Disclosure on Intellectual Capital in the Age of Industry 4.0: Evidence From Italian Capital Market

Maria Serena Angelini, Alessandro Gennaro, Simone Labella
Guglielmo Marconi University, Rome, Italy

Matter of interest is the disclosure on intellectual capital (IC) in the era of global “knowledge economy” or global “knowledge society”. The aim of the paper is to verify the level of disclosure that Italian companies have on the components and on the relevance of their IC. Using the “content analysis” and a specific method already tested in managerial literature, we propose a report that measures the intellectual capital with the adoption of 21 functional indicators, which consider specific aspects of intangible assets of a firm. Applying the content analysis to financial statements of 56 companies included in five super-sector stock indexes of Italian equity market, we find that the level of overall disclosure is, on average, moderate but increasing. Observing a disclosure index based on the specific components of intellectual capital considered in this research, all the aspects of IC have benefited, on average, of an improvement in the level of external communication. This paper represents an improvement of a paper presented at the Symorg Conference regarding the empirical analysis. At the same time, it is just the first step of a wider research that aims to verify the relationships existing between IC, firm performances, and market capitalization.

Keywords: intellectual capital, corporate disclosure, knowledge resources, financial statement

Introduction

This paper focuses on the relevance of intellectual capital (IC) in the era of global “knowledge economy” or global “knowledge society”. In the last few years, an increasing number of companies have realized that the conditions for running a competitive business in turbulent markets are innovation and flexibility. Indeed, the knowledge resources of a firm represent an increasing part not only of its products, but also of its value because they are allowed to innovate, compete, and grow. Therefore, a company’s strategic development may depend on the whole organization being ready to make use of distinctive knowledge resources. The main developed economies around the world have been characterized by an increasing exploitation of knowledge resources (i.e., employees, customers, processes, and technologies) by small medium and large enterprises. Being able to take advantage from that kind of resources will be a decisive condition for the firms, at the present and in the future, to have success and growth.

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Maria Serena Angelini, Ph.D., professor, Guglielmo Marconi University, Rome, Italy.
Alessandro Gennaro, Ph.D., professor, Guglielmo Marconi University, Rome, Italy.
Simone Labella, Ph.D., professor, Guglielmo Marconi University, Rome, Italy.

Correspondence concerning this article should be addressed to Maria Serena Angelini, Guglielmo Marconi University, Rome, Italy.
In this context, it raises a need to employ the best tools and methods to support and measure the knowledge creation and application, and to structure an effective knowledge management system. All of the components of IC should be considered and improved to obtain a strong competitive advantage. The intellectual capital statements represented a way for managing and bringing focus to the development of the company’s knowledge resources. Providing a status of the company’s knowledge through text, figures, and illustrations, the intellectual capital statement is a useful tool for companies wishing to improve and apply systematically its intangible assets, human expertise, and relationship power. The intellectual capital statement is one of the tools of voluntary disclosure that a company could use; it may integrate the set of information already given by the financial statement, which is the main tool of mandatory disclosure. However, a relevant part of Italian companies, including those listed in capital markets, do not use the intellectual capital statement to communicate outside their effort to develop knowledge resources. Therefore, it is the duty of the mandatory communication, i.e., of the financial statements, to provide that kind of information. This is the reason why, given the relevance of knowledge resources, we consider interesting to check quality and quantity of information about the intellectual capital reported in the financial statements.

Literature Review

Over the past 30 years, there has been a remarkable increase in articles, books, conferences, and job titles all related to the primary issue of harvesting intellectual capital through knowledge management.

Although we study the disclosure of Italian companies on the components and on the relevance of their intellectual capital, the analysis of measurement models of intellectual capital was necessary to understand the drivers that compose the IC, in order to orient the choices of items considered in our model of analysis.

