Intellectual Capital in Manufacturing and Service Firms of the Dominican Republic: An Exploratory Approach

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Abstract: This paper analyses 64 variables related to the intellectual capital of manufacturing and service firms in the Dominican Republic. In addition, the study included 10 control variables related to firms' characteristics, and 10 variables related to firms' performance, for a total of 84 variables. The main findings show that business performance in manufacturing firms relies mainly on relational capital and depends to a lesser extent on human capital, and that innovative performance depends on a closer relation between human and structural capital. In the case of service firms, both business and innovative performance rely on structural and relational capital, indicating the role of suppliers as a potential source of innovations.

Keywords: intellectual capital, Dominican Republic, manufacturing and service firms

1. Introduction

This paper provides the main results of the exploratory study on the intellectual capital (IC), of manufacturing and service firms in the Dominican Republic (DR). The research was carried out in the frame of the interagency partnership between the National Office of Intellectual Property and the National Competitiveness Council, and with the collaboration of the Atabey Innovation Centre and the Association of Industries of the Dominican Republic. Given the fact that this has been the first measurement of IC in the DR, a very basic exploratory and context-based approach was chosen, which had at least two implications from the point of view of the research design: 1) a participatory process to build and define every item of the IC scale used in the survey, in order to structure a scale that made sense to Dominican firms, and 2) a basic statistical analysis to identify research trends and support further analysis (Andriessen, 2004). This research aims to answer two research questions: 1) What specific factor of IC supports value creation in manufacturing and service firms in the Dominican Republic?, and 2) What is the dominant component in value creation in Dominican firms? From the perspective of this research, value creation refers to both business performance and innovative performance. Business performance refers to financial results and innovative performance to the ability of firms to introduce new products or services or improve existing ones (OECD, 2006). Consequently, from the scope of the exploratory approach selected, the objective is to understand the role of IC in the business and innovative performance of the surveyed Dominican firms.

1.1 Background

Although this research is the first measurement of IC in the Dominican Republic, an important precedent was the National Innovation Survey carried out in 2010, in which some typical elements of IC studies were considered, such as qualifications of human capital, insights into intellectual property, and relations with third parties, mainly universities and research centres (MESCYT, 2011). However, the innovation survey referred to lacks an approach on IC given its own objectives.

Some Latin American countries, such as Argentina (Jardón & Martos, 2008), Brazil (Joia, 2001, Pompa Antunes, 2006) and Mexico (Funes Castaño and Hernández Garnica, 2001, Hidalgo Gallardo and García Meca, 2009), have experience in measuring IC, focusing on sector-specific activities and relating their value chain to IC or its different components, and also pointing out the role of IC in business and the financial performance of firms.

1.2 The Dominican Republic

According to the World Bank, the Dominican Republic is the largest economy in Central America and the Caribbean, with a GDP of over US$ 60.6 billion and an annual growth rate of 4.1% in 2013 (World-Bank, 2014). According to the same source, the DR is an upper-middle-income country with a GDP per capita (measured in current US$ PPP) of over US$ 11,000 in 2013. Manufacturing and service firms together represented 73.7% of the total economic activity in 2013, of which 52.7% corresponds to service firms and 21% to manufacturing firms according to the country's Central Bank (Banco-Central, 2014). In terms of human development, according to the Human Development Report corresponding to 2014, the DR is considered a high human development country, in spite of being a country with significant social distortions in terms of poverty and income distribution (Attali, 2010). The DR occupies over two-

Reference this paper as: Gómez-Valenzuela V," Intellectual Capital in Manufacturing and Service Firms of the Dominican Republic: An Exploratory Approach" *The Electronic Journal of Knowledge Management Volume 13 Issue 3 (pp198-208)* available online at www.ejkm.com

thirds of the island of Hispaniola, which it shares with the Republic of Haiti. It has a surface area of 48,670 km^2 and a total population of 10.3 million inhabitants, of which 6% are urban residents (US-Census-Bureau, 2013). The Dominican Republic, together with Cuba and Puerto Rico (US territory), constitute the Spanish Caribbean islands.

