The impact of intellectual capital on performance in Brazilian companies

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Abstract: The objective of this article is to analyze comparatively the importance of intellectual capital and the impact of intellectual capital on the performance of Brazilian companies awarded the Rio Grande do Sul Quality Award in 2004 and 2017. A sample of 72% of the Brazilian companies that received this Quality Award of the Gaucho Quality and Productivity Program in 2004 and 70.5% in 2017 were investigated. It can be affirmed that intellectual capital continues to be an essential asset, but during this period there have been some changes concerning the level of presence and importance among the elements that compose it. Regarding the changes in the influence of intellectual capital on organizational performance between 2004 and 2017, the results showed that intellectual capital, through human, structural and client capital, practically still has the same level of influence on organizational performance.

Keywords: human capital; client capital; structural capital; quality; performance.

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1. Introduction

In the contemporary corporate world, sources the competitive edge have shifted from traditional assets to intellectual ones. This situation has arisen due to the globalization process as well as due to increasing breakthroughs in areas such as production technology, computing and telecommunications (Osinski et al., 2017). All these transformations suggest a new outlook and interpretation on society as a whole (Zerenler et al., 2008; Sharma & Dharni, 2017).

These constant and significant transformations have shifted the global economy from an industrial economy to a knowledge one, in which companies look to build up value and competitive edge, thus concentrating on developing their intangible knowledge assets as critical success factors (Dženopoljac et al., 2016). In the knowledge economy, Intellectual Capital (IC) has become the main mechanism in a company's capacity to stand out over competitors, due to its variable, widespread and dynamic nature (Andreeva & Garanina, 2016; Verbano & Crema, 2016; Mendoza, 2017; Villegas González et al, 2017) and the importance of intellectual as a unique and fundamental resource for the success of a business and as a source of competitiveness (Bontis et al., 2015; Secundo et al., 2017).

International literature has shown several studies about IC and its influence on organizational development (Fedoce et al., 2015; Mendoza, 2017; Villegas González et al., 2017) and the impact of resources based on knowledge in successful management change programs (Schiuma et al., 2008), among other contributing factors to organizational success (Temel et al., 2013; Díaz-Fernández et al., 2015; Zerenler et al., 2008; Greco et al, 2013). Moreover, recent studies show an increasing attention given to intellectual capital in literature, as the study by (Sardo & Serrasqueiro, 2017; Dzenopoljac et al., 2017; Nawaz & Haniffa, 2017; Amin & Aslam, 2017).

These studies make it clear the growing importance of IC over the last years, for both the academic and organizations. Hence, one may witness an explicit acknowledgment by a growing number of organizations that their IC plays an essential role in their competitive advantage and that it ought to be managed more systematically. Therefore, this study aims to analyze comparatively the impact of intellectual capital on the performance of Brazilian companies awarded with the Quality Award in 2004 and 2017. We intend to investigate whether there have been changes in how they value intellectual capital and whether the influence of IC on performance has changed over this time.

In order to achieve the goal of the study, we have compared the results found in applied research from 2004 and 2017 in companies awarded with the RS Quality Award. The results suggest that IC remains an important asset, despite changes over the time regarding presence level and importance between its constituting elements, the influence of intellectual capital, through human capital, structural and clients in organizational performance.

2. Intellectual capital and its importance in organizational performance

Organizational analyzes based solely in accounting systems have become insufficient to assets the intangible value of assets (Nawaz & Haniffa, 2017or any other Emerald publication, then please use our Emerald for Authors service information about how to choose which publication to write for and submission guidelines are available for all. Please visit www.emeraldinsight.com/authors for more information. About Emerald www.emeraldinsight.com Emerald is a global publisher linking research and practice to the benefit of society. The company manages a portfolio of more than 290 journals and over 2,350 books and book series volumes, as well as providing an extensive range of online products and additional customer resources and services. Abstract Purpose \u2013 The purpose of this paper is to empirically examine the effect of intangible resources, i.e. intellectual capital (IC; Sharma & Dharni, 2017). In this sense, IC has become an important tool for companies' economic value creation (Jordão & Almeida, 2017). IC is the additions of everyone's knowledge in the com-

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pany, which provides a competitive advantage and forms intellectual matter- knowledge, information, intellectual property, experience- which can be used to generate wealth and represents the company's knowledge whose potential can be made into tangible profit (Nawaz & Haniffa, 2017or any other Emerald publication, then please use our Emerald for Authors service information about how to choose which publication to write for and submission guidelines are available for all. Please visit www.emeraldinsight.com/authors for more information. About Emerald www.emeraldinsight.com Emerald is a global publisher linking research and practice to the benefit of society. The company manages a portfolio of more than 290 journals and over 2,350 books and book series volumes, as well as providing an extensive range of online products and additional customer resources and services. Abstract Purpose \u2013 The purpose of this paper is to empirically examine the effect of intangible resources, i.e. intellectual capital (IC). IC may be defined as the sum of all knowledge and knowledge skills that allow companies to obtain and/or keep a sustainable competitive advantage (the authors analyze the use of content analysis in disclosing voluntarily information on intangible assets, the intangible assets disclosures (IADJordão & Almeida, 2017).

