https://doi.org/10.31410/tmt.2023-2024.349

Intellectual Capital in Hospitality: A Panel Data Regression on Hotel Brand Financial Performance

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Received: November 11, 2023
Revised: June 25, 2024
Accepted: July 3, 2024

Keywords:
Intellectual capital;
Brand;
Hotels;
Financial performance;
Competitive advantage

Abstract: *This research aims to examine the impact of intellectual capital on the financial performance of the hotel brand. Beyond human and structural capital, the study underscores the significance of relational capital in fortifying a hotel brand. Consequently, strategic investments in diverse intangible assets within the hotel industry are posited to enhance brand value, thereby elevating financial performance. The empirical analysis, encompassing 29 hotels in the Republic of Serbia from 2018 to 2022, through panel data regression, illuminates a statistically significant and positive correlation between intellectual capital and brand financial performance. This correlation underscores the tangible impact of intellectual capital and other non-material assets, such as brand, on the hotel financial performance.*

1. INTRODUCTION

In the context of contemporary business dynamics, particularly within the tourism sector, fierce competition prevails. In such business conditions, relying solely on traditional physical assets proves insufficient in establishing a sustainable competitive advantage. A *Resource-based view of the firm* (RBV) underscores the significance of resources that are rare, valuable, and not easy to imitate - such as intellectual capital (Gallego et al., 2020). Within the realm of intellectual capital, paramount importance is often attributed to the distinctive competencies and knowledge of employees, namely human capital (Pekovic et al., 2020). However, equal attention should be directed towards elements within the structural and relational dimensions. Components such as IT, databases, customer relations, organizational culture and brand play pivotal roles.

In the hotel sector, the brand is deemed a crucial component of intellectual capital (Robinot & Giannelloni, 2010). It serves as the identity of the organization's products and services, distinguishing it from competitors. The reputation and perception of the hotel, alongside the emotional connection visitors establish with the brand, contribute to its recognizability and differentiation from the competition. Consequently, visitors develop trust and loyalty, leading them to willingly pay a premium for the hotel's branded services. The effective management of intellectual capital often aligns with building the hotel brand. This involves fostering employee competence and friendliness, crafting a positive image, managing visitor relations, etc (Sadalia et al., 2019). Adopting such an approach not only enhances the value of intellectual capital and the brand but also translates into positive financial performance for hotels. Bearing in mind the above, this research aims to examine the impact of intellectual capital on the financial performance of the hotel brand. Specifically, this study focuses on how various dimensions

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of intellectual capital - human, structural, and relational capital, contribute to the overall financial success of hotel brands.

The present research delves into the relationship between intellectual capital and financial performance within the hotel industry. By conducting a comprehensive analysis, we identify which elements of intellectual capital are most influential in driving financial success. We also uncover that effective brand management, deeply intertwined with intellectual capital, enhances financial outcomes.

2. LITERATURE REVIEW

2.1. Intellectual Capital in Hotels

RBV states that long-term success necessitates assets that are not easily copied or substituted and possess the potential to generate value over an extended period (Gallego et al., 2020). In the contemporary business landscape, intangible resources and intellectual capital fulfill this role, encompassing specific employee competencies, technology, organizational culture, relationships with stakeholders, and various other facets of organizational operations (Pekovic et al., 2020). Given its intangible nature, intellectual capital is challenging to measure or identify precisely. Nevertheless, its inclusion of unique and valuable assets resistant to imitation allows it to create substantial value for organizations in the market (Jardon & Martinez-Covas, 2021). Building intellectual capital is a complex task requiring not only financial investments in intangible assets, especially employee knowledge but also a strategic orientation in which investing in intellectual capital is seen as an investment rather than an expense. This approach enables organizations to develop knowledge-based assets capable of yielding long-term profitability (Obeidat et al., 2021).

Intellectual capital is typically assessed through three key dimensions: human, structural, and relational capital (Gallego et al., 2020; Jardon & Martinez-Covas, 2021; Soewarno & Tjahjadi, 2020). Human capital, often identified as the most crucial component, incorporates knowledge, skills, and abilities unique to employees within the organization (Pekovic et al., 2020). Beyond competencies and specific skills, human capital encompasses employee values, attitudes, motivation, willingness to collaborate, continuous learning, and knowledge sharing (Jardon & Martinez-Covas, 2021; Slavković & Ognjanović, 2018; Soewarno & Tjahjadi, 2020). It evolves through continuous education, informal training, work, and employee experience, supplementing formal education with competencies leading to the development of tacit knowledge, that is knowledge inherent to the organization's employees which is difficult to imitate (Quintero-Quintero et al., 2021).