The strategic rule of the intangible assets, which have evolved from “needed to win” resources to “needed to play” resources, has been confirmed from the 90s. In 2001, Thomas Stewart, former editor at *Fortune Magazine*, proposed a cover story by exclaiming that brainpower and intellectual capital were becoming America’s most valuable assets. Intellectual capital quickly became part of a new lexicon describing novel forms of economic value. It belonged to a paradigm where sustainable competitive advantage was tied to individual and organizational knowledge. Reliance on traditional productive tangible assets, such as raw materials, fixed capital, and land no longer accounted for investments made and wealth created by new and prospering companies. Instead, leveraging knowledge assets became the key reason attributed to corporate success stories during the dawn of the internet age (Bontis, Booker, Hardie, & Serenko, 2010).

The reasons for this evolution can be brought back to the real market and to the financial market changes. The first one is characterized by a demand which has moved to more sophisticated goods and services, which have a strong technology connotation or a distinctive character; secondly, there is a widening gap from the market value to the book equity with all the connected consequences (even negative fraud).

The evolution of the rule of the intangible resources in business management has led to an evolution of the accounting studies, developing pricing models that can be distinguished between pure currency paradigms and integrated currency paradigms. Simultaneously, there was the affirmation of the intangible assets strategic rule and the necessity of their measurement. The pure currently paradigms try to estimate the intangible constituents using only monetary values, for example, to unite the immaterial resource value with the difference between the market value and balance sheet value. The integrated models create new approach and estimation
methodologies, based on the joint use of monetary measures and physical-technical measures that are able to take particular innovative features of the immaterial resources.

While the accounting researchers were focused on the concept of value and the cost, and the initial expense of the immaterial resources, in the other discipline, the attention of professors and academics was dedicated to knowledge, information, brand, reputation, and human resources management process; a wider item list was difficult to manage for them because there was not enough information (Johanson & Henningsson, 2007). The common ground between the ideas of the academics is represented by the concept of IC, which is a still widely debated notion because the doctrine and the procedure have proposed a whole host of definitions, which sometimes are similar but not exactly the same and no one has been generally accepted, but the components can all be lead back to human capital, structural capital, and relational equity. Nowadays, there are many methods for measuring the intellectual capital; the doctrinal approach affirms that a model can be considered scientifically valid if underlying model can be frame in the “weakly defined” model category—that overtakes the four conditions of clarity, objectivity, robustness theoretical, and generality. Then, in this work, we try to overcome the current model limits by identifying a method which can become a common practice. The different approaches to measure IC can be divided in the following four principal categories.

(1) Direct intellectual capital (DIC) methods. This kind of methods estimates the monetary value of the intellectual capital (knowledge) by the identification of the components that make up the knowledge. Once the components have been defined, they are commended individually and also using an aggregated ratio. For example, this category include: EVVICA (estimated value via intellectual capital analysis) (McCutcheon, 2008), FiMIAM (Rodov & Leiaert, 2002), intellectual asset (Sullivan, 2000), total value creation (Anderson & McLean, 2000), value explorer (Andriessen & Tiessen, 2000), inclusive valuation methodology (McPherson, 1998), accounting for the future (Nash, 1998), technology broker—intellectual capital audit (Brooking, 1996), citation-weighted patents (Dow Chemical, 1996), and HR costing/accounting (Johansson, 1996).

(2) Market capitalization methods (MCM). These methods calculate the difference between the market capitalization of the organization and its net asset. This value is the knowledge value in the organization ownership. For example, the “Tobin’s Q” (Villalonga, 2004), the “invisible balance sheet” (Sveiby, 1989), the “calculated intangible value” (Stewart, 1997), and the “stock and flow” (Bolisani & Oltramari, 2012), are parts of this category.

(3) Return on assets (ROA) methods. The ROA and index are calculated by dividing the average pre-tax income of the company, related to a certain time period, for the company’s average assets (related to physical assets). In this case, the same concept is applied to the business knowledge which the methods of this category calculate the economics return. The ROA calculated in this way can also be useful when is related to the ROA of different years or is related to the ROA of different companies of the same sector. For example, knowledge capital earnings by Lev (1999), economic value added by Stern and Stewart (1997), and value added intellectual coefficient by Pulic (1997), are parts of this category.