2. Basic definition of intellectual capital

There is no standard definition of IC, but in practical terms some authors define it as the combination of three components: human capital, structural capital and relational capital (Bontis, 1998).

Human capital (HC) refers to the tacit knowledge, skills, training, education and experience of individual workers, and is considered to be the main component of IC because it can act as a driver of other IC components (Chen et al., 2004). In fact, the economic role of human talent is widely recognized, not only at the firm level but also at the country level (Nahapiet and Ghoshal, 1998). The tacit condition of HC implies that it resides in the individual, and therefore it cannot be easily transferred and/or codified (Bollen et al., 2005).

Structural capital (SC) refers to the stock of assets that support HC activities including routines, codified knowledge (handbooks, manuals, reference systems) and tools such as information technologies (IT) and other support resources (Chen et al., 2004). The SC belongs to the firm and its value can be measured as physical assets using conventional accounting procedures (Bontis, 1998). Structural capital could also be called "organizational capital" (Bontis, 1998:66; Subramaniam & Youndt, 2005: 451).

Relational capital (RC) refers to the range of external "relationships and networks" in which firms' activities lie (Subramaniam and Youndt, 2005). Some authors have pinpointed "marketing channels and customer relationship" as the key features of RC (Bontis, 1998). However, it is accepted that RC is more than customer relations, and includes government relations, social responsibility activities, branding and positioning, which are factors that can affect the market value of firms (Tan et al., 2007).

In regard to the relation between IC and firms' performance, evidence suggests a clear link not only in terms of firms' performance, but also their market value. Furthermore, some evidence clearly suggests different effects in specific dimensions of firms, such as innovation, business and market valuation (Chen et al., 2006).
The interplay between certain components of IC, for instance HC and SC, tends to be more related to innovative performance including R&D activities (Vergauwen et al., 2007), and RC seems to influence financial business performance depending on sectorial activities (Tan et al., 2007). IC studies highlight the fact that knowledge management, including intellectual property, is a key element of IC and can be traced throughout its different components and in the process of value creation (Bollen et al., 2005).

This implies that IC can ultimately be summarized as a diversified and hierarchical structure of knowledge for value creation in firms. Moreover, defining IC as a set of capabilities immediately refers to the concept of knowledge as an intellectual capability for "intellectual or physical action" (Foray, 2004). The idea of IC as a hierarchical structure of knowledge in firms' management provides the IC concept with a heuristic scope as a tool for analysis.

3. Methodology

3.1 Defining IC items

The first step (in this study) consisted in exploring literature on measuring IC, including variables and indicators used in the Meritum project (Cañibao Calvo et al., 2002), the Skandia Navigator (Roy, 1999) and the intellectual assets approach (OECD, 2006), among others (van den berg, 2007). As a result, a first set of IC items was discussed extensively in a workshop on June 20th 2012 at the headquarters of the AIRD. The discussion also included items on firms' performance and control variables. The result of the discussion was a draft set of IC items, which was sent via email to approximately 40 firms. The firms answered and recommended reducing the length of the proposed items and simplifying the questions. A second workshop was carried out on August 4th 2012, where a second draft was generated and sent again to firms, and as result, a third and final draft was approved. Table 1 shows the final items of the agreed scales of human, structural and relational capital, and also the agreed items of business and innovative performance. In regard to firm size, the Dominican Act 488-08 sets a regulatory framework based on labour force, in which micro firms are those with 1 to 15 workers, small firms are those with 16 to 60 workers, medium-size firms between 61 and 200 workers, and large firms 201 or more workers. The above definition based on labour force does

not match the international standards such as the OECD standards, in which micro firms are those composed of 1 to 19 workers, small firms 20 to 99, medium firms 100 to 499 workers, and large firms 500 or more workers (OECD, 2005).