While intellectual capital is a commonly explored topic in various industries, research on its significance in tourism, especially the hotel sector, remains relatively limited (Costa et al., 2020). In the hotel sector, where performance hinges on employee competence, service quality, and relations with visitors and stakeholders (Costa et al., 2020; Ognjanovic & Slavkovic, 2022), human capital emerges as a key factor. Despite the substantial presence of physical assets, the creativity, innovation, and competence of hotel employees play a pivotal role in gaining a competitive advantage (Vale et al., 2022). Competent employees primarily generate the hotel's intangible assets, underscoring the pivotal role of human capital as the foremost component of intellectual capital. Hence, employee competencies emerge as a crucial determinant of hotel performance and competitiveness (Slavković et al., 2023).

The full potential of human capital cannot be expressed without adequate "intangible" internal infrastructure and IT, elements that represent structural capital. Building a good relationship with stakeholders, especially with customers, helps the company position itself in the market, increase its performance, create loyal customers, and build its image (Lim & Dallimore, 2004). The role of structural and relational capital is considered very important for service companies (Kianto et al., 2010). Nevertheless, there is limited representation in the literature regarding research on how these two categories of intellectual capital affect the competitiveness of companies in the hotel industry (Ognjanovic, 2016). In some studies, like Toylan et al. (2020), six aspects of structural and relational capital were analyzed as important enablers of knowledge sharing in strategic alliances of 4-and 5-star hotels in Turkey. The findings indicate significant impacts, direct and indirect through the inter-organizational knowledge-sharing process, on the innovative behavioral outcome of hospitality alliance companies.

Structural capital (also called organizational or intern capital) includes all stored knowledge in the organization, formalized in the form of databases, organizational charts, process guidelines, patents, licenses, information systems and strategies (Allameh, 2018) that support employee productivity (Edvinsson & Malone, 1997). It consists of organizational capital and technological capital. According to Rudež and Mihalič (2007), elements of structural capital in the hotel industry are management philosophy, culture, business processes and information technology. Structural capital is the set of knowledge and intangible assets derived from action processes that remain in the organization at the end of the working day (Weqar et al., 2020). This definition points out the key difference between human and structural capital, human is owned by employees, and structural capital is owned by organizations (Edvinsson & Malone, 1997). Higher-categorized hotels have a better ability to create value by utilizing the synergy of human and structural capital (Slavković et al., 2023). Structural capital is also a supporting infrastructure for the formation of external relations (Sardo et al., 2018).

Customer capital is owned by any organization that has customers (Stewart, 1999). It includes relationships that are created between internal individuals of an organization and their customers (Chang & Tseng, 2005). It is constituted of customer satisfaction and loyalty, image and brand, and direct distribution channels (Rudež & Mihalič, 2007). By shifting the point of view from customer relations to relationships with all stakeholders, customer capital becomes relational or social capital. Relational capital is the product of knowledge that results from relationships within the organization and outside of it (Quintero-Quintero et al., 2021). It is a market-specific resource related to external relationships with channel partners and customers (Yayla et al., 2018).

2.2. Intellectual Capital and Financial Performance of a Brand

In the hotel industry, branding holds significant importance for establishing hotel recognition and instilling consumer confidence in receiving services aligned with their expectations. Lahap et al. (2016) emphasize the critical role of branding, linking it to a positive Return on Investment (ROI) and asserting that a robust brand is imperative for overall success. Brand image, notably, ranks among the foremost considerations for users when selecting accommodation. A study involving 300 respondents by Lahap et al. (2016) revealed that 75% considered the brand a key factor in their accommodation choices. Similar findings were found by Dhillon (2013), who emphasized the pivotal role of the brand in the service sector. Memories of hotel service users regarding service quality and satisfaction during their stay serve as a reflection of

the brand (Saleem & Raja, 2014). Fung et al. (2013) assert that a strong hotel image influences corporate reputation, revenues, financial indicators, and guest occupancy. Robinot and Giannelloni (2010) note that while satisfied service users are vital for strengthening the brand, satisfaction alone may not guarantee user loyalty. Users continually seek higher quality services, leading them to hotels that can offer such standards. Nam et al. (2011) identify the value of a hotel brand, primarily hinging on the quality of the physical facility and the service provided by staff.

