not sufficient.. It is necessary to continuously develop and renew acquired knowledge in order to sustain the leading competition position (Eisenhardt & Martin, 2000). RNWC reveals organizational ability to survive and sustain in the changing conditions (Ritala et al., 2023). It includes organizational learning capability and the capacity to seek new information and develop skills (Ritala et al., 2023). There is s dilemma whether the enterprises with well-developed RNWC can build on the bases of previous knowledge and information and generate new knowledge (Maditinos et al., 2010; Ritala et al., 2023). There is empirical evidence that supports the fact that RNWC and learning lead to the development of new products, processes, and management practices (Jimenez-Jimenez et al., 2008; Sanz-Valle et al., 2011), as well as enhance innovativeness on both individual and organizational levels (Wang & Ellinger, 2011). Some studies revealed RNWC to be a key antecedent of innovation performance

(Buenechea-Elberdin et al., 2018; Cabrilo et al., 2018; Cabrilo & Dahms, 2020) and enterprise performance overall (Paoloni et al., 2015). Likewise, there is evidence that RNWC mediates the relationship between IC components and enterprise performance outcomes (Buenechea-Elberdin et al., 2018; Ritala et al., 2023). RNWC not only builds new knowledge but also potentially enables the creation of new relationships between learned elements known to the enterprise but not connected in a certain way (Savino et al., 2017). The renewed knowledge represents the base upon which enterprises use to add and rectify their current knowledge (Carnabuci & Operti, 2013), as well as to generate new connections between the existing knowledge in familiar ways (Ritala et al., 2023). The capability to learn and develop in line with changing customer needs in shorter cycles, more unexpected and in smaller segments could be more pronounced in the service enterprises rather than in manufacturing enterprises because of the nature of services (Kianto et al., 2010; Andreeva et al., 2021).

The IC stocks include HC (employee skills and experience), SC (efficiency of internal functions), RC (firms' external (customers) relationships), and RNWC (skills for learning and development).

3. Research methodology

3.1 Sample and data collection

The research sample contains enterprises in Republic of Srpska, Bosnia and Herzegovina. The survey questionnaires were delivered to 500 enterprises registered in the database of Chamber of Commerce and Industry of the Republic of Srpska. Data were collected from 232 representatives of the enterprises. After data cleansing to detect outliers, missing values, and pattern responses, some of the questionnaires were excluded to obtain quality input data for statistical analysis. Thus, 8 questionnaires are excluded from the sample. The remaining 224 questionnaires were used for further data analysis. Among theoe 224 questionnaires, 84 (38%) are collected from representatives of the manufacturing sector, while the remaining 140 (62%) are collected from the service sector. According to the size and maturity of the enterprises, the majority of enterprises are SMEs (88.39%), older than 15 years (63.39%).Tthe majority of the manufacturing enterprises belong to industries as follows: construction, metallurgy and metal processing, agriculture, fishing, food and tobacco industry. Among service enterprises, the majority of them are from communal and service, trade and ICT sectors.

To measure IC components that include three components: human, structural and RC, the questionnaire developed by Bontis (1998) was used. IC was measured using 53 items. The measurement scale used to validate RNWC, as a part of IC as proposed in recent literature, was built upon previous research (Edmondson, 1999; Garcıa-Morales & Lorens-Montes, 2006; Kianto et al., 2010; Inkinen et al., 2017). The measurement scale of RNWC has four items. All IC items were measured on a seven-point Likert scale where value 1 indicates "completely disagree" and value 7 "completely agree". Perceptual measures were used to evaluate all IC components, as shown in the Table in the Appendix. These measures are widely used to evaluate intangible resources (Kannan & Aulbur, 2004).

DeVellis (2017) emphasizes that sample size in exploratory factor analysis (EFA) is a controversial issue. Thus, there is no universal rule of thumb for sample size in the EFA (Johnson & Morgan, 2016). The sample size is very important in the EFAs, with the minimum recommended sample generally being at least cases of 100 individuals (Kline, 2011).