IC is the intangible asset represented by knowledge, brands, patents and trademarks (Dženopoljac et al., 2016; Roos, 2017; Agostini *et al.*, 2017). IC may be considered as a value unseen in financial displays, whose value may be evaluated in the difference between steady Market value and accounting value (Clarke, Seng & Whiting, 2011). IC includes a set of hidden values of capital, assets, or resources that tends to add real value to an organization, thus allowing its continuity and better organizational performance.

Recurrent categorization in literature centers on three components: human capital, structural/organizational capital and client/social/relational. Capital Human capital is a combination of knowledge, skills, experience, and the individual inherent capabilities. It concerns knowledge, capabilities, educations, skills, and characteristics. Structural capital refers to what is owned by the company and client capital consists of relationships with partners such as clients and suppliers as well as any other relational resource, namely reputation, brand and loyalty (Agostini et al., 2017).

In the new economy, intellectual capital is a prominent resource in order to generate wealth and growth, it is also a strong company performance enhancer and a market value booster (Wang & Chang, 2005; Tseng et al., 2013). IC through knowledge management, experience, intellectual property, and information may be used to create wealth, thus becoming vital for organizational performance (Amin & Aslam, 2017).

We point out that IC management not only influences organizational performance but also may facilitate for companies to promote advantages and competitive value (Wang & Chang, 2005). According to a viewpoint based on company resources, intangible assets are the main propellers of organizational performance (Forte et al., 2017). However, one of the main challenges for contemporary management is organizational value measurement, that is why companies and the market look for techniques that allow them to recognize, measure and assess reliably the companies' intangible assets (Jordão & Almeida, 2017).

Nowadays knowledge can no longer be restricted to academic and cultural circles, instead, it must be present in business activities since intellectual capital management affects organizational performance and increases competitive advantages (Amin & Aslam, 2017). By managing IC organizations will design and execute their strategies (Clarke et al., 2011).

Highlighting the value of intellectual capital means, above all, to highlight people's importance, taking into account their characteristics, capabilities, and competencies in order to solve problems and make decisions. The value of structural capital is to emphasize the importance of company structure, which encloses processes and managerial and productive procedures, managerial instruments, information systems and the company's administrative philosophy in order to innovate, develop products and services aiming to better assist clients and gain market share. As for client capital for the competitive performance, one may highlight the importance of the company's quality relationships with clients and suppliers in order to assist them, guarantee and conquest new markets to trade its products (Jordão& Almeida, 2017).

Therefore, we may state that IC has become more and more important in companies' performance, thus creating in many companies the largest portion of their value of products and services (Agostini et al., 2017). Hence, it is not difficult to realize the value of intellectual capital as an important element for the organization's performance. Lastly, managers must pay the necessary attention to the company's intellectual capital management, mainly by focusing on identifying its most important elements for organizational performance. Nevertheless, for an efficient management, it is of the essence to measure it and not simply identifying it; looking to recognize objectively its relation with performance within organizations.

3. Methodology

3.1 *Hypotheses*

Empirical studies point out that IC influences organizational performance through the combinations and interactions of different dimensions. Regarding the relation between IC and a company's performance, most studies show a positive and significant impact (Tseng et al., 2013; Nimtrakoon, 2015; Dzenopoljac *et al.*, 2017). Concerning human capital, studies had shown a positive and significant impact of human capital on the company's performance, approached by the operational profit by employee. Studies found a positive and significant correlation between human capital and overall performance (Tseng et al.; 2013; Long Kweh, Lu, & Wang, 2014; Morris, 2015; Nimtrakoon, 2015).

In respect with structural capital, Tseng et al. (2013), split structural capital into process capital and innovation capital and the findings show a positive relation between innovation capital and company's

performance. Nimtrakoon (2015) discloses a positive and statistically significant relation between structural capital and company's performance.

Tseng et al. (2013) utilized a revenue growth rate as an indicator and found a positive relation between client capital and organizational performance and Nimtrakoon (2015) shows a positive and statistically significant correlation between client capital and companies' performance.

In short, a number of studies clarify the relationship between IC elements and performance and a growing importance of IC in companies. Therefore, we aim to analyze comparatively the impact of intellectual capital on the performance of Brazilian companies that received the RS quality award from the state's Program for Quality and Productivity in 2004 and 2017; we propose the following hypotheses:

Hypothesis 1: IC importance for the companies has changed between 2004 and 2017.

Hypothesis 2: IC influence on organizational has changed between 2004 and 2017.

The RS quality award recognizes companies' effort to continuously improve their management systems. A survey collected the data for this study, applied to the managers responsible for the quality management in the sampled companies. The survey happened between September and October 2004 and September and October 2017. The data collection occurred by e-mail, supported by the Qualtrics software. In the year 2004, out of 79 award-winning companies, 57 answered the survey, which corresponds to 72.1% response rate. In 2017, 31 out of 44-awarded companies answered the survey, which indicates a response rate of 70.5%. The companies and respondents remain not identified.

3.2 *Measurement*

The questionnaire consists of 54 questions divided in two parts. In part A, we evaluated organizational performance 3 closed-ended questions about investment return, sales growth and market share. Part B has 51 closed-ended questions that aimed to identify the presence levels of intellectual capital on the 5-point Likerts scale ranging from unimportant to extremely important.

In order to measure organizational performance, we used average investment return, sales growth, and market share, which were collected off a 5-point scale ranging from Increasing and Decreasing. The use of performance indicators is common because it allows comparing business unit from different markets.

