Journal of Intellectual Capital

A history of intellectual capital measurements: from production to consumption

Marco Giuliani Maria Serena Chiucchi Stefano Marasca

A history of intellectual capital measurements: from production to consumption

Marco Giuliani, Maria Serena Chiucchi and Stefano Marasca
Department of Management,
Università Politecnica delle Marche, Ancona, Italy

Abstract

Purpose – This paper has the ambition to enrich the extant research about the interplay between measuring intellectual capital (IC) and managing IC or, more precisely, about the production and consumption of IC measurements in practice. Stemming from these considerations, the purpose of this paper is to disentangle the production and consumption processes of IC measurements in practice.

Design/methodology/approach – This study is based on a longitudinal case study is analysed adopting an interventionist approach.

Findings – This study shows the peculiarities regarding the production and consumption of IC measurements, from several perspectives. In particular, it emerges that the reporting of IC can, in some specific contexts, lead to the non-use of IC measurements and to the disappearance of the measured object, IC. What is questionable is whether it is the loss of interest in the IC object that has led to the non-use of the IC measurements or if it is the non-consumption of the measurements and their qualities that has implied the disappearance of the measurement object. In addition, this study sheds a light on the fact that in an IC project the consumption of the measurements can occur not only at the end of the production process, but also (and may be especially) during the production process itself. This consumption can generate different effects such as the identification of new managerial objects, the establishment of new initiatives, the development of a deeper knowledge about how IC works or a change of the sense of some of the existing measurements. In all, the paper underlines the fact that how IC measurements are produced (the process followed and the "actors" involved) affects their actual consumption (or non-consumption).

Research limitations/implications – This paper contributes to the extant literature regarding the production and consumption of IC measurements. Moreover, it contributes to the field of IC "in practice" as it highlights what happens when an IC measurement system is implemented. Finally, the research work can contribute both to the studies regarding IC as an accounting change and to the ones regarding IC as a tool that facilitates organizational change. From the first perspective, the paper highlights how the introduction of IC has fostered long-lasting changes in the management accounting system, albeit circumscribed to the local (departmental) level. From the second perspective, the paper shows how IC may allow the creation of new managerial objects, thus promoting possible new actions. The main limitations of this study are related to the methodology adopted and to its specific pros and cons.

Originality/value – In comparison to previous studies, this one does not focus only on the managerial and organizational aspects related to the design and implementation of IC measurements or on their actual use, but attempts to approach them simultaneously adopting a longitudinal view. Moreover, this study does not adopt a theoretical perspective on how the indicators are designed and consumed but is aimed at investigating how these indicators are produced and consumed "in practice". Finally, this study focus on the interplay between production and consumption of indicators, i.e. on the use of IC measurements in relation to the peculiarities of their production process.

Keywords Production, Intellectual capital, Indicators, Measurements, Consumption, Use

Paper type Research paper

1. Introduction

Measuring intellectual capital (IC) seems to be an on-going challenge for accountant as in the last decades, several discussions have been brought forward by scholars and practitioners in an attempt to define how IC should be measured (Guthrie *et al.*, 2001, 2012).

Journal of Intellectual Capital
Vol. 17 No. 3, 2016
pp. 590-606

1469-1930
DOI 10.1108/JIC-08-2015-0071

Some argue that the problems related to measuring IC can be due to the fact that IC is a multi-dimensional magmatic concept, to the lack of appropriate measurement tools, to the fact that it was pushed forward in an effort to include accountants as well as non-accountants or to the lack of an adequate number of field analyses (Dumay, 2013; Gröjer, 2001; Guthrie *et al.*, 2012; Johanson and Henningsson, 2007; Mouritsen, 2009; Roslender and Fincham, 2001).

Analysing the extant literature, it is possible to identify studies devoted to the analysis of the production of IC measurements while others dedicated to their "consumption", i.e. to their "actual use", or to their "meaningful social exchange" (Bay *et al.*, 2014; Graham, 2008). More in depth, while it is possible to identify several attempts of defining how IC measurements should be produced, i.e. designed and implemented, less effort has been made to understand what the actual consumption of IC measurements is in practice (Catasús *et al.*, 2007; Catasús and Gröjer, 2006; Chaminade and Roberts, 2003; Chiucchi and Dumay, 2015; Dumay, 2009; Giuliani, 2013b, 2015b; Giuliani and Marasca, 2011; Johanson *et al.*, 2001a; Mouritsen, 2009). In addition, most of the contributions to the IC discourse tend to focus only on one of the two aspects, i.e. on the production or on the consumption: consequently, the use of IC measurements in relation to the peculiarities of their production process still remains an under-investigated issue (Chiucchi, 2013b; Chiucchi and Dumay, 2015; Chiucchi and Montemari, 2016; Giuliani, in press). In other words, it seems that within the IC discourse the old problem emerges again: understanding how reality is translated into numbers and how these numbers affect and construct reality (Hines, 1988; Hopwood and Miller, 1994; Potter, 2005).

Moving from these considerations, this paper has the ambition to enrich the extant research about the interplay between measuring IC and managing IC or, more precisely, about the production and consumption of IC measurements in practice. Stemming from these considerations, the aim of this paper is to disentangle the production and consumption processes of IC measurements in practice. In order to achieve this aim, the paper reports "a history" of IC measurements, i.e. a longitudinal field analysis about the production and consumption of IC measurements developed adopting an interventionist approach.