Despite extensive research on the topic, a universally accepted model for measuring brand value in the hotel industry remains elusive (Çınar, 2020). Authors worldwide employ diverse dimensions and factors to identify brand value and its influencing elements. Increasingly, intellectual capital is highlighted as the factor distinguishing a hotel from its competitors (Liu, 2017; Rico et al., 2020; Sardo et al., 2018). Brand value often relies on secondary data derived from the organization's operations, frequently found in financial reports (Choi et al., 2017). Given that the success of the hotel business can be expressed through market, strategic, and financial performance (Bontis et al., 2015), a similar approach is applicable in determining brand value. This approach acknowledges that in addition to consumer attitudes (often subjective), a financial approach based on information in financial reports is crucial when expressing brand value (Kim et al., 2003). Hotel management, in pursuit of business objectives, implements various strategies to enhance performance and market position. Positive effects of the brand, beyond visitor satisfaction and loyalty, are evident in achieved financial performance (Isberg & Pitta, 2013). As a multidimensional structure, the brand is influenced by factors like employee professionalism and kindness, service quality, interior and exterior design, and relations with visitors. Effective management and investment in intellectual capital contribute to brand value enhancement, leading to improved financial performance (Ginesti et al., 2018; Hsu et al., 2013; Kim et al., 2003). Notably, these effects are reflected in Return on Assets (ROA), Return on Equity (ROE), and net profit (Choi et al., 2017). Sadalia et al. (2019) confirm a positive impact of intellectual capital on the financial performance of the brand, measured through ROA, ROE, and net profit. Consequently, the following research hypothesis is proposed:

H1: *Intellectual capital has a statistically significant and positive impact on the financial performance of the hotel brand.*

3. METHODOLOGY

The study focused on the hotel sector of the Republic of Serbia, involving a sample comprising 29 hotels of 4- and 5-star categories. The analysis spanned the financial performance achieved from 2018 to 2022. The data required for analyzing the financial performance of the brand and intellectual capital were sourced from the regular financial reports of the hotels, available on the website of the Serbian Business Registers Agency. The information-gathering process was conducted in several steps. Initially, the hotels to be included in the analysis were identified, with the criterion set to include only fourth and fifth-category hotels. These hotels typically have a significant number of employees and a high value of tangible and intangible assets, providing a robust informational basis for deriving objective scientific evidence. Subsequently, a random selection of 30 hotels meeting the criteria was made. One of the hotels in the selected sample did not have all the necessary financial information, and because of this, it was excluded from further analysis. Financial reports for the specified period of analysis were then collected, and data from each report was entered into the software to create a foundation for further statistical analysis. This systematic approach ensures the

collection of relevant and comprehensive data for the study. Statistical analysis was conducted using SPSS V26 and EViews V13 software. In addition to descriptive statistical analysis, a panel data regression was employed to test the hypothesis.

The independent variable in the model is intellectual capital, while the dependent variable is operationalized through three indicators: net profit margin (NPM), Return on Assets (ROA), and Return on Equity (ROE). Intellectual capital was measured using the VAIC model, developed by Pulic (2000). This model assesses intellectual capital based on information extracted from financial statements. The initial step involves determining Value Added (VA), calculated as the difference between income (OUT) and business expenses (IN). However, salary expenses (HC) are subtracted from business expenses, considering them as an investment in employees' competencies. Thus, the VAIC model's first step can be represented by the following equation:

$$VA = OUT - (IN - HC) \quad (1)$$

As the creation of hotel value involves the utilization of all resources, it becomes crucial to establish the value of Capital Employed (CE). This is quantified through the Capital Employed Coefficient (CEE), derived from the following model (Xu & Liu, 2020):

$$CEE = VA / CE \quad (2)$$

In the previous model, Capital Employed (CE) usually corresponds to the assets of the organization. In the next step, the Structural Capital Coefficient (SCE) is determined. For these needs, it is first necessary to determine the value of the Structural Capital (SC) itself, as the difference between Value Added (VA) and salary expenses (HC). Then the resulting value is divided by the Value Added (Xu & Liu, 2020):