Having the information on presence and importance, we calculated the value of pondered variables, which involve the multiplication of the value from the agreement scale by the value from importance scale for the company's competitive performance. IBM SPSS statistical software packaged helped analyzing the data. The software performed validity and reliability analysis of the constructs. All values of Cronbach´s Alfa overcome 0.8, which is a satisfactory. Kaiser-Meyer-Olkin measure of sampling adequacy and the Bartlett test of sphericity also presented good adjustment values. Table 1 shows the results.

Table 1: Validity and Reliability Results

	Items	KMO	Bartlett	Factors	% Explanation	Cronbach's Alpha
Structural	19	0.742	<0.001	6	68.4	0.870
Human	21	0.866	<0.001	5	68.0	0.905
Clients	11	0.785	<0.001	4	73.9	0.807

In order to analyze the importance of intellectual capital over this period we used the t-test for mean differences, considering a 0.05 significance. To compare IC influence on organizational performance in 2004 and 2017 we analyzed presence variables that compose regression models that best explain organizational performance. The variables that suport the dimensions of human, client and structural capital operated as explanatory variables, through the stepwise regression method for each year separately. The level of explanation of the models is presented by R^2 adjusted (coefficient of multiple determination).

4. Results

Considering the dimension of structural capital, in the 19-question group, there was not any significant change in the overall mean (p=0.235). However, when observing individual results, one can see that a small number of questions present a difference over the years. Table 2 shows mean values and standard deviation obtained for all pondered variables in structural capital from 2004 e 2017 and shows a significant difference in the mean of the pondered variables, presence, and importance for organizational performance.

Table 2: Mean and standard deviation obtained for all variables pondered from the structural capital

	2004	2017	Pond.	Pres.	Import.
Investment increase in new methods and systems	20.63 (4.48)	19.90 (5.28)	0.498	0.758	0.193
Growing investments in information technology	20.62 (4.60)	20.97 (4.98)	0.747	0.695	0.737
The company has been in the market a long time	19.51 (6.94)	20.83 (5.33)	0.366	0.020*	0.978
Employees' suggestions are implemented	18.82 (5.27)	17.07 (4.53)	0.125	0.512	0.073*
Increase of new products compared to planning	15.53 (6.66)	15.80 (4.87)	0.844	0.876	0.184
Improvement of technical capabilities in production processes	19.64 (4.71)	16.55 (5.26)	0.007*	0.015*	0.054*
Fast and efficient product delivery to customers	20.93 (4.25)	19.28 (5.26)	0.122	0.236	0.169
Loss and waste reduction	19.74 (5.00)	19.93 (5.08)	0.866	0.977	0.771
Decrease in customers' complaints	18.89 (5.38)	18.73 (4.53)	0.889	0.942	0.702
Decrease in defects rate	19.07 (5.38)	17.40 (4.42)	0.178	0.143	0.521
Increase in the number of R&D employees	15.18 (6.74)	11.83 (6.16)	0.028*	0.037*	0.391
Creative ideas are shared with everyone	18.00 (6.04)	17.66 (4.96)	0.792	0.934	0.784
Employees seek new knowledge	18.73 (5.50)	16.96 (4.53)	0.146	0.563	0.037*
Number of equipment against number of employees is adequate	18.07 (5.93)	19.43 (5.81)	0.308	0.496	0.308
Time spent on research and development has grown	16.95 (5.52)	16.17 (6.11)	0.556	0.382	0.880
Information systems share information	19.40 (4.54)	17.93 (4.86)	0.164	0.131	0.578
Company's philosophy is encouraging and participative	21.30 (4.97)	20.57 (5.04)	0.518	0.832	0.409
Administrative spendings have decreased	14.93 (6.62)	17.34 (6.01)	0.104	0.239	0.308
Information obtained from customers is shared with everyone	17.42 (6.2)	17.97 (6.15)	0.700	0.806	0.528
Mean (standard deviation)					

Concerning the pondered mean for structural capital variables, the following modifications stand out. There has been a reduction in the variable "Improvement of technical capabilities in production processes" (p=0.007) and for the variable "Increase in the number of employees R&D" (p=0.028). When observing presence evaluations of structural capital variables (Table 2) one can notice an increase in the value for the variable "Time the company participates in the market" (p=0.020). The variables "Improvement of technical capabilities in production processes" (p=0.015) and "Increase in the number of employees R&D" (p=0.037) show a decrease over the period. From importance standpoint, the following variables show a decrease: "Employees' suggestions are implemented" (p=0.073), "Improvement of technical capabilities in production processes" (p=0.054) and "Pursuit of knowledge by employees" (p=0.037).

Regarding human capital in the group of 21 questions, there has not been a significant difference in the overall mean between 2004 and 2017 (p=0.522). However, changes can be perceived (Table 3) in the pondered variables for the questions "Revenue per employee has increased significantly ", which has decreased (p=0.041) and "High employee turnover", which has increased (p=0.097). The analysis of the presence of human capital, the question "Are education/ higher education levels high?" shows a mean increase (p=0.081). Regarding importance, the means for the following questions have dropped "Employees are always creative and show initiative" (p=0.095), "Revenue per employee has increased significantly" (p=0.016) and "Employees have desired knowledge and experience" (p=0.006).