3.2 Method of analysis

EFA with principal axis factoring, as a factor extraction method and promax oblique rotational method, was used to identify the underlying factorsThe four-factor structure of IC: HC, RC SC and RNWC factors for the Republic of Srpska's enterprises was identified. The Cronbach's alpha coefficient was used to test the internal consistency of items within each IC factor. To address the research question, the statistical difference in mean values of each IC component was tested in manufacturing and service enterprises.

4. Results and discussion

EFA enables the reduction of the number of items in a scale. Thus, this results in the maximized variance explained by the scale. To detect the factorial structure of the IC scale, EFA was applied following the five-step approach proposed by Williams et al. (2010). This approach includes: checking the suitability of data, selection of the factor extraction method, determining the number of factors, selection of the rotational method, and interpretation.

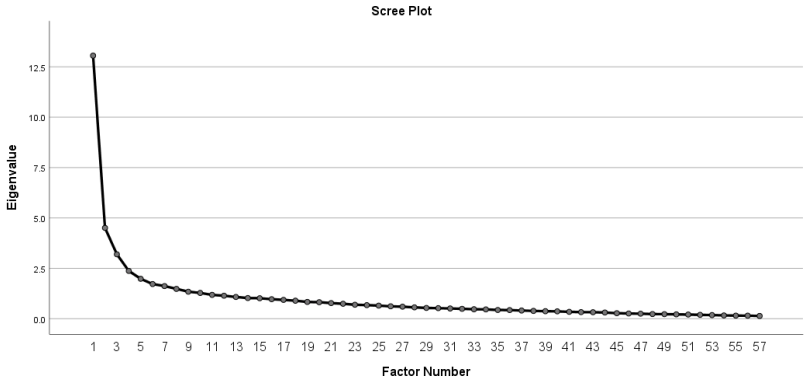
EFA was used to identify the underlying factors, for each of the four IC components: on 20 items relating to HC, on 17 items relating to RC, on 16 items relating to SC, and on 4 items relating to RNWC. The eigenvalue criterion and the scree plot were used to determine the factorial structure. All item

communalities are adequate which is in line with Taherdoost et al. (2020). The indicators with factor loadings above 0.4 were retained in the model.

Before carrying out a factor analysis, the connection and statistical significance of the relationship between source (original) variables, using the correlation matrix was examined. Another way of determining suitability for factoring of data is checking the anti-image correlation matrix. This method enables detection of the elements that are off-diagonal in the anti-image correlation matrix which should be below 0.30, while diagonal elements of the matrix should be above 0.50 for data to be suitable for factorability. Field (2013) emphasizes that to obtain generalisable results from EFA, the normal distribution of data is essential. Kline (2011) suggested that the absolute value of skewness and kurtosis, as indicators of univariate normal distribution of data, should not be greater than 3 and 10. To check univariate normality, skewness and kurtosis values of each item were calculated. It was revealed that skewness ranged between -1.17 and 0.526, while kurtosis ranged between -1.3 and 2.259. Depending on these results it is possible to say that the univariate normality assumption was met. However, the deviation from normality often does not make a substantive difference in analysis when the sample size is more than 200 (Tabachnick et al., 2013).

Bartlett's sphericity test and Kaiser-Meyer-Olkin (KMO) test are other approaches to checking the suitability of data for performing EFA. According to these tests, the factorability of the data is determined. Bartlett's sphericity test is expected to be statistically significant, and KMO is expected to be above 0.50 (Field, 2013). Bartlett's sphericity test was found to be statistically significant (χ^2 (1596) = 6011.310, p = 0.000) and KMO value was 0.872. These results showed suitability of the use of EFA. The principal axis factoring (PAF) has an advantage of requiring no distributional assumptions (Fabrigar et al., 1999). Since multivariate normality assumptions were not met, the principal axis factoring was used as an extraction method. EFA aims to reduce multiple items to fewer common structures. There are several techniques to determine the number of factors like Kaiser-Guttman rule (eigenvalue over 1), visually interpreting scree plot, etc. The Kaiser-Guttman criterion and parallel analysis were used together to decide on the number of factors for extraction because using multiple techniques to determine the number of factors is preferred (Williams et al., 2010). According to the calculated eigenvalues of variance explained, it was observed that the four-factor structure is present. A parallel analysis plot presented in Figure 1. Suggests that the scale might have four factors. In line with the empirical results and literature review, it is inferred that the scale might have four factors.