Table 1: Items of the scale of intellectual capital and firms' performance

Human capital	Structural capital	Relational capital	Performance items
HC1901: Quality of the education	SC2301: Manual job description	RC2701: Firm's market share	PERFOM1701: In the last two years, the company has introduced at least one new product (good or service)
HC1902: Percentage of workers with college education	SC2302: Manuals of processes and procedures	RC2702: Existence of customer database	PERFORM1702: In the last two years, the company has improved at least one product (good or service)
HC1903: Proportion of workers with graduate education	SC2303: Standardized maintenance equipment and machinery	RC2703: Existence of a system for analysis and customer classification	PERFORM1703: In the last two years, the company has introduced at least one new production process or has improved an existing one
HC1904: Technical and administrative skills	SC2304: Process maps and critical points	RC2704: Ability to identify potential customers	PERFORM1704: In the last two years, the company has introduced at least one new marketing or distribution method
HC2001: Human resources policy (equal employer)	SC2305: Report generation based on indicators	RC2705: Capacity to measure customer satisfaction	PERFORM1705: In the last two years, the company has introduced at least one new management or organization method
HC2002: Gender policy	SC2306: Documentation of corrective actions	RC2705: Degree of customer satisfaction (previous year)	PERFORM1801: In the last two years, the company has launched more products (goods or services) than the competition
HC2003: Analytical and problem-solving capabilities	SC2307: SC2307: R&D expenditure	RC2707: Capacity to track and recover customers	PERFORM1802: In the last two years, the company has increased its market share
HC2004: Creativity and inventiveness	SC2308: SC2308: Time development and launch of product and services	RC2801: Degree of interest in strategic alliances (other firms and actors)	PERFORM1803: Nowadays, the company is in a stronger financial and economic position than the competition
HC2005: Employee turnover rate	SC2309: Firm's innovative profile of products and processes (high, medium, low)	RC2802: Capacity to identify competitors	PERFORM1804: Shareholders and partners are pleased with firm's performance
HC2006: Years of tenure of workers (experience)	SC2310: Degree of collaboration with universities and research centres	RC2803: Ongoing cooperative initiatives with other actors	PERFORM1805: In the last two years, the company has expanded to new regional and international markets
HC2007: Competitive salary level	SC2311: Flexibility and openness in the organization	RC2901: Legally established suppliers	

Human capital	**Structural capital**	**Relational capital**	**Performance items**
HC2101: Training and education programme	SC2401: Quality certification system implemented and verified (ISO-9000 series; ISO-1400 series)	RC2902: Preference for accredited and certified suppliers	
HC2102: Observable improvement of technical skills	SC2402: Accreditation of lab testing and equipment calibration (i.e. ISO/IEC-17025)	RC2903: Strong relationships with suppliers	
HC2103: Observable improvement of administrative skills	SC2501: Degree of knowledge of the national IP legal system	RC3001: Policy of corporate social responsibility	
HC2104: Percentage of staff in training activities (last year)	SC2502: Degree of use of ONAPI facilities	RC3002: Bargaining power of the brand	
HC2105: Average hours of training per employee	SC2503: Degree of use of IP legal procedures	RC3003: Firm's prestige	
HC2106: Average annual investment in training	SC2504: Degree of use of IP international procedures (PCT, USA, Japan, EU)		
HC2201: Supportive and stimulating environment for learning	SC2505: Degree of legal protection of developed innovations		
HC2202: Codification of informal knowledge (learning by-using-by-interacting)	SC2506: Degree of protection of trademarks		
HC2203: Stimulating environment for team working	SC2601: Quality of ICT infrastructure (hardware and software)		
HC2204: Degree of workers' commitment and engagement	SC2602: Percentage of workers with access to terminals		
HC2205: Good communication between management and staff	SC2603: Automation of production process of goods and services		
	SC2604: Automation of procurement process		
	SC2605: Automation of customer management process		
	SC2606: Automation of administrative processes		
	SC2607: Degree of automation of human resource management		

With the objective of illustrating the control variables chosen, Table 2 shows the frequency of the agreed control variables. Two of the control variables were taken from the literature and then agreed in the workshops; these were firm's age (Berger and Udell, 1998) and technological level of products or services (Hatzichronoglou, 1997).