Table 3: Mean and standard deviation obtained for all pondered variables in human capital

	2004	2017	Pond.	Pres.	Import.
Leaders are always respected in their areas	21.35 (4.50)	19.56 (5.12)	0.106	0.158	0.315
Employees perform their tasks efficiently and effectively	18.44 (4.33)	17.89 (3.81)	0.574	0.921	0.202
Employees take part in company's decision making	16.88 (5.23)	16.48 (4.98)	0.743	0.774	0.428
Employees are Always creative and show initiative	20.63 (5.20)	18.67 (5.99)	0.127	0.334	0.095*
Employees' time in the company is long	14.26 (5.91)	14.74 (6.86)	0.744	0.560	0.351
Education/ higher education is high among employees	18.25 (5.50)	19.81 (4.81)	0.216	0.081*	0.756
Company invests in employees in the long-term	19.12 (5.16)	18.22 (6.27)	0.488	0.276	0.848
Revenue per employee has increased significantly	17.64 (5.82)	14.81 (5.78)	0.041*	0.118	0.016*
Employees work effectively in teams	18.39 (4.44)	18.04 (5.01)	0.744	0.575	0.121
Employees are engaged with the company	18.77 (5.41)	17.63 (5.64)	0.375	0.787	0.326
Employees are greatly qualified	19.73 (4.98)	18.81 (5.63)	0.454	0.857	0.133
High investment in trainings	17.32 (7.09)	15.63 (6.63)	0.302	0.366	0.512
There is trust between company and employees	21.74 (4.72)	20.74 (5.67)	0.400	0.499	0.438
Experimenting is encouraged	16.86 (7.07)	16.96 (5.52)	0.947	0.440	0.977
Employees' capacity allows task innovation	18.77 (5.13)	17.88 (5.29)	0.471	0.991	0.192
Employees have desired knowledge and experience	17.75 (4.70)	17.07 (5.36)	0.559	0.525	0.006*
Employees' skills are appreciated by clients	18.57 (5.44)	18.44 (5.69)	0.922	0.467	0.267
Pleasant atmosphere for task executions	21.39 (4.58)	20.78 (4.59)	0.568	0.823	0.661
Employees are creative and innovative	18.47 (5.12)	17.52 (5.44)	0.436	0.526	0.429
There is a loss should an important employee leave the company	13.3 (6.46)	15.26 (6.60)	0.201	0.476	0.100
High employee turnover	8.04 (5.04)	10.19 (6.34)	0.097*	0.253	0.358

As for client capital, no significant change has been observed in the general mean (p=0.676), yet, for individual questions (Table 4), there is reduction for the following pondered variables "Business proportion has increased" (p=0.024), which is explained by the decrease in the presence of this same variable (p=0.031). It has also been observed a reduction for the question "Sales have grown significantly" (p=0.055) and an increase for the variable "Is clients re-order rate high" (p=0.096). The results showed no difference in importance.

Table 4: Mean and standard deviation obtained for all variables in client capital

	2004	2017	Pond.	Pres.	Import.
Business proportion has increased	20.76 (5.08)	17.71 (6.13)	0.024*	0.031*	0.145
Number of clients and new businesses has grown	19.09 (6.07)	19.3 (5.40)	0.884	0.853	0.843
Clients are fully satisfied with the company	19.84 (4.11)	20.04 (3.32)	0.832	0.363	0.391
Sales have grown significantly	19.04 (5.80)	17.17 (4.77)	0.170	0.055*	0.693
Clients' satisfaction with price, quality and deadlines	20.07 (4.74)	19.67 (4.12)	0.717	0.938	0.648
Company's brand s well-known in the market	21.76 (4.57)	22.26 (5.16)	0.675	0.481	0.441
Company has a great reputation among clients and suppliers	22.16 (4.30)	22.75 (4.63)	0.585	0.469	0.948
Strong partnership with suppliers and clients	21.52 (4.46)	21.63 (5.17)	0.926	0.758	0.730
Company identifies clients' needs	22.07 (3.45)	20.92 (4.20)	0.203	0.329	0.291
High re-order rates	18.11 (6.84)	20.48 (5.52)	0.148	0.096*	0.120
Company recognizes and rewards employees' efforts	18.51 (5.49)	17.17 (7.18)	0.367	0.237	0.645

The correlation between capital values shows a change in structure between them. In 2004, there were positive correlations between structural capital and human capital (r=0.790. p<0.001), structural capital and client capital (r=0.628, p<0.001) and human capital and client capital (r=0.664, p<0.001). In 2017, some correlations have changed. The correlation between structural capital and human capital remained stable (r=0.692, p<0.001). However, the correlation between structural capital and client capital was low (r=0.394 and p=0.057) and the correlation between human capital and client capital was not significant (r=0.138, p<0.521).

In order to evaluate comparatively IC influence on organizational performance in the years 2004 and 2017, we used the variables that make up the dimensions of human capital, structural capital and client capital on presence level. We calculated the adjusted R^2 (coefficient of multiple determination) in order to form the regression models that best explain the organizational performance. The adjusted R^2 value of the model was 0.623 and Regression F Test significance ($F=10.682$, $p<0.001$) for 2004. In 2017 R^2 was 0.667 and Regression F Test significance ($F=12.994$, $p<0.001$), showing that models are statistically meaningful. Tables 5 and 6 show the coefficient values of the regression equation for 2004 and 2017 according to the stepwise method.