Figure 1. Scree plot for parallel analysis



Source: *Research results*

To simplify the data structure and to interpret it easily, rotational methods were used (Costello & Osborne, 2019). When correlation is expected to be between factors, oblique rotational methods allow reaching statistically accurate factor structures (Field, 2013; Williams et al., 2010). According to the literature review, the structure of enterprises' IC was inferred to arise from correlated elements. As a result, it was decided to use the promax oblique rotational method.

Factors are identified depending on the factor loadings of the items (Johnson & Morgan, 2016). In this research, it was decided that the lower bound for item loading would be 0.40 (Johnson & Morgan, 2016) and to remove any items lower than that value from the scale. Overlapping items with less than 0.20 difference in factor loadings were removed from the scale (Child, 2006). EFA was conducted and items with lower than 0.40 item loading and overlapping items were removed from the scale. After each item removal, the analysis was repeated. In the end, there were 38 items left for EFA. Bartlett's sphericity test and KMO test were also carried out with 38 items.

The results of Bartlett's sphericity test were statistically significant (χ^2 (741) = 3757.665, p = 0.000) and KMO was 0.891 indicating that data were suitable for EFA. The results of EFA are presented in Table 3., where, in line with the Kaiser-Guttman criterion, only four factors whose eigenvalues exceeds value 1 and their corresponding items are retained in the structure, as shown.

As it can be concluded, factor HC explained 25.315 %, factor SC explained 7.779%, factor RNWC explained 6.91 % and factor RC explained 4.827% of the total variance. The IC scale explained 44.831% of the total variance.

Table 2. IC four-factor structure – EFA results

	Factors				Communalities
Items	HC	SC	RNWC	RC	
hc9	0.826	-0.138	0.057	0.168	0.703
hc8	0.799	0.097	-0.010	-0.034	0.704
hc1	0.678	-0.011	0.004	-0.047	0.461
hc11	0.667	0.083	-0.177	-0.095	0.562
hc18	0.644	-0.128	0.130	-0.110	0.616
hc20	0.455	-0.112	0.164	0.256	0.539
hc7	0.444	0.268	0.030	0.138	0.525
hc10	0.439	0.104	0.024	0.107	0.551
sc12	-0.018	0.700	0.215	-0.013	0.479
sc9	-0.127	0.655	0.030	-0.002	0.385
sc10	-0.010	0.615	-0.020	-0.042	0.488
sc7	0.114	0.574	0.005	-0.031	0.573
sc11	0.253	0.568	-0.074	-0.063	0.464
sc2	0.033	0.433	-0.111	0.041	0.508
rnw2	-0.172	0.097	0.810	0.103	0.784
rnw1	-0.068	0.070	0.690	0.033	0.701
rnw4	0.089	0.072	0.679	0.016	0.548
rnw3	0.086	0.220	0.652	-0.063	0.711
rc7	-0.016	-0.159	-0.022	0.805	0.618
rc6	0.002	0.123	0.104	0.764	0.579
rc4	0.084	0.058	-0.143	0.619	0.522
rc8	-0.074	-0.115	0.010	0.413	0.506
Variance Explained (%)	25.315	7.779	6.91	4.827	
Cronbach's α	0.86	0.79	0.88	0.73	

Source: *Research results*

Firstly, the assumption of normality of distribution for all IC components is assessed using Kolmogorov-Smirnov's and Shapiro-Wilk's tests, at a significance level of 5%. Distribution of all IC components, except HC, deviates from a normal distribution ($p<0.05$). The overall results are reported in the following Table 3.