Table 2: Simple frequency of control variables

Variables	Frequency	%	Variables	Frequency	%
1) Regions			2) Localization		
Metropolitan area of Santo Domingo	231	62.1	Urban zones	344	92.5
North Region	78	21.0	Rural zones	28	7.5
East Region	21	5.6	Total	372	100%
South Region	42	11.3			
Total	372	100%			
3) Tax regime			4) Firms' age		
Ordinary	333	89.5	Junior firms	22	5.9
Special (free zones)	39	10.5	Middle-age firms	236	63.5
Total	372	100%	Senior firms	114	30.6
			Total	372	100%
5) Shareholders			6) Firms' size		
100% Dominican	319	85.7	Small	305	82.0
Up to 50% Dominican	9	2.4	Medium	42	11.3
Up to 50% international	11	3.0	Large	25	6.7
Up to 75% international	7	1.9	Total	372	100%
100% international	26	7.0			
Total	372	100%			
7) Firms' activity			8) Market orientation		
Manufacturing	184	49.5	Local	151	40.6
Services	188	50.5	Regional	43	11.6
Total	372	100%	National	131	35.2
			International	47	12.6
			Total	372	100%

Variables	Frequency	%	Variables	Frequency	%
9) Technological level of products/services			10) Products/services life cycle		
High-tech level	57	15.3	Short	92	24.7
Medium-high tech level	125	33.6	Medium	78	21.0
Medium-low tech level	73	19.6	Long	146	39.2
			N/A	56	15.1
Low-tech level	117	31.5	Total	372	100%
Total	372	100%			

A Likert-type ranking scale from 1 to 7 was used to capture more variance and sensitivity (Tseng and James Goo, 2005b). In operational terms, 84 variables were used as part of this IC analysis: 10 dependent variables (performance), 22 variables or items of HC, 26 variables of SC, 16 variables of RC and 10 control variables.

3.2 Sample design

The AIRD allowed access to their firms' database, which after being filtered based on criteria such as size, tax regime, regions and activities, resulted in a sample frame of 6,877 firms. Following the criteria of the National Innovation Survey, firms with 10 workers or fewer were excluded from the study (MESCYT, 2011). A simple random design with proportional allocation by activities (manufacturing or services) was selected (Harrison and Brady, 2004). The final sample was of 372 firms, against the 800 originally planned. The distribution by regions was as follows: the metropolitan area of Santo Domingo (62.1%), the North region (21%), the South region (11.3%) and the East region (5.6%). The sample reached had a confidence level of 95% and a margin of error of 5% (Morales Vallejo, 2008). The number of respondent firms was similar to or higher than in other studies conducted in larger and more complex economies from Europe and Asia. Some similar studies to mention are the IC analysis of German pharmaceutical firms based on 41 responses (Bollen et al., 2005), the IC study of Taiwanese manufacturing firms based on the analysis of 81 firms (Tseng and James Goo, 2005b), and the case of IC analysis of service firms in Spain, based on answers of 120 firms from a planning sample of 700 (de Castro et al., 2009). The fieldwork corresponding to this study was carried out from October 2012 to May 2013 across the country.

3.3 Analytical approach

The analytical phase consisted of a two-step approach: 1) an exploratory factor analysis (Zambon et al., 2007), and 2) multiple regressions to estimate the influence of IC on Dominican firms' performance. The EFA was performed using the method of principal components with VARIMAX rotation, intended to reduce the number of variables and group them into components, which could explain the variability of each IC component (Bontis, 1998). The final factorial scores were standardized in order to perform the regression analysis. Two basic tests were carried out: Cronbach's alpha and the Kaiser-Meyer-Olkin (KMO). The first enables testing of the reliability of the scales used to measure the IC components through correlations between items and scales. It is recommended to keep in the analysis the items with values over 0.6 (Chen et al., 2004). The KMO test helps to identify the factor variances that could be analysed. Values below 0.7 rule out the EFA (de Castro et al., 2009). Multiple regression models were assumed on the basis of a linear relationship between components of the IC and firms' performance (Subramaniam and Youndt, 2005). The relationship between firm characteristics and IC components was tested by using a series of multivariate analyses of variance or MANOVA (Ferreira, 2010).