$$SCE = (VA - HC) / VA \quad (3)$$

According to the VAIC methodology, human capital is observed through the so-called human capital coefficient (HCE), which is obtained by the ratio between Value Added (VA) and salary expenses (HC), i.e:

$$HCE = VA / HC \quad (4)$$

When all the components are determined, the Intellectual Capital Coefficient (ICE) is obtained by their sum:

$$ICE = HCE + CEE + SCE \quad (5)$$

When it comes to the indicators of the dependent variable, their calculation was carried out on the basis of the following models:

$$NPM = \text{Net profit/Income} \quad (6)$$

$$ROA = \text{Net profit/Total assets} \quad (7)$$

$$ROE = \text{Net profit/Equity} \quad (8)$$

To assess the influence of intellectual capital on the financial performance of the brand, a panel regression was employed. The initial step in applying the panel regression entails conducting the F test, which addresses the acceptability of the pool model for the specified analysis (Newbold et al., 2010). The null hypothesis of the F test posits the homogeneity of constant terms in the model (Asteriou & Hall, 2007). The execution of the pooled panel relies on the following quantitative model:

$$y_{it} = \alpha + \beta_1 x_{it1} + \varepsilon_{it} \quad (9)$$

$$i = 1, \ldots, N; t = 1, \ldots, T$$

where N is the total number of observed units, T is the number of periods, and observation units in the period t, α is the model constant. This is a common term across all units and time periods that represents the average value of y, when all independent variables are equal to zero, while β_1 is the regression coefficient for the independent variable x_{it1}, showing how much y_{it} changes on average for each unit change in x_{it1}. ε_{it} is the stochastic error or residual for unit i at time period t. The decision to apply the panel data regression model was made because this model combines information from different units and from several time periods. In addition, it reduces the problem of collinearity, enables monitoring of dynamics, control of unobserved heterogeneity, but also better identification of causes.

By performing the logarithm over the defined variables, the model can be represented as follows:

$$\ln_{NPM} = \alpha + \beta_1 \ln ICE_{it} + \varepsilon_{it} \quad (10)$$

$$\ln_{ROA} = \alpha + \beta_1 \ln ICE_{it} + \varepsilon_{it} \quad (11)$$

$$\ln_{ROE} = \alpha + \beta_1 \ln ICE_{it} + \varepsilon_{it} \quad (12)$$

where:

$\ln_{NPM}$ – logarithmic data NPM;
$\ln_{ROA}$ – logarithmic data ROA;
$\ln_{ROE}$ – logarithmic data ROE;
$\ln_{ICE}$ – logarithmic intellectual capital.

Upon accepting the null hypothesis, it is determined whether a pooled panel or a fixed effects model is more appropriate for analysis, and vice versa (Kennedy, 2008). In the pooled panel model, the parameter α maintains a constant value across all observed units throughout the observed period. In contrast, in the fixed effects model, α remains constant over time but varies with the change in observation units. A pooled panel model with fixed effects can be expressed through the following equation:

$$y_{it} = \alpha_i + \beta_1 x_{it1} + + \varepsilon_{it} \quad (13)$$

$$i = 1, \ldots N; t = 1, \ldots, T$$

Evaluating the suitability of the model with stochastic effects for the analysis is conducted through the Breusch-Pagan LM test. This test relies on the assumption that the variances of the

members are equal to zero. Rejecting the null hypothesis indicates the presence of a stochastic effect, affirming that the stochastic model is better suited for the analysis. The quantitative representation of this model is as follows:

$$y_{it} = \alpha + \beta_1 x_{it1} + + v_i + \varepsilon_{it} \quad (14)$$

$$i = 1, \ldots N; t = 1, \ldots T$$

where v_i is the random effect for each unit, α common constant term for all observed units. The Breusch Pagan LM test was applied to decide whether a pooled model or a random effects model was the correct choice for the analysis. By applying this test, it is checked whether there is a significant difference between the units. If both the Breusch-Pagan LM test and the F test indicate the suitability of both fixed and stochastic effect models, the next step is to conduct the Hausman test. The decision regarding the adequacy of the Hausman test model is based on the following hypotheses:

H0: The stochastic effects model is appropriate.

H1: The fixed effects model is appropriate.