(4) Scorecard (SC) methods. These methods identify the different components of the intellectual capital (and of the business knowledge) and on these are calculated the appropriated indicators and indexes which are introduced in a schedule or in a graphic, according to the classical approach of the balanced scorecard (Kaplan & Norton, 1996). For example, ICU report by Sanchez (2009), InCas by EU (2008), RICI (Rogers International Commodity Index) by Schiuma, Lerro, and Carlucci (2008), knowledge asset value creation map by Schiuma
and Carlucci (2006), IabM by the Japanese Ministry of Economy and Industry (2004), SICAP (Social Inclusion and Community Activation Programme) by many authors (2004), national intellectual capital by Bontis (2004), index by Topplinjen/Business IQ (Sandvik, 2004), public sector IC by Bossi (2003), Danish guidelines by Mouritsen, Bukh, and others (2003), IC-dV AL (intellectual capital dynamic valuation) (Bonfour, 2003), intellectus model (Sanchez-Camizares, 2007), knowledge asset methodology by the Global Bank (2002), IC rating by Edvisson (2002), value chain scoreboard by Lev (2002), MERITUM T by Meritum Guidelines (2002), intangible asset statement by Garcia (2001), value creation index by Baum et al. (2000), IC-index T by Roos et al. (1997), balanced scorecard by Kaplan and Norton (2006), holistic accounts by Ramball Group (1995), Skandia Navigator T by Edvisson and Malone (1997), and intangible asset monitor by Sveiby (1997), are parts of this category.

Some methods constitute widespread practise, even in a limited context; such as: the Danish guidelines, the IABM method, remarkably diffused in Japan (support by the Japanese government), and the citation weighted patents method promoted and implemented by Dow Chemicals and the Business IQ method. Nevertheless, the usage of these methods is cordoned off a specific company, a sector, and a geographic area and no one of these have achieved a state of global acceptance and may not succeed in the future. The methods that belong to the “ROA category” can be considered more general and objective, sometimes “adjusted” to the knowledge measurement, such as the accounting for the future or the Tobin’s Q (for these methods there is not clear definition of concepts and proprieties).

Methodology

Method and Dataset

Our research aims to verify the level of disclosure that Italian companies make on the components and on the relevance of their intellectual capital. The methodology applied in our research job is based on the “content analysis” (Krippendorff, 1980; Yi & Davey, 2010), which requires a survey and consequent analysis of data and information in financial statements about knowledge resources. As a methodological approach frequently used in social communication and in environmental communication (Hackston & Milne, 1996), the application of this method is based on five stages:

- The choice of report to classify the information;
- The choice of analysis unit to assess the presence or absence of the research information (the sentences, the paragraph, the page, and the entire document);
- The coding procedure and the evaluation of its robustness;
- The codification;
- The ex-post verification of the reliability of the reach data.

Effectively, the choice of the report, for the information classification about the intangible assets of the company, has been placed on the methodological scheme formalized by OECD (Guthrie, Petty, Ferrier, & Wells, 1999). The measurement report of the intellectual capital of the companies is divided in two sections and three components:

- The internal section is referred to:
  (1) The structural capital, which is represented by the set of codified know-how within the company, the ability for innovation and research, the efficiency of internal processes, the corporate culture, the degree of cohesion of the management, and the ability to attract new skills; it is divided in:
• intellectual proprieties;
• infrastructure assets.

(2) The human capital, that is expression of the set of knowledge, skills, and abilities of the people who work in the company;
• The external section is referred to:

(3) The relationship capital that is based on the wealth of relationships established with the market, with stakeholders, and with current and potential customers.

Every section/component is measured with the adoption of functional indicators—at all 21 items—which measure specific intangibles (culture, know-how, process, rights, etc.). Following the common approach in literature, we have included in the external section, the franchising agreements index, and the ethical and environment index. As analysis’ unit to assess the presence or absence of an information search, we decided to use “the sentences” because it is considered more reliable than a print page or than an entire paragraph (Hackston & Milne, 1996). More specifically, each sentence is associated at a score that could represent one of the different intangible asset indicators, measured with the semantic differential with a coefficient between 0 and 3. Indeed:
• Score 0 is assigned when the information is not qualified (not quantitatively reported with reference to the traditional accounting documents—balance sheet and income statement not described qualitatively in other documents—the management report, the code of ethics, etc.
• Score 1 is assigned when the information is qualified only qualitatively or only quantitatively (with reference only to the traditional accounting documents—balance sheet and income statement for the quantitative aspect or only to the management report, the code of ethics or other corporate documents for the qualitative aspects).
• Score 2 is assigned when the information is qualified both quantitatively and qualitatively.
• Score 3 is assigned when the information is quantitative qualified, and specifically, it is qualitative indepth (the strategic and competitive nature of the agreement is specified).