4. Results

4.1 Descriptive results

According to Table 2, the majority of firms are located in the metropolitan area of Santo Domingo and in the northern region of the country (83.1% combined). Firms are fundamentally urban (92.5%) and belong to the ordinary tax regime (89.5%). In general terms, the surveyed firms are predominantly small firms (82%) and mainly composed of Dominican

shareholders (85.8%). In terms of market focus, the main activity is in internal markets (87.4%), and only 12.6% of them have declared an orientation to international markets. In terms of the technological level of products/services, 51.1% of firms declared that they offered medium-low to low-tech-level products/services, and 48.9% declared that they offered medium-high to high-tech products/services. In regard to the life cycle of products and services, 60.2% of firms declared that their products/services have a medium to long life cycle. The proportion of manufacturing and service firms is quite balanced: 49.5% for the former and 50.5% for the latter. Table 3 shows the results related to the reliability tests of the agreed and used scales.

Table 3: Reliability tests of IC and performance scales

Scales	Number of items	Cronbach's Alpha	KMO	Bartlett's test of sphericity
Human capital	22	0.878	0.874	3338.444 (0.000)
Structural capital	26	0.927	0.877	4528.383 (0.000)
Relational capital	16	0.869	0.869	2204.079 (0.000)
Firms' performance	10	0.886	0.885	1599.442 (0.000)

Based on the scores of the Cronbach's alpha test (over 0.8), all the scales agreed and used were efficient (Bontis, 1998). Likewise, the reached scores of the KMO and Bartlett's sphericity test indicate that the factor analysis is appropriate for all the scales of the IC survey (Bollen et al., 2005).

4.2 Factor analysis

Although in the VARIMAX rotation items with scores over 0.6 could be considered worthy, for this study the IC items with scores below 0.7 were excluded from the saturation matrix, and only the stronger ones were kept (Stewart, 1981). The results of the factor analysis are shown in Table 4. The original 22 HC items were reduced to five factors: TRA, ENV, SPE, EXP and POL. The TRA factor refers to the HC items related to the existence of training programmes or at least training activities inside the firm. The ENV factor refers to the existence of an environment that supports and stimulates learning processes in the firm (learning-by-doing-by-using-by-interacting), which could be a relevant dimension of the innovation process especially in developing countries (Cohen and Levinthal, 1989). The SPE factor reflects the importance of college education for Dominican firms. The EXP factor makes reference to the experience of employees in terms of years of tenure in firms. The POL factor refers to the existence of a human resource policy in terms of equity practices. The 26 SC items were reduced to four practical factors: DOC, ICT, IPU and R&D. The DOC factor refers to the availability of written processes and procedures in the form of handbooks, manuals or instructions. The ICT factor also comprises information and communication technologies. The IPU factor addresses the utilization of intellectual property legislation by firms. The R&D factor highlights the effort of Dominican firms in developing and launching new products or services.

The 16 RC items were reduced to four factors: CLI, SUP, IMA and COP. The CLI factor emphasizes the client-customer orientation of firms. The SUP factor refers to the relation with suppliers. The IMA factor focuses on the external perception, image and prestige of a firm in relation to other firms, on the bargaining power and on social responsibility. Finally, the COP factor focuses on the firm's attitude to cooperating and developing projects with other firms, universities and research centres. In regard to firms' performance, the agreed 10 items of the scale were reduced to two factors: BUP and INP. The BUC factor embraces the elements strictly related to business performance: financial success, market share, expansion to new markets and growth. The INP factor covers the items directly related to innovation activities, such as the introduction of new products/services, improvement of existing products or services, process innovation and marketing activities.