The Hausmann test was applied with the aim of deciding whether a model with fixed effects or a model with stochastic effects is the correct choice for conducting the analysis. This test checks whether the random effects are consistent and effective. Opting for a fixed-effects model involves considering the internal dimension of the data. Conversely, choosing models with stochastic effects considers both internal differences and variations between individual subjects. In the case of this research, the aforementioned includes 29 hotels and a period of five years.

4. RESULTS AND DISCUSSION

The results of descriptive statistics are shown in Table 1, in which the mean, standard deviation (SD), minimum and maximum values are displayed.

Table 1. Results of descriptive statistics

Variable	Mean	SD	Min	Max
ICE	11,68	74,86329	-135,24	845,01
NPM	2,6757	23,72942	-285,52	0,85
ROA	0,1873	1,97791	-24	0,64
ROE	40,4183	286,21261	-2,8	169,98

Source: Own research

The results of descriptive statistics show that all hotels on average achieve a positive value of intellectual capital and financial performance. A high standard deviation of these indicators means that there are individual cases of hotels where the values of intellectual capital and financial performance are extremely high or low, as shown by the min and max columns in Table 1.

4.1. Effects of Intellectual Capital on Net Profit Margin

The F test results, as displayed in Table 2, reveal an F statistic value of 703.4156, with a significance level of p=0.0010. The obtained result leads to the rejection of the null hypothesis. This implies that for this analysis a fixed effects model is a suitable alternative. However, a

conclusive decision about accepting the results of this model cannot be reached until the adequacy of the model with stochastic effects is also assessed.

Table 2. Results of pooled model F test: Intellectual capital and NPM

Dependent Variable: ln_NPM				
Method: Panel Least Squares				
Periods included: 5				
Cross-sections included: 30				
Total panel (unbalanced) observations: 150				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-1.987525	0.326554	-3.568455	0.0000
ln_ICE	0.685975	0.159655	2.956555	0.0030
R-squared	0.85859	Mean dependent var		7.325554
Adjusted R-squared	0.785256	S.D. dependent var		1.569855
S.E. of regression	0.632555	Akaike info criterion		1.752255
Sum squared resid	40.25459	Schwarz criterion		1.625225
Log likelihood	-109.6940	Hannan-Quinn criter.		1.326590
F-statistic	**703.4156**	Durbin-Watson stat		0.265988
Prob(F-statistic)	**0.001000**			

Source: Own research

Table 3 presents the model with fixed effects. The findings indicate that a 1% growth in intellectual capital corresponds to a simultaneous increase in the NPM by 0.71%. In simpler terms, a 1% change in intellectual capital can account for a 0.74% change in the NPM. While these results suggest a robust relationship, their acceptance hinges on the outcome of tests for stochastic models to ascertain their adequacy. Further insights into this matter will be obtained through the administration of additional tests.

Table 3. Results of Fixed effect model: Intellectual capital and NPM

Dependent Variable: ln_NPM				
Method: Fixed effect model				
Periods included: 5				
Cross-sections included: 30				
Total panel (unbalanced) observations: 150				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-1.119655	0.436325	-3.455221	0.0010
ln_ICE	0.744121	0.163625	2.132658	0.0020
R-squared	0.775515	Mean dependent var		7.652258
Adjusted R-squared	0.698555	S.D. dependent var		1.596325
S.E. of regression	0.523556	Akaike info criterion		1.598877
Sum squared resid	38.23265	Schwarz criterion		1.554552
Log likelihood	-107.9780	Hannan-Quinn criter.		1.536560
F-statistic	**701.1669**	Durbin-Watson stat		0.359898
Prob(F-statistic)	**0.000000**			

Source: Own research

The results of the Breusch Pagan Lagrange multiplier (LM) test, as shown in Table 4, reveal a probability value (p) of 0.0000, which is below the 5% threshold. Consequently, the null hypothesis is rejected in favor of the alternative hypothesis, indicating a significant stochastic effect in the given model. This suggests that the stochastic effect model might be a suitable alternative for this analysis. Given that both the fixed-effects model and the stochastic-effects model could be viable alternatives in this case, a decision must be made through the Hausman test.

Table 4. Results of Breusch Pagan test: Intellectual capital and NPM

Lagrange multiplier (LM) test for panel data			
Total panel observations: 150			
Probability in ()			
Null (no rand. effect)	Cross-section	Period	Both
Alternative	One-sided	One-sided	
Breusch-Pagan	**798.9897**	4.65982	817.1621
	(0.0000)	(0.0169)	(0.0000)

Source: Own research

The results of the Hausman test shown in the following Table 5 show in this analysis that it is adequate to use a model with stochastic effects since the p-value of the Chi-Sq statistic is greater than 5% (Asteriou & Hall, 2007).