With regards to the implementing rules of the “content analysis”, one of the critical elements for its operation and adjustment is about the “strength” (Krippendorff, 1980) of the codifying procedure because the classification scheme could suffer from the subjective assessment of the researchers (Guthrie, Petty, Yongvanich, & Ricceri, 2004). Following that literature, it is possible to identify different kinds of “strength”:

(1) The reproducibility: referred to the risk of making codify systematic errors when more than one researcher is involved in the activity;
(2) The care: referred to the researcher’s ability to apply the codify procedure uniformly in different periods;
(3) The stability: referred to the possibility to link the reproducibility of the results with a determinate standard laid down in advance.

The empirical research concerns the analysis and the quali-quantitative study of the financial statements that refer to the fiscal years 2010 and 2016, of a sample of companies listed on the Italian stock market. In particular, the sample comprises the listed companies included in the following “super-sector” indexes of the “Borsa di Milano”: FTSE Italy Technology, FTSE Italy Financial Services, FTSE Italy Automobiles & Parts, FTSE Italy Chemicals, FTSE Italy Oil & Gas, and FTSE Italy Retail.
Table 1

**Intellectual Capital Components, Score, Disclosure Index**

| Intellectual capital components | Score | Disclosure index |
|---------------------------------|-------|------------------|
| Structural capital              |       |                  |
| Patent                          | $p_1 \in (0, 3)$ |                  |
| Copyright                       | $p_2 \in (0, 3)$ |                  |
| Brand/trademark                 | $p_3 \in (0, 3)$ |                  |
| Intellectual property disclosure index $OCDI = \frac{(p_1 + p_2 + p_3)}{3} \in (0, 3)$ |
| Corporate culture               | $p_4 \in (0, 3)$ |                  |
| Management processes            | $p_5 \in (0, 3)$ |                  |
| Information systems             | $p_6 \in (0, 3)$ |                  |
| Networking systems              | $p_7 \in (0, 3)$ |                  |
| Research projects               | $p_8 \in (0, 3)$ |                  |
| Operational capital disclosure index $OCDI = \frac{(p_4 + p_5 + p_6 + p_7 + p_8)}{5} \in (0, 3)$ |
| External relation capital       |       |                  |
| Clients                         | $p_9 \in (0, 3)$ |                  |
| Loyalty                         | $p_{10} \in (0, 3)$ |                  |
| Distribution channels           | $p_{11} \in (0, 3)$ |                  |
| Partnership                     | $p_{12} \in (0, 3)$ |                  |
| Research agreements             | $p_{13} \in (0, 3)$ |                  |
| Financial partnership           | $p_{14} \in (0, 3)$ |                  |
| Licensing agreements            | $p_{15} \in (0, 3)$ |                  |
| Franchising agreements          | $p_{16} \in (0, 3)$ |                  |
| Ethics & environment            | $p_{17} \in (0, 3)$ |                  |
| Relationship capital disclosure index $RCDI = \frac{(p_9 + p_{10} + p_{11} + p_{12} + p_{13} + p_{14} + p_{15} + p_{16} + p_{17})}{9} \in (0, 3)$ |
| Human capital                   |       |                  |
| Training programs               | $p_{18} \in (0, 3)$ |                  |
| Employees                       | $p_{19} \in (0, 3)$ |                  |
| Business process knowledge      | $p_{20} \in (0, 3)$ |                  |
| Business process                | $p_{21} \in (0, 3)$ |                  |
| Human capital disclosure index  |       |                  |
| $HCDI = \frac{(p_{18} + p_{19} + p_{20} + p_{21})}{4} \in (0, 3)$ |
| Intellectual capital disclosure index |
| $ICDI = \frac{IPDI \times 3 + OCDI \times 4 + RCDI \times 9 + HCDI \times 4}{4} \in (0, 3)$ |