Table 3. Assumption on normality of data distribution

	Kolmogorov-Smirnov's test			Shapiro-Wilk's test		
	Statistic	df	Sig.	Statistic	df	Sig.
HC	0.061	224	0.042	0.988	224	0.060
SC	0.071	224	0.008	0.983	224	0.007
RC	0.075	224	0.004	0.974	224	0.000
RNWC	0.134	224	0.000	0.954	224	0.000

Source: Research results

IC components are tested for the mean differences among the manufacturing and service sectors using a parametric t-test and non-parametric Mann-Whitney U test for two independent samples. According to the results shown in Table 4., there is evidence to support the difference between the values of the majority of IC components ($p<0.05$) of the two industry sectors: manufacturing and service sector. However, there is no evidence to support the difference between the values of RC of the two industry sectors ($p>0.05$).

Table 4. IC stocks – significance of differences

Type of enterprise		HC*	SC	RC	RNWC*
Manufacturing enterprise	Mean	4.76	5.60	4.57	5.53
n=84	Std deviation	4.81	5.83	4.75	5.50
Service enterprise	Mean	5.09	5.38	4.65	5.98
n=140	Std deviation	5.13	5.33	4.75	6.00
	Difference	-0.3349	0.22	-0.08	-0.45
	Sig. (two tailed)/Asymp.Sig. (two-tailed test)	0.01	0.006	0.733	0.000
*Note: Data follow normal distribution					

Source: Research results

The significance of HC is higher for service enterprises because they, to a greater extent, rely on employees who create and produce services. Human resource accounting, an approach to measure and report on HC, was developed and used in the context of service enterprises where HC has a more emphasized role in organizational value (Bontis et al., 1999).

RNWC plays a significant part in successfully creating services. New services are produced simultaneously with changes in the service delivery process and skills improvement of employees who are in direct communication with customers (Nijssen et al., 2006). So, learning and acquiring new information is of great relevance. RNWC has a more pronounced role in service enterprises because all information and knowledge obtained through collaboration with external parties could be used to enhance services and its delivery process immediately according to the flexible and adaptable nature of services.

SC is more important for manufacturing enterprises. As for the other – although statistically insignificant – difference, RC was found to be more important for service enterprises, thus given the need for collaboration with other enterprises – most notably customers. Nevertheless, RC is needed in present-day markets regardless of the orientation. It is not really surprising that no differences have appeared. As previous research suggested (Kianto et al., 2010; Andreeva et al., 2021), this research also confirms that manufacturing and service enterprises may have different importance of IC components that, eventually, might make different contributions to their performance.

5. Conclusion

The research analysis proposes the four-factorial structure of IC scale for enterprises in a small transition economy such as the Republic of Srpska, Bosnia and Herzegovina, which is in accordance with theoretical references and previous empirical evidence. In an attempt to reveal more information on IC in manufacturing and service sector in small transition economy, the static approach to IC was applied. Some empirical evidences on IC components' similarities and differences between manufacturing and service enterprises have emerged.

In contrast to the traditional three-factor structure of IC, this research examines the less used four-structure and identifies the IC measurement scale. The research findings have indicated the importance of a comprehensive understanding of IC components and various IC development of components in researched industry sectors.

The research provides theoretical contributions and practical implications. From a theoretical point of view, the research highlights that IC should be measured and analyzed not only in the context of developing economies, but also in the context of small transition economies. This research enriches the existing IC measurement theory and overall IC research stream because it provides evidence of the presence of IC resources and its differences in the level of

development of IC components in the manufacturing and service sector in a small transition economy. It proposes an IC measurement scale with satisfactory psychometric characteristics that should be further validated in similar research contexts. From a practical point of view, this research provides information to managers on types of indicators that should be investigated to detect and boost the level of the development of each IC component. Also, it reveals the importance of each IC component by the type of enterprisee and suggests level of contribution of each IC component for overall IC. This finding can help managers redirect their attention towards significant IC components and effectively and efficiently manage overall IC.

It is advised to business managers to apply the IC framework to determine the key enterprise resources. The recognition of the strategic importance of the IC can encourage business owners, managers and other external parties to provide more financial aid for growth of intangible resources, knowledge and learning capabilities.