Table 5: Regression Model for 2004 data

Model	B	T	Significance
Constant	0.565	0.897	0.376
CH 8	0.418	3.254	0.003
CE 15	0.335	3.229	0.003
CC 4	0.460	4.264	0.000
CH 20	-0.204	-2.034	0.050
CE 12	-0.379	-3.267	0.002
CH 21	0.344	3.170	0.003
CH 7	0.338	2.637	0.013

In order to evaluate comparatively IC influence on organizational performance in the years 2004 and 2017, we used the variables that make up the dimensions of human capital, structural capital and client capital on presence level. We calculated the adjusted R^2 coefficient of multiple determination in order to form the regression models that best the organizational performance.

Table 6: Regression Model for 2017 data

Model	B	T	Significance
Constant	3.209	5.112	0.000
CE 15	0.139	1.918	0.070
CH 10	-0.246	-3.224	0.004
CC 2	0.439	4.896	0.000
CC 5	-0.296	-2.749	0.012

The model for the year 2004 presented in Table 5 shows as significant variables structural, human and client capital variables. Equation 1 represents the model.

MPERF = 0.565 + 0.418 **CH 8** + 0.335 **CE 15** + 0.460 **CC 4** – 0.204 **CH 20** – 0.379 **CE 12** + 0.344 **CH 21** +0.338 **CH 7**

Equation (1)

Therefore, according to the model, the explanatory variables in 2004 are CH 8 (Revenue per employee has increased significantly), CE 15 (Time spent on research and development has grown), CC 4 (Sales have increased significantly), CH 20 (There is a loss should an important employee leave the company), CE 12 (Creative ideas are shared with everyone), CH 21 (High employee turnover), and CH 7 (Company invests in employees in the long-term).

Regarding 2017, questions from three dimensions, yet, with another variable configuration, support the model, as noted from equation 2:

MPERF = 3.314 + 0.147 **CE 15** – 0.249 **CH 10** + 0.412 **CC 2** – 0.297 **CC 5**

Equation (2)

According to the model, the explanatory variables are CE15 (Time spent on research and development has increased over the last years), CH10 (Employees are engaged with the company, therefore they intend to remain in the company for long), CC2 (The company's intensity to draw new clients or business has grown significantly) and CC5 (Clients are satisfied with the company regarding its prices, quality, and delivery deadlines).

Discussion

Concerning the research hypothesis number 1, which attempted to test whether or not there were changes in IC importance in companies in 2004 and 2017, one can state the intellectual capital remains an active asset. Yet, along this period, a few modifications occurred regarding the level of presence and importance among its constituting elements. Hence, this study confirms hypothesis 1.

In respect with the variables pondered means of structural capital for the period, the study highlights some modifications. There were significant reductions in variables "Improvement in technical capabilities of production processes" and "Increase in a number of R&D employees". However, when analyzing the presence of structural capital separately, we can observe an increase in the variable "Time the company has been on the market".

The explanation of the modifications relies on the fact that the most companies in 2017 operate in the service sector, unlike the 2004's research when companies were predominantly industrial. These changes relate also to the variable "time the company has been in the market" which elicits that companies seek to invest in methodologies, processes, and technologies, thus allowing the organization's operation as well structures and systems that will affect growth, stability and competitiveness and better trust in the company.

From the standpoint of intellectual capital importance for organizational performance, it is crucial to analyze the variables that present reduction, such as "Employees' suggestions are implemented", "Improvement in technical capabilities of production processes and "Pursuit of knowledge by employees". Given that, we point out that companies are aware of the fact that the predominant business model in today's economy depends on intangible resources, which in many cases are much more valuable to the company than its tangible assets (Dzenopoljac et al., 2017). In 2004, companies already saw the importance of these variables for their performance, which in 2017 consider other variables more important. Therefore, they recognize that better

organizational performance may take place through a combination of human, organizational and relational resources and a company's activities; including knowledge, skills, experiences, employees' skills organizational routines, procedures, systems, company's database, and all resources connected to the company's external relationships with clients, suppliers and R&D partners (Agostini et al., 2017).

Regarding human capital, we have observed the following changes in the pondered variables "Revenue per employee has increased significantly", which has dropped and "High employee turnover", which has risen. Explanation of these modifications relies on the current level of human capital, assessed through the question "Education and higher education levels are high", whose average value has increased. Hence, we can see that companies understand human capital as a key factor for wealth whose main contribution lies on knowledge and skills that an employee brings to adding value (Bontis et al., 2015). Human capital increases as people build up information, skills, and specialized knowledge, which allow them to communicate efficiently and effectively, thus reducing decision-making errors and eventually improving performance.

Moreover, companies that invest in higher education or skills for their employees shall probably have a better entrepreneurial judgment. Therefore, they shall continue to develop their human capital and consequently shall improve their performance. In other words, human capital creates new ideas and techniques that may be incorporated into equipment and production method, delivery services, thus improving internal relationships as well external relationships which eventually will better performance (Nawaz & Haniffa, 2017) or any other Emerald publication, then please use our Emerald for Authors service information about how to choose which publication to write for and submission guidelines are available for all. Please visit www.emeraldinsight.com/authors for more information. About Emerald www.emeraldinsight.com Emerald is a global publisher linking research and practice to the benefit of society. The company manages a portfolio of more than 290 journals and over 2,350 books and book series volumes, as well as providing an extensive range of online products and additional customer resources and services. Abstract Purpose \u2013 The purpose of this paper is to empirically examine the effect of intangible resources, i.e. intellectual capital (IC.