Table 2

**Listed Companies Included in the Following “Super-Sector” Indexes of the “Borsa di Milano”**

| FTSE Italy Technology | FTSE Italy Financial Services | FTSE Italy Automobiles & Parts | FTSE Italy Chemicals, Oil & Gas | FTSE Italy Retail |
|-----------------------|-------------------------------|--------------------------------|---------------------------------|-------------------|
| 1. Be                 | 1. Anima Holding Spa          | 1. Brembo                      | 1. Eni                          | 1. Basicnet       |
| 2. Cad it             | 2. Azimut Holding             | 2. Ferrari                     | 2. Gas Plus                     | 2. Chl            |
| 3. Dada               | 3. Banca Generali             | 3. Fiat                        | 3. Maire Tecnimont              | 3. Damiani        |
Therefore, to apply the content analysis, 112 financial statements relating to 56 listed companies were examined.

Evidences

Applying the content analysis to financial statement of companies included in FTSE Italy Technology, it results that the level of overall disclosure is moderate but increasing. Indeed, the Intellectual Capital Disclosure Index of the examining sector moves from a level of 1.54 in 2010 to a level of 1.77 in 2016 (+15.1%). Just three companies of the sector have worsened their overall level of disclosure, having the other 13 bettered their one.

![Figure 1. Intellectual capital disclosure index 2016 vs 2010.](image)

Observing the disclosure index related to the specific component of intellectual capital considered in this research, all the aspects of IC have benefitted, on average, of an improvement in the level of external communication. The highest level of disclosure is concerning the communication of intellectual property and operational capital; the worst is inherent to the human capital. In terms of improvement between 2010 and 2016, the largest increase in the disclosure index is recorded for operational capital.
Applying the content analysis to the financial statement of companies included in FTSE Italy Financial Services, it results that the level of overall disclosure is not sufficient and lower than the other sector considered in our research. However, the Intellectual Capital Disclosure Index of the examining sector moves from a level of 1.00 in 2010 to a level of 1.11 in 2016 (+ 10.7%). All the companies of the sector have bettered their overall level of disclosure.

Observing the disclosure index related to the specific components of intellectual capital considered in this research, all the aspects of IC have benefited, on average, of an improvement in the level of external communication. The highest level of disclosure is concerning the communication of operational and human capital; the worst is inherent to the relational capital. In terms of improvement between 2010 and 2016, the largest increase in the disclosure index is recorded for operational capital.

![Figure 2](image1.png)
*Figure 2. Disclosure index related to the specific components of intellectual capital considered.*

![Figure 3](image2.png)
*Figure 3. Disclosure index related to the specific components of intellectual capital considered 2016 vs 2010.*
Figure 4. Disclosure index: Financial.

Considering the “Automobile & Parts” Super-sector, the content analysis applied to financial statement of companies included, conducts to a good and increasing level of overall disclosure. Indeed, the Intellectual Capital Disclosure Index of the examining sector moves from a level of 1.92 in 2010 to a level of 2.07 in 2016 (+ 7.8%). Just one company of this sector has worsened its overall level of disclosure, having the other eight bettered their one.

Figure 5. Disclosure index: Automobile & Parts 2016 vs 2010.

The disclosure indexes of the specific components of IC say that all the aspects of IC, except the intellectual property, have benefited on average of an improvement in the level of external communication. Despite being worsening, the highest level of disclosure is concerning actually the communication of intellectual property; the worst level is inherent to the human capital. In terms of improvement between 2010 and 2016, the operational capital gets the largest increase in the disclosure index.
About the “Chemicals, Oil & Gas” Super-sector, we find that the content analysis gives a low but increasing level of overall disclosure. The Intellectual Capital Disclosure Index of this super-sector moves from a level of 1.67 in 2010 to a level of 1.87 in 2016 (+ 11.7%). All the companies of this sector have bettered their overall level of disclosure.