4.3 Regression analysis

Given that the IC factors are standardized variables, the regressions were performed without the intercept (Jardón and Martos, 2008). Table 4 shows the results corresponding to four models: models 1A and 1B correspond to business and innovative performance of manufacturing firms and models 2A and 2B correspond to business and innovative performance of service firms. Standardized coefficients are presented, and those that are statistically significant at 1% and 5% have been highlighted in bold. On the panel of model specifications in Table 4, all models were correctly specified and values of the Durbin-Watson test between 1.6 and 2.1 indicate that the residuals meet the criteria of

independency. The capacity of the models to explain variance in the dependent variables (R, R^2 adjusted) is quite similar to that in other similar studies (Bollen et al., 2005).

Table 4: Regression analysis

IC factors	Manufacturing				Services			
	Model 1A. Business performance		Model 1B. Innovative performance		Model 2A. Business performance		Model 2B. Innovative performance	
Human capital	B	t	B	t	B	t	B	t
TRA	0.100	1.146	0.114	1.330	0.046	0.525	0.097	1.164
ENV	-0.010	-0.121	0.258*	3.264	0.050	0.590	0.031	0.383
SPE	0.148**	1.945	-0.141***	-1.880	0.074	0.990	0.053	0.737
EXP	0.049	0.736	0.032	0.484	0.001	0.021	-0.064	-0.982
POL	0.004	0.062	0.023	0.347	0.029	0.412	-0.187*	-2.788
Structural capital								
DOC	0.019	0.227	0.112	1.379	-0.107	-1.400	0.125***	1.718
ICT	0.085	0.961	0.268*	3.083	0.207*	2.675	0.109***	1.474
IPU	-0.017	-0.240	0.222*	3.187	0.032	0.451	0.243*	3.609
R&D	0.046	0.592	0.186*	2.440	0.182**	2.198	0.205**	2.581
Relational capital								
CLI	0.218*	2.648	-0.022	-0.273	0.213*	2.761	-0.003	-0.037
SUP	-0.087	-1.188	0.107	1.487	-0.020	0.266	0.169**	2.349
IMA	0.121	1.428	-0.006	-0.073	0.079	0.963	0.151***	1.931
COP	0.152**	2.104	-0.107	-1.512	0.115	1.537	-0.006	-0.078
Statistical significance	*p<0.01			**p<0.05			***p<0.1	
Model specifications								
Model summary	Manufacturing				Services			
	Model 1A		Model 1B		Model 2A		Model 2B	
R	0.511		0.538		0.489		0.551	
R2	0.261		0.289		0.239		0.304	
Adjusted R2	0.205		0.235		0.183		0.252	
Standard error	0.836		0.862		0.947		0.868	
Durbin-Watson	2.149		1.697		2.093		2.040	

For the case of manufacturing firms, model 1A (business performance) only explains 26% of the variance of the dependent variable (R^2=0.261%) with three IC factors statistically significant: SPE, CLI and COP. The SPE factor corresponds to human capital whilst the CLI and COP factors correspond to relational capital.

Model 1B (innovative performance) explains 29% of the total variance in the dependent variable (R^2=0.287) with five factors explaining the innovative performance: ENV, SPE, ICT, IPU and R&D. In this model, factors with a negative sign

such as SPE could be indicating a selective effect on the firm's preferences (Estrada and Dutrénit, 2007). The first two factors correspond to human capital and the other three to structural capital. Model 1B is quite interesting because, in general terms, it supports other authors' findings that relate intellectual property to business performance, although, instead of linking IP to IC and then to business performance, in this paper IP is treated as a factor of the SC. Similar results can be found in pharmaceutical companies (Bollen et al., 2005).

Model 2A (business performance) explains 24% of the total variance (R^2=0.239) with three IC factors: ICT, R&D and CLI. The ICT and R&D factors belong to SC and CLI to RC. Model 2B (innovative performance) explains little more than 30% of the total variance (R^2=0.304) with seven factors: POL, DOCS, ICT, IPU, R&D, SUP and IMA.