Table 5. Results of Hausman test: Intellectual capital and NPM

Correlated Random Effects - Hausman Test			
Equation: Untitled			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	4.965985	1	**0.08963**

Source: Own research

The aforementioned result indicates that the model will account for both internal differences within the hotels from which the data were collected and differences between the hotels included in the analysis. Consequently, testing with the stochastic effects model is necessary, and the results obtained from this model will be considered authoritative. In Table 6, presenting the results of the stochastic effect model, it is observed that the coefficient Ln_ICE bears a positive sign (0.798636) and is statistically significant, as evidenced by the p-value ($p = 0.0026 < 0.05$). This denotes a positive relationship between these variables, signifying that the growth of one variable induces the growth of the other.

Table 6. Results of random effect testing: Intellectual capital and NPM

Dependent Variable: ln_NPM				
Method: Panel EGLS (Cross-section random effects)				
Periods included: 5				
Cross-sections included: 30				
Total panel (unbalanced) observations: 150				
Swamy and Arora estimator of component variances				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-2.498522	0.595633	-6.144525	0.0000
ln_ICE	**0.798636**	0.136554	2.889555	**0.0026**
Effects Specification			S.D.	Rho
Cross-section random			0.59600	0.8979
Idiosyncratic random			0.156554	0.0301
Weighted Statistics				
R-squared	**0.722012**	Mean dependent var		0.525641
Adjusted R-squared	0.735654	S.D. dependent var		0.296555
S.E. of regression	0.132554	Sum squared resid		2.565549
F-statistic	207.5697	Durbin-Watson stat		0.735507
Prob(F-statistic)	0.000000			
Unweighted Statistics				
R-squared	0.831502	Mean dependent var		7.336578
Sum squared resid	56.02154	Durbin-Watson stat		0.284847

Source: Own research

The obtained result reveals a positive and statistically significant relationship between intellectual capital and NPM. Specifically, an increase in intellectual capital by 1% influences the growth of NPM by 0.79%. The R-squared of the regression model is 72%, indicating that the model effectively explains the relative change in NPM resulting from the variation in intellectual capital. Despite the high R-squared value, the variables in the regression model attained an adequate level of significance, mitigating concerns about multicollinearity.

4.2. Effects of Intellectual Capital on ROE

The results of the F test presented in Table 7 show that the value of the F statistic is 668.7787, with a significance level of 0.000.

Table 7. Results of pooled model F test: Intellectual capital and ROE

Dependent Variable: ln_ROE				
Method: Panel Least Squares				
Periods included: 5				
Cross-sections included: 30				
Total panel (unbalanced) observations: 150				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-1.025997	0.332641	-4.545445	0.0000
ln_ICE	0.847985	0.154547	2.063257	0.0030
R-squared	0.787765	Mean dependent var		6.362554
Adjusted R-squared	0.832664	S.D. dependent var		1.636597
S.E. of regression	0.598747	Akaike info criterion		1.362547
Sum squared resid	35.23628	Schwarz criterion		1.532568
Log likelihood	-84.9570	Hannan-Quinn criter.		1.532250
F-statistic	**668.7787**	Durbin-Watson stat		0.332354
Prob(F-statistic)	**0.000000**			

Source: Own research

Based on the results in Table 7, an alternative hypothesis can be accepted, i.e. the hypothesis that the members of the analysis are not homogeneous and that the model with fixed effects can be adequate for this analysis.

Table 8. Results of Fixed effect model: Intellectual capital and ROE

Dependent Variable: ln_ROE				
Method: Fixed effect model				
Periods included: 5				
Cross-sections included: 30				
Total panel (unbalanced) observations: 150				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-1.069855	0.336258	-3.298479	0.0030
ln_ICE	**0.812365**	0.136257	3.368498	0.0010
R-squared	0.698748	Mean dependent var		7.165444
Adjusted R-squared	0.642584	S.D. dependent var		1.454121
S.E. of regression	0.562321	Akaike info criterion		1.326544
Sum squared resid	37.24469	Schwarz criterion		1.698650
Log likelihood	-99.9260	Hannan-Quinn criter.		1.324150
F-statistic	**665.1936**	Durbin-Watson stat		0.556235
Prob(F-statistic)	**0.000000**			

Source: Own research

Based on the presented results of the model with fixed effects, in Table 8, it can be concluded that with an increase in the value of intellectual capital by 1%, there is an increase in ROE by 0.81%. However, before accepting these results, the Breusch Pagan test was conducted with the aim of examining whether the model with stochastic effects is a good alternative.