As for the importance of human capital for performance, there was a decrease for the means for questions such as "Employees are always creative and show initiative", "Revenue per employee has increased significantly" and "Employees have the desired knowledge and experience".

Given this fact, one can see that this decrease probably occurred due to the predominant characteristics and objectives of the company studied in 2017, unlike the companies analyzed in 2004 because in 2004 the studied companies already saw the importance of these variables for performance. Nowadays they deem other variables of human capital to be important for performance.

Furthermore, this result may be associated with different relations between human capital components and performance. The contribution of human capital to performance may occur through resource strategic management and therefore their knowledge and skills. Yet, human capital plays a vital role in removing outdated knowledge, which is an inevitable result for the creation of new organizational knowledge. It may also offer new ideas and input for companies' work practices, which allows existing knowledge to be later processed and generate new knowledge (Benevene, Kong, Barbieri, Lucchesi, & Cortini, 2017) precisely about the human capital, relational capital and organizational capital. Design/methodology/approach This paper used a qualitative approach. A total of 81 senior managers were interviewed individually. Interview data were analyzed using different techniques of content analysis, particularly by using the T-Lab software (analysis of word occurrence and co-word mapping, analysis of Markovian sequences.

Regarding client capital, reductions happened in the variables "Business proportion has increased" and "Sales have increased significantly". These reductions may be connected to the fact that nowadays the companies, unlike 2004, wish to invest in a higher client capital or relational level in order to promote effective planning problem solving, which increases production and efficiency in delivery services. Client capital is a set of a company's relationships with the outside and includes relationships with the environment, specifically, with economic agents that play a part in different stages of a product value chain, such as suppliers, competitors, and clients (Roos, 2017). Therefore, according to the authors, in this study, the increase in the variable "High clients' re-order rates" may relate to the fact that companies seek to develop communication channels with clients, the use of social networks to improve relational capital, which consequently increases sales. Besides, it is important to report we have not verified differences in the importance of organizational performance in client capital variables, similarly to studies by Tseng et al. (2013), who point out that client capital is an active asset for organizational performance.

Regarding hypothesis number 2, which consisted of testing whether there were changes in the influence of IC on organizational performance between 2004 and 2017, the findings make it clear that intellectual capital, through human, structural and client capitals has virtually the same level of influence on organizational performance, which may be explained by the result of the Coefficient of Determination (R^2).

The results from Coefficient of Determination (R^2) from 2004 and 2017 models indicate that the models are statistically significant since the F tests significance levels are lower than 0.001 that is, the study refutes the null hypothesis that all angular coefficients of the models are equal to zero.

Analyzing R^2 values adjusted to the model, it stands out that 2004 was 0.623 and 2017 was 0.667, that is, the set of variables that constituted the intellectual capital in 2004 model explains 62.3% of the organizational performance while the set of variables for 2017 explains 62.6%. Given that, despite the R^2 adjusted values being near, when analyzed comparatively the explanatory variables of the model highlights that in 2004 the seven variables influenced the performance, two of which from the structural capital, four variables from human capital and one variable from client capital.

Analyzing equation 1 from 2004 model, in terms of variable signs of the relation between each independent and dependent variable of the model, we have verified that variables CH8 (revenue per employee has increased significantly), CE15 (time spent on research and development has increased), CC4 (sales have increased significantly), CH 21 (high employee turnover), and CH7 (the company invests in employees in the long term) present positive coefficient.

This result suggests that these seven variables directly influenced performance, that is to say, that an increase in these variables improved organizational performance. Hence, the variable coefficient CC4 (0.46) is higher than the coefficients for variables CH 8 (0.418), CH 21 (0.344), CH 7 (0.338) and CE 15 (0.335), which indicates that the first weighs more than the second and the second weighs more than the third and so on, on the overall performance influence.

On the other hand, variables CH 20 (revenue per employee has increased significantly) and CE 12 (everyone shares creative ideas) present negative coefficients. This suggests that these variables inversely influence organizational performance, which means that as the lower these variables are the better organizational performance, will be.

It is interesting to remark on the negative coefficient signal for variable CE 12, which in general, organizations encourage sharing and dissemination of information and ideas in order to achieve competitive advantage and better performance, unlike the result the result obtained in this company sample.

In 2017, the model explanatory variables suggest that four variables influence the performance, one from the structural capital, another one from human capital and two variables from client capital. Upon analyzing equation 2 of the model, in terms of variable signals of the relation between each independent variable and the dependent of the model, we have verified that variables CH 15 (time spent on research and development has increased over the last years), and CC2 (the intensity the company draws new clients and business has increased significantly) present positive coefficients.

As for variables CH 10 (employees are engaged with the company and intend to remain in the company for long) and CC 5 (clients are satisfied with the company's prices, quality, and delivery deadlines), they present negative coefficients. This suggests that these variables inversely influence organizational performance, which means that the lower one of these variables is the better organizational performance will be. According to (Mention & Bontis, 2013), knowledge and individual skills account for valuable resources and a source of sustainable competitive advantage, as long as companies are able to manage and explore knowledge and experience within individuals to achieve better results.