In model 2B, one factor corresponds to HC (POL), four factors correspond to SC (DOC, ICT, IPU and R&D) and two factors to RC (SUP and IMA). In the innovative performance of service firms the POL factor stands out, and aligns with other authors' findings that relate firm performance to cultural diversity and gender policy (Richard et al., 2004). As in the case of model 1B, the negative sign of the POL factor could be indicating a selective effect. Another interesting finding is the fact that all the SC factors are implied in the innovative performance of firms. The SUP factor point outs the role of suppliers as sources of innovation (Henke and Zhang, 2010), and the weight of the firm's prestige could indicate a relation between innovative performance and collaborative activities, which has been documented by other authors (Stuart, 2000).

In regard to the relation between IC factors and firms' characteristics, based on the MANOVA procedure, business performance in service firms was significantly affected by the variable "localization" (urban or rural) at 5% of confidence level. Service firms were also found to be affected by the variable market orientation, but at 10% of confidence level. In this analysis, the IC components of manufacturing firms weren't affected by firms' characteristics; however, this could be due to an effect of the research design and for this reason it may deserve further analysis. Taking into account firms' activity, no significant differences in IC components were found.

Finally, in manufacturing firms, RC factors prevail in business performance, but in innovative performance, although SC factors prevail, a relative balance between HC factors and SC factors was found. These findings are similar to those in which HC and SC factors are closely related to value creation in the manufacturing sector (Tseng and James Goo, 2005a). In the business performance of service firms, SC factors prevail, but the RC factor relative to client orientation plays a major role. These findings are quite similar to those related to service firms in Spain, which point out the relevance of SC factors such as ICT and RC factors such as customer orientation (de Castro et al., 2009).

The relevance of SC factors in both business and innovative performance in Dominican firms reflects the importance of capital endowment and intellectual property as sources of knowledge and innovation (Barney, 1991).

5. Concluding remarks

It is clear that IC, as a concept and as a methodological tool, makes a contribution to understanding the performance of Dominican firms in business and innovation performance. In regard to the first research question, the specific IC factors that support value creation in both manufacturing and service firms were identified. In manufacturing firms, seven IC factors were identified: ENV, SPE, ICT, IPU, R&D, CLI and COP. In service firms, eight factors were identified: POL, DOC, ICT, IPU, R&D, CLI, SUP and IMA. In manufacturing firms, HC and SC factors are relevant but SC factors prevail, while in service firms, SC and RC factors prevail. In regard to the second research question, SC is definitely the IC component that prevails in the Dominican context, which implies the importance of capital goods endowment.

The previous statement refers to the idea of firms' resources as competitive advantages in value creation (Barney, 1991). The relevance of SC clearly refers to the transversal role of HC as a driving force of the SC factors across the firm (Vergauwen et al., 2007), which is consistent with some findings of IC studies in the Latin American context (Jardón and Martos, 2008). The possible selective effect of some IC factors could highlight the relevance of the cultural context and values in regard to firms' management practices (Estrada & Dutrénit, 2007: 16). In terms of public policy implications and taking into account the Dominican institutional context, this research indicates a path in which R&D activities should be formalized in relation to intellectual property management, which means that potential R&D outputs could be treated as intellectual property items. In the current Dominican context, two policy tools try to address this challenge: 1) the National Plan of Science, Technology and Innovation (SEESCYT, 2008), which supports fundamental research, applied research and R&D through financial aid, and 2) the National Strategy on Intellectual Property (ONAPI, 2013), which emphasizes training activities focused on IP management. The key issue to

be evaluated in the short term is how these two policy tools could create the necessary synergy to get through this challenge, which is yet to be seen. Finally, further research and analysis are required in order to identify, in a more accurate way, the possible sectorial effects of IC in Dominican firms. Another interesting research implication could be understanding the structural relations of IC components, and the firms allocation of tangible and intangible resources.

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