Table 9. Results of Breusch Pagan test: Intellectual capital and ROE

Lagrange multiplier (LM) test for panel data			
Total panel observations: 150			
Probability in ()			
Null (no rand. effect)	Cross-section	Period	Both
Alternative	One-sided	One-sided	
Breusch-Pagan	**699.7790**	4.565255	708.1142
	(0.0594)	(0.0563)	(0.0512)

Source: Own research

Based on the results of this test, it is evident that there is no significant stochastic effect in the model, as the level of significance surpasses 5% (Table 9). This indicates that the model with stochastic effects is not a suitable alternative for examining the impact of intellectual capital on ROE, whereas the model with fixed effects proves to be a viable alternative. Consequently, it can be asserted that changes in the values of ROE in the observed hotels, amounting to 0.81%, can be elucidated by corresponding changes in the value of intellectual capital by 1% in those hotels. This underscores a robust and statistically significant relationship between these two variables, signifying that hotels willing to invest in the development of their intellectual capital concurrently ensure a positive impact on the growth of the ROE. Similarly, the R-squared remains notably high (0.81), and the significance levels of the model with fixed effects are below 5%, mitigating concerns about multicollinearity.

4.3. Effects of Intellectual Capital on ROA

The results of the previous analysis show that the value of intellectual capital in the hotel industry has a positive impact on the NPM and ROE of the hotels. In addition to these variables, for the purpose of a more detailed and complete analysis, research was also conducted regarding the relationship between the value of the hotel's intellectual capital and ROA.

Table 10. Results of pooled model F test: Intellectual capital and ROA

Dependent Variable: ln_ROA				
Method: Panel Least Squares				
Periods included: 5				
Cross-sections included: 30				
Total panel (unbalanced) observations: 150				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	1.25649	0.398745	3.562141	0.0000
ln_ICE	0.90511	0.252154	1.9365227	0.0000
R-squared	0.71521	Mean dependent var		6.124483
Adjusted R-squared	0.69412	S.D. dependent var		1.548741
S.E. of regression	0.32656	Akaike info criterion		1.489562
Sum squared resid	32.2358	Schwarz criterion		1.448758
Log likelihood	-83.8270	Hannan-Quinn criter.		1.498510
F-statistic	**642.2456**	Durbin-Watson stat		0.341244
Prob(F-statistic)	**0.000000**			

Source: Own research

The results of the F test, presented in Table 10, show that the value of the F statistic is 642.2456, with a significance level of 0.000. The results indicate a highly significant relationship between intellectual capital and ROA.

Table 11. Results of Fixed effect model: Intellectual capital and ROA

Dependent Variable: ln_ROA				
Method: Fixed effect model				
Periods included: 5				
Cross-sections included: 30				
Total panel (unbalanced) observations: 150				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	1.07849	0.436254	4.982471	0.0010
ln_ICE	0.85687	0.232651	1.895657	0.0020
R-squared	0.82142	Mean dependent var		5.269854
Adjusted R-squared	0.77852	S.D. dependent var		1.242566
S.E. of regression	0.44526	Akaike info criterion		1.636262
Sum squared resid	39.2331	Schwarz criterion		1.478528
Log likelihood	-81.9260	Hannan-Quinn criter.		1.542850
F-statistic	**621.1636**	Durbin-Watson stat		0.363254
Prob(F-statistic)	**0.001000**			

Source: Own research

The results presented in Table 11 suggest that the model with fixed effects is suitable for analysis and result derivation. Furthermore, the findings indicate a robust and positive relationship between the variables, which is statistically significant. Consequently, a 1% increase in the value of intellectual capital corresponds to a 0.86% increase in ROA. Nevertheless, these results warrant cautious interpretation and further testing is advisable before drawing conclusive inferences.