Client satisfaction derives from the perceived quality of products or services, which depends on process capital (Wang & Chang, 2005); besides, competition nowadays forces organizations to concentrate harder on client relationship, customer service as well as attracting new clients. Organizations are involved in joint ventures and collaboration in order to increase an organization's brand value (Sharma & Dharni, 2017).

Having said that, one can notice that, as time goes by, companies consider intellectual capital to influence performance. Yet, for each of the years in the study, the variables explaining performance are different. Therefore, we may say that based on the changes in the equations from the 2004 model to 2017 model in the variables explaining performance, hypothesis 2 of this study is confirmed.

6. Final considerations

This article aimed to analyze comparatively the impact of intellectual capital on the performance of companies that receive the RS quality award in 2004 and 2017. Specifically, the study investigated whether there were changes in the value of intellectual capital for companies and whether intellectual capita influenced has changed over this time. The study concluded that IC has remained practically as influential on companies' performance. However, the analyses pointed out that some changes have occurred with intellectual capital variables. Therefore, concerning the objective of this study, it has been perceived that the results obtained allow arguing that intellectual capital is important and believed to be a source of competitive advantage and important for organizational performance.

According to a comparative evaluation of the relationship between IC and organizational performance, it became clear that the intellectual capital influences performance as at least one of the variables from the elements of intellectual capital has a significant correlation with organizational performance.

Regarding the first and second hypothesis of this study that consisted of verifying, respectively, whether there were changes in the IC level of importance in companies between 2004 and 2017; and whether there were changes in IC influence on organizational performance between 2004 and 2017; the study confirmed both hypotheses. Therefore, overall, we may say that the regression model employed in this research is adequate since the results obtained are coherent with the premises of multiple regression analysis. It is possible to state that the several variables that make up IC influence the organizational performance. Thus, the results of this study contribute to research suggesting that IC is an important resource for companies' performance in the Brazilian context, specifically for companies participating in the Rio Grande do Sul's Program for Quality and Productivity.

The study offers several practical implications. The research findings have significant implications besides expanding the theoretical aspect of IC impact on organizational performance, mainly for these companies, but also to offer useful and specific guidelines for the intellectual capital management. With respect to theoretical implications, this study contributes to the debate on elements that constitute intellectual capital and their effects on performance, and mainly explicit changes occurring along the time through a comparative study.

Regarding practical implications, these findings may help company managers to understand better how to develop and improve IC and how to use its elements strategically in order to improve companies' capacity to achieve better performance. Therefore, should managers wish to effectively boost performance, they shall understand how intellectual capital may affect this process.

This study presents the following limitations to be explored in further research. As time passed, while assessment criteria for the Rio Grande do Sul Program for Quality and Productivity – PGQP remain the same, the companies' operation areas are quite different. In 2004, most of the companies in the research belonged to the industrial sector unlike 2017, the year in which most of the companies operates in the service sector, which limits the comparison to a certain extent. Another limitation is sample size, essential for statistical analysis. For future studies, we suggest widening the samples through longitudinal studies to carry out comparative studies. Lastly, we suggest broadening the analysis of the relationship between organizational performance and intellectual capital.

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References

Agostini, L., Nosella, A., & Filippini, R. (2017). Does intellectual capital allow improving innovation performance? A quantitative analysis in the SME context. *Journal of Intellectual Capital*, *18*(2), 400–418. https://doi.org/10.1108/JIC-05-2016-0056

Amin, S., & Aslam, S. (2017). Intellectual Capital, Innovation and Firm Performance of Pharmaceuticals: A Study of the London Stock Exchange. *Journal of Information & Knowledge Management*, *16*(2), 1750017. https://doi.org/10.1142/S0219649217500174

Andreeva, T., & Garanina, T. (2016). Do all elements of intellectual capital matter for organizational performance? Evidence from Russian context. *Journal of Intellectual Capital*, *17*(2), 397–412. https://doi.org/10.1108/JIC-07-2015-0062

Benevene, P., Kong, E., Barbieri, B., Lucchesi, M., & Cortini, M. (2017). Representation of intellectual capital's components amongst Italian social enterprises. *Journal of Intellectual Capital*, *18*(3), 564–587. https://doi.org/10.1108/JIC-12-2016-0127

Bontis, N., Janošević, S., & Dženopoljac, V. (2015). Intellectual capital in Serbia's hotel industry. *International Journal of Contemporary Hospitality Management*, *27*(6), 1365–1384. https://doi.org/10.1108/IJCHM-12-2013-0541

Clarke, M., Seng, D., & Whiting, R. H. (2011). Intellectual capital and firm performance in Australia. *Journal of Intellectual Capital*, *12*(4), 505–530. https://doi.org/10.1108/14691931111181706

Díaz-Fernández, M. C., González-Rodríguez, M. R., & Simonetti, B. (2015). Top management team ' s intellectual capital and fi rm performance, *33*, 322–331. https://doi.org/10.1016/j.emj.2015.03.004

Dženopoljac, V., Janoševic, S., & Bontis, N. (2016). Intellectual capital and financial performance in the Serbian ICT industry. *Journal of Intellectual Capital*, *17*(2), 373–396. https://doi.org/10.1108/JIC-07-2015-0068

Dzenopoljac, V., Yaacoub, C., Elkanj, N., & Bontis, N. (2017). Impact of intellectual capital on corporate performance : evidence from the Arab region. *Journal of Intellectual Capital*. https://doi.org/10.1108/JIC-01-2017-0014