Several authors revealed that in case of service enterprises, co-production and the fact that overall value has been delivered to customers by direct contacts with employees, it is necessary to define a specific set of measures to evaluate HC (Namasivayam & Denizci, 2006). In line with this statement, measures used to evaluate HC in service enterprises should be in line with characteristics of the value creation process and service provided in service enterprises. Empirical findings reveal useful suggestions in terms IC components. However, to ensure that the relevance of measurement scale of IC is established, it would be useful to develop specific measurement scale in line with characteristics of the analyzed business sector. Likewise, it would be interesting to investigate whether the level of development of IC components differs between certain types of service enterprises.

Beside static approach to IC that deals with evaluation of the stocks of intangible resources, further research analysis should be aimed towards investigation of the dynamic nature of IC. Dynamic approach to IC is based on understanding the following issues: the need to apply present intangible resources in everyday enterprise activities to create value; how intangible resources develop, change and renew, and how to protect them from copyright infringement.

Future research should pay attention to the existing intangible resources as well as organizational activities and capabilities that enable the development, management and protection of IC stocks. Testing the relationships between static and dynamic elements of IC and enterprise performance could provide deeper insights in terms of effective and efficient IC management. The presence of differences between the static and dynamic characteristics of IC, for different types of enterprises, could give information on the significance of

application of suitable approaches to enterprise management and ensure the success and sustainability of the manager's decisions.

Although this research contributes to the existing IC literature and empirical studies, it has some limitations. The determined IC measurement scale using EFA needs to be validated on several independent samples and time periods to obtain complete content and convergent validity as a measurement instrument. The sample structure is an obstacle to generalising the conclusions of this research. Future research should apply a multiple-respondent approach for each enterprise to ensure comprehensive data collection. Longitudinal studies are advised to detect the changes in IC components in enterprises over the time. Similar empirical research conducted in a different context, as in this research, can positively influence the development of the IC theory.

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Appendix

Table IC measurement scale (excerpts from questionnaire)

HC				
hc1	competence ideal level		hc11	employees perform their best
hc2	succession training program		hc12[b]	recruitment program comprehensive
hc3	planners on schedule		hc13r*[a]	big trouble if individuals left
hc4[a]	employees cooperate in teams		hc14r*	rarely think actions through
hc5r[a]	no internal relationships		hc15r*	do without thinking
hc6[b]	come up with new ideas		hc16[a]	individuals learn from others
hc7	upgrade employees' skills		hc17[a]	employees voice opinions
hc8	employees are bright		hc18	get the most out of employees
hc9	employees are best in industry		hc19r*	bring down to others' level
hc10	employees are satisfied		hc20	employees give it their all
RC				
rc1[a]	customers generally satisfied		rc10	meet with customers
rc2[a]	reduce time to resolve problem		rc11	customer info disseminated
rc3	market share improving		rc12	understand target markets
rc4	market share is highest		rc13r*[a]	do not care what customer wants
rc5[a]	longevity of relationships		rc14	capitalize on customers' wants
rc6	value added service		rc15r*[a]	launch what customers don't want
rc7	customers are loyal		rc16[a]	confident of future with customer
rc8	customers increasingly select us		rc17[a]	feedback with customer
rc9	firm is market-oriented			
SC				
sc1[a]	lowest cost per transaction		sc9	develops most ideas in industry
sc2	improving cost per revenue		sc10	firm is efficient
sc3	increase revenue per employee		sc11	systems allow easy info access
sc4[b]	revenue per employee is best		sc12	procedures support innovation
sc5[a]	transaction time decreasing		sc13r*[a]	firm is bureaucratic nightmare
sc6[a]	transaction time is best		sc14[a]	not too far removed from each other
sc7	implement new ideas		sc15[a]	atmosphere is supportive
sc8[b]	supports development of ideas		sc16r[a]	do not share knowledge
RNWC				
rnw1	enterprise acquired new and important knowledge			
rnw2	employees acquired important skills and abilities			
rnw3	enterprise as a learning organisation			
rnw4	enterprises' operations described as creative and inventive			
Note: Superscript letters a and b indicate those items with loading below 0.4 and overlapping items excluded from further analysis, respectively; r* means reversed coded item				

Source: Bontis, 1998; Kianto et. al., 2010; Inken et al., 2017