Table 12. Results of Breusch Pagan test: Intellectual capital and ROA

Lagrange multiplier (LM) test for panel data			
Total panel observations: 150			
Probability in ()			
Null (no rand. effect)	Cross-section	Period	Both
Alternative	One-sided	One-sided	
Breusch-Pagan	**726.6930**	5.75455	714.1397
	(0.0000)	(0.0010)	(0.0000)

Source: Own research

Based on the results of the conducted Breusch Pagan LM test and the significance level that is lower than 5%, it can be concluded that the model with stochastic effects can also be a good alternative for conducting the analysis. Accordingly, the final decision is made based on the Hausman test (Table 13).

Table 13. Results of Hausman test: Intellectual capital and ROA

Correlated Random Effects - Hausman Test			
Equation: Untitled			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	5.798539	1	**0.0641**

Source: Own research

The result in Table 13 shows that the model will consider the internal differences within the hotels from which the data were collected, as well as the differences between the hotels included in the analysis. Due to the above, it is necessary to conduct testing with the stochastic effects model.

Table 14. Results of random effect testing: Intellectual capital and ROA

Dependent Variable: ln_ROA				
Method: Panel EGLS (Cross-section random effects)				
Periods included: 5				
Cross-sections included: 30				
Total panel (unbalanced) observations: 150				
Swamy and Arora estimator of component variances				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	1.385555	0.474552	4.235659	0.0000
ln_ICE	**0.866235**	0.156239	2.754543	**0.0000**
Effects Specification				
			S.D.	Rho
Cross-section random			0.230000	0.7894
Idiosyncratic random			0.112456	0.0211
Weighted Statistics				
R-squared	**0.782065**	Mean dependent var		0.432655
Adjusted R-squared	0.763252	S.D. dependent var		0.272545
S.E. of regression	0.2412551	Sum squared resid		2.523659
F-statistic	192.5324	Durbin-Watson stat		0.763257
Prob(F-statistic)	0.000000			
Unweighted Statistics				
R-squared	0.752369	Mean dependent var		7.432551
Sum squared resid	44.03315	Durbin-Watson stat		0.232545

Source: Own research

As the Hausman test's Chi-Sq p-value exceeds 0.05, the preference leans towards choosing a model with stochastic effects. Consequently, the results of the model with stochastic effects are presented in Table 14, indicating a robust and statistically significant positive relationship between the variables, with a significance level below 0.05 (p=0.000). Specifically, a 1% increase in the value of intellectual capital corresponds to a subsequent 0.87% increase in ROA. Furthermore, the realized significance levels affirm the absence of multicollinearity in this particular case. Given that intellectual capital exhibits a positive impact on NPM, ROA, and ROE, it is reasonable to conclude that the *H1 hypothesis is accepted*. In other words, *intellectual capital has a statistically significant and positive impact on the financial performance of the brand*.

5. CONCLUSION, LIMITATIONS AND FUTURE RESEARCH

Recognizing the challenge in determining the value of a brand, certain approaches propose associating it with the attained financial outcome. The analysis results frequently indicate that a higher-quality and more valuable brand correlates with enhanced financial performance. Therefore, aligned with the objective of this research, a statistically significant and positive relationship between intellectual capital and the financial performance of the brand was established. Increased investment in intellectual capital was found to correspond with heightened net profit margin, return on assets, and return on capital. In essence, intellectual capital emerges as a contemporary strategy for constructing a hotel brand, ultimately leading to an improved market position.

While research on the impact of intellectual capital on financial performance is not uncommon, there exists a research gap concerning the relationship between intellectual capital and brand,

particularly intellectual capital and brand financial performance. The added value in this research lies in the application of panel regression, yielding a wealth of valuable information that substantiates the scientific findings and lays the groundwork for future research. Practically, the research results offer insights to hotel managers on effective strategies for building intellectual capital and brand.

However, the research results have limitations, serving as guideposts for future studies. One limitation pertains to the sample size, emphasizing the need to expand it in subsequent research, considering its structure. This research exclusively includes hotels of the highest category, warranting the inclusion of hotels from other categories to enhance representativeness. While panel regression contributed unique value, future studies should employ additional statistical techniques, such as hierarchical regression, to delve into the significance of each component of intellectual capital individually. Moreover, it is advisable in future research to explore the influence of intellectual capital on other financial aspects of the brand and discover alternative methods for determining brand value based on information gleaned from financial statements.

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