The disclosure indexes of the specific components of IC say that all the aspects of knowledge have had on average an improvement in the level of external communication. The highest level of disclosure is concerning the communication of operational capital; the worst level is inherent to the human capital. In terms of relative increase, between 2010 and 2016 the human capital gets the largest increase in the related disclosure index.

About the “Retail” Super-sector, we find that the content analysis gives a moderate but increasing level of overall disclosure. The Intellectual Capital Disclosure Index of this super-sector moves from a level of 1.69 in 2010 to a level of 1.95 in 2016 (+ 15.3%). All the companies of this sector have bettered their overall level of disclosure.
The disclosure indexes of the specific components of IC say that all the aspects have had on average an improvement in the level of external communication. The highest level of disclosure is concerning the communication of intellectual property; the worst level is inherent to the human capital. In terms of relative increase, between 2010 and 2016, the operational capital gets the largest increase in the related disclosure index.

By comparing the five considered super-sectors, we observe that the companies of FTSE Italy Automobiles & Parts present, on average, a level of disclosure significantly higher than the other sectors, both in 2010 and 2016; the worst performance of index is that of the companies included in the FTSE Italy Financial Services. Different results emerge considering the increase in the level of index: “technology” and “retail” are the best; “automobiles & parts” is the worst.

This finding is confirmed examining all the elements of intellectual capital. Companies of the FTSE Italy Financial Services have the worst results in both the considered years, for all the components of IC.
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| Listed Companies | Intellectual Property Disclosure Index | Operational Capital Disclosure Index | Relational Capital Disclosure Index | Human Capital Disclosure Index |
|------------------|----------------------------------------|--------------------------------------|-------------------------------------|-------------------------------|
|                  | IPDI 2016 | IPDI 2010 | Δ % | OCCI 2016 | OCCI 2010 | Δ % | RCDI 2016 | RCDI 2010 | Δ % | HCDI 2016 | HCDI 2010 | Δ % |
| Basicnet          | 2.33      | 2.33      | 0.0% | 1.40      | 1.00      | 40.0% | 1.78      | 1.33      | 33.3% | 1.50      | 1.00      | 50.0% |
| Chi               | 2.33      | 1.67      | 40.0% | 1.40      | 0.80      | 75.0% | 1.00      | 1.33      | -25.0% | 0.50      | 0.50      | 0.0%  |
| Damiani           | 2.33      | 2.33      | 0.0% | 2.00      | 1.40      | 42.9% | 2.33      | 2.44      | -4.5%  | 1.50      | 1.50      | 0.0%  |
| Epice             | 2.33      | 2.33      | 0.0% | 2.40      | 2.00      | 20.0% | 2.11      | 2.22      | -5.0%  | 2.00      | 1.50      | 33.3% |
| Ivs Group         | 2.67      | 2.67      | 0.0% | 2.80      | 2.20      | 27.3% | 2.22      | 2.00      | 11.1%  | 1.75      | 1.50      | 16.7% |
| Mxr               | 2.00      | 2.00      | 0.0% | 2.00      | 1.20      | 66.7% | 2.00      | 2.00      | 0.0%   | 1.60      | 1.00      | 0.0%  |
| Netweek           | 2.00      | 2.00      | 0.0% | 1.40      | 1.40      | 0.0%  | 1.33      | 1.11      | 20.0%  | 1.25      | 1.25      | 0.0%  |
| Uneuro            | 2.33      | 2.33      | 0.0% | 2.40      | 2.00      | 20.0% | 2.33      | 2.33      | 0.0%   | 1.50      | 1.25      | 20.0% |