Fedoce, R. S., Moraes, R. de O., & Piqueira, J. R. C. (2015). Knowledge management as a competitive advantage to the Brazilian MVAS ecosystem. *Journal of Technology Management and Innovation*, *10*(2), 1–8. https://doi.org/10.4067/S0718-27242015000200001

Forte, W., Tucker, J., Matonti, G., Nicolò, G., & Nicolò, G. (2017). Measuring the intellectual capital of Italian listed companies Measuring the intellectual capital of Italian listed companies. https://doi.org/10.1108/JIC-08-2016-0083

Greco, M., Grimaldi, M., Scarabotti, L., & Schiraldi, M. M. (2013). The Sources of Competitive Advantage in University Spin-Offs : a Case Study. *Journal of Technology Management and Innovation*, *8*(3), 139–152. https://doi.org/10.4067/S0718-27242013000400013

Jordão, R. V. D., & Almeida, V. R. de. (2017). Performance measurement, intellectual capital and financial sustainability. *Journal of Intellectual Capital*, *18*(3), 643–666. https://doi.org/10.1108/JIC-11-2016-0115

Mendoza, R. R. (2017). Relationship Between Intangible Assets and Cash Flows: An Empirical Analysis of Publicly Listed Corporations in the Philippines. *Review of Integrative Business and Economics Research*, *6*(1), 188–202. https://doi.org/10.5897/AJBM2017.8429

Mention, A. L., & Bontis, N. (2013). Intellectual capital and performance within the banking sector of Luxembourg and Belgium. https://doi.org/10.1108/14691931311323896

Mohammadi, A., & Taherkhani, P. (2017). Organizational capital, intellectual capital and cost stickiness (evidence from Iran). *Journal of Intellectual Capital*, *18*(3), 625–642. https://doi.org/10.1108/JIC-06-2016-0066

Nawaz, T., & Haniffa, R. (2017). Determinants of financial performance of Islamic banks: an intellectual capital perspective. *Journal of Islamic Accounting and Business Research Journal of Islamic Accounting and Business Research Iss*, *8*(1), 130–142. https://doi.org/10.1108/JIABR-06-2016-0071

Nimtrakoon, S. (2015). The relationship between intellectual capital, firms' market value and financial performance. *Journal of Intellectual Capital*, *16*(3), 587–618. https://doi.org/10.1108/JIC-09-2014-0104

Osinski, M., Selig, P. M., Matos, F., & Roman, D. J. (2017). Methods of evaluation of intangible assets and intellectual capital. *Journal of Intellectual Capital*, *18*(3), 470–485. https://doi.org/10.1108/JIC-12-2016-0138

Roos, G. (2017). Knowledge management , intellectual capital , structural holes , economic complexity and national prosperity. https://doi.org/10.1108/JIC-07-2016-0072

Sardo, F., & Serrasqueiro, Z. (2017). A European empirical study of the relationship between firms' intellectual capital, financial performance and market value. *Journal of Intellectual Capital*, 00–00. https://doi.org/10.1108/JIC-10-2016-0105

Schiuma, G., Lerro, A., Schiuma, G., & Lerro, A. (2008). Editorial Intellectual capital and company ' s performance improvement. https://doi.org/10.1108/13683040810881153

Secundo, G., De Beer, C., Schutte, C. S. L., & Passiante, G. (2017). Mobilising intellectual capital to improve European universities' competitiveness. *Journal of Intellectual Capital*, *18*(3), 607–624. https://doi.org/10.1108/JIC-12-2016-0139

Sharma, S., & Dharni, K. (2017). Intellectual capital disclosures in an emerging economy: status and trends. *Journal of Intellectual Capital*, *18*(4), 868–883. https://doi.org/10.1108/JIC-09-2016-0092

Temel, S., Mention, A. L., & Torkkeli, M. (2013). The impact of cooperation on firms' innovation propensity in emerging economies. *Journal of Technology Management and Innovation*, *8*(1), 54–64. https://doi.org/10.4067/S0718-27242013000100006

Tseng, K., Lan, Y., Lu, H., & Chen, P. (2013). Mediation of strategy on intellectual capital and performance. *Management Decision*. https://doi.org/10.1108/MD-03-2012-0143

Verbano, C., & Crema, M. (2016). Linking technology innovation strategy, intellectual capital and technology innovation performance in manufacturing SMEs. *Technology Analysis & Strategic Management*, *28*(5), 524–540. https://doi.org/10.1080/09537325.2015.1117066

Villegas González, E., Hernández Calzada, M. A., & Salazar Hernández, B. C. (2017). La medición del capital intelectual y su impacto en el rendimiento financiero en empresas del sector industrial en México. *Contaduria Y Administracion*, *62*(1), 184–206. https://doi.org/10.1016/j.cya.2016.10.002

Wang, W., & Chang, C. (2005). Intellectual capital and performance in causal models. *Journal of Intellectual Capital*, *6*(2), 222–236. https://doi.org/10.1108/14691930510592816

Zerenler, M., Hasiloglu, S. B., & Sezgin, M. (2008). Intellectual Capital and Innovation Performance: Empirical Evidence in the Turkish Automotive Supplier. *Journal of Technology Management & Innovation*, *3*(4), 31–40. https://doi.org/10.4067/S0718-27242008000200003