**Figure 10.** Disclosure index retail upper sector.

| Sector            | Intellectual Capital Disclosure Index | Relational Capital Disclosure Index | Human Capital Disclosure Index |
|-------------------|---------------------------------------|--------------------------------------|-------------------------------|
|                   | ICID 2016 | ICID 2010 | Δ % | RCDI 2016 | RCDI 2010 | Δ % | HCDI 2016 | HCDI 2010 | Δ % |
| FTSE Italy Technology | 1.77    | 1.54    | 15.1% | 1.81 | 1.63 | 10.9% | 0.98 | 0.87 | 13.5% |
| FTSE Italy Financial Services | 1.11    | 1.00    | 10.7% | 1.14 | 1.12 | 1.9%  | 0.77 | 0.67 | 14.0% |
| FTSE Italy Automobiles & Parts | 2.07    | 1.92    | 7.8%  | 1.93 | 1.88 | 2.6%  | 1.67 | 1.50 | 11.1% |
| FTSE Italy Chemicals, Oil & Gas | 1.87    | 1.67    | 11.7% | 1.89 | 1.85 | 2.7%  | 1.38 | 1.19 | 15.8% |
| FTSE Italy Retail | 1.95    | 1.69    | 15.3% | 2.12 | 1.86 | 18.3% | 1.25 | 1.21 | 3.3%  |

**Figure 11.** Disclosure index retail upper sector.

| Sector | Intellectual Property Disclosure Index | Operational Capital Disclosure Index | Relational Capital Disclosure Index | Human Capital Disclosure Index |
|--------|----------------------------------------|--------------------------------------|-------------------------------------|-------------------------------|
|        | IPDI 2016 | IPDI 2010 | Δ % | OCCI 2016 | OCCI 2010 | Δ % | RCDI 2016 | RCDI 2010 | Δ % | HCDI 2016 | HCDI 2010 | Δ % |
| FTSE Italy Technology | 1.84    | 1.78    | 3.6%  | 1.97 | 1.59 | 24.4% | 1.81 | 1.63 | 10.9% | 0.98 | 0.87 | 13.5% |
| FTSE Italy Financial Services | 0.96    | 0.97    | 0.7%  | 1.29 | 1.11 | 15.7% | 1.14 | 1.12 | 1.9%  | 0.77 | 0.67 | 14.0% |
| FTSE Italy Automobiles & Parts | 2.30    | 2.37    | -3.1% | 2.13 | 1.82 | 17.1% | 1.93 | 1.88 | 2.6%  | 1.67 | 1.50 | 11.1% |
| FTSE Italy Chemicals, Oil & Gas | 1.75    | 1.58    | 10.5% | 2.03 | 1.83 | 11.6% | 1.96 | 1.71 | 14.6% | 1.47 | 1.31 | 11.9% |
| FTSE Italy Retail | 2.29    | 2.21    | 3.8%  | 1.98 | 1.50 | 27.1% | 1.89 | 1.85 | 2.7%  | 1.38 | 1.19 | 15.8% |

**Figure 12.** Performance in financial service.
Conclusion

This paper aims to measure, as a first step of a research on the relationship among knowledge, performances, and market value, the level of disclosure on intellectual capital that characterizes some Italian listed companies. Applying the content analysis to financial statement of 56 companies listed on Milan Stock Market, we measured 21 functional indicators representative of the four main components of IC, attributing to each one a coefficient between 0 and 3.

It results that, on average, the level of overall disclosure is not the maximum but sufficient or moderate both in 2010 and 2016, except for the companies of FTSE Italy Financial Services (the level is not sufficient); but comparing the results of this two fiscal years, the level of disclosure appears to be significantly increasing. Observing the disclosure index related to the specific component of intellectual capital considered in this research, all the aspects of IC have benefited, on average, of an improvement in terms of communication. The highest level of disclosure is concerning the communication of intellectual property and operational capital; the worst is inherent to the human capital. In terms of improvement between 2010 and 2016, the largest increase in the disclosure index is got by the operational capital.

Comparing the companies included in FTSE Italy Financial Services Index with those included in the other super-sectors, it results that the level of overall disclosure of the first one is not sufficient and lower than the others. This finding is confirmed examining all the elements of intellectual capital. Anyway, almost all the companies of the five super-sectors have bettered their overall level of disclosure; also this finding is confirmed examining all the elements of intellectual capital. Concluding, the increase in the disclosure index, that emerges the comparing of the communication level in 2010 and in 2016, confirms the relevance of intellectual capital in the age of Industry 4.0.

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