The paper starts with an overview of the extant literature regarding IC measurement and management. The next section presents the design of the study and the description of the investigated case study. In the central part, an attempt will be made to make sense out of the case findings and to develop the theoretical arguments of the study. The paper ends by presenting some of the insights gained and some of the conclusions drawn, and proposing future research opportunities.

2. Production and consumption of IC measurements: the state of the art

The development of a measurement system traditionally consists in a phase of production and in a phase of consumption (Bourne *et al.*, 2000; Ferreira and Otley, 2009; Neely and Bourne, 2000; Otley, 1999).

Within the former phase (production), it is possible to identify two steps: the design and the implementation. The design actually has to do with the process of deciding what to measure and it encompasses the actual design of the measures. The implementation occurs when the designed system is put into place in a particular organizational setting and data are collected and processed. These two phases are the ones devoted to the production of accounting, that recalls the idea of accounting as a useful means to produce a true and fair representation of stocks and flows (Roslender and Fincham, 2004).

The consumption phase that generally occurs at the end of the production process refers to the actual application of the designed and implemented system by company actors in order to obtain its expected outcomes (Bourne *et al.*, 2000; Ferreira and Otley, 2009; Neely and Bourne, 2000). The consumption of measurements can be intended in various ways. For instance, Graham (2008), moving from the studies of Baudillard, define consumption as a meaningful social exchange or, more precisely, as "a social system for producing meaning through differences in the sign value of commodities" (p. 759). In other words, consumption occurs when the meaning is generated. Bourne *et al.* (2000, p. 758) identify two different types of consumption-use: "assessing the implementation of the strategy and challenging the strategic assumptions". Simons (2000), in turn, distinguish between "diagnostic" and "interactive" control systems. Measurements are used in a "diagnostic" way when they are used to "monitor" a certain situation, i.e. to ensure that the objectives are met and if necessary, that the corrective actions are taken. Instead, measurements are used in an "interactive" way when they are used to manage uncertain situations, in order to promote discussions among company actors and foster change and innovation. Bay *et al.* (2014) use the idea of consumption of accounting to underline the actual use of accounting, i.e. the process of recognition and sense-making of accounts. In all, even if the idea of consumption can be interpreted in different manners, it underlies and recalls the ones of transmission and reception of accounts and how they affect behaviours (Vollmer, 2007). Therefore, it seems that it is exactly during the consumption phase that management is fostered, even if with various degrees and nuances: measurements are "put into action", are discussed and thus, actions can be identified and promoted which can influence the status quo.

From the analysis of the extant literature, it seems possible to argue that the same process (production and consumption) is followed within the IC discourse. In fact, in illustrating the case studies investigated, several scholars refer to phases that can be named, for example, "design, implementation and use" or "introduction, implementation and use" or "identification, understanding and use" (Andriessen, 2004; Chiucchi, 2008, 2013b; Dumay, 2009; Giuliani and Marasca, 2011; Skoog, 2003; Tayles *et al.*, 2002). In spite of the fact that it has been debated for over a decade, IC still tends to be considered a "new" accounting object and consequently, researchers have yet to investigate completely the relationship between production and consumption of IC measurements (Chiucchi, 2013b; Chiucchi and Dumay, 2015; Giuliani, in press).

More in depth, making reference to the evolution of the IC discourse (Guthrie *et al.*, 2012), it seems possible to argue that the studies about measuring IC passed through three main stages. The first stage, centred on what IC is, relied on the old adage "what gets measured gets managed" (Catasús *et al.*, 2007; Petty and Guthrie, 2000) and consequently the studies were based on the idea that "numbering" IC allows to make the invisible visible and therefore manageable (Petty and Guthrie, 2000). Thus, the focus was on producing "the right" IC numbers (Edvinsson and Malone, 1997; Guthrie *et al.*, 2001; Petty and Guthrie, 2000; Stewart, 1997; Sveiby, 1997).

The second stage focused on what IC does, i.e. how capital and labour markets react to the potential for IC to create value and how IC should be managed in order to create and maintain a sustainable competitive advantage. In this case, the attention of scholars and practitioners moved from the analyses of production of IC measurements to their consumption, i.e. "looking beyond the measurement of performance to the management of performance" (Mouritsen and Larsen, 2005, p. 372; Otley, 1999, p. 364). This critique was also supported by the fact that the benefits of measuring have often not been realised or recognized in practice (Dumay, 2012; O'Donnell *et al.*, 2006). In other

words, in this stage the focus was on how IC measurements, together with images and narratives, affect an organization or the capital market (Dumay and Rooney, 2011; Giuliani, 2013b; Mouritsen and Larsen, 2005).

The third stage of the IC discourse contains, at its core, the investigation of how IC is utilized and taken up inside organizations. In other words, this stage is dedicated to the analysis of the use of IC measurements in practice, to the exam of the interplay between them and IC mobilization and management and to the investigation of the effects, the benefits and the drawbacks of measuring IC (Catasús *et al.*, 2007; Catasús and Gröjer, 2006; Dumay, 2013; Guthrie *et al.*, 2012; Mouritsen, 2009). Thus, this stage is devoted to critically investigate how organizations understand and adopt IC as a management technology (Cuganesan, 2005; Cuganesan *et al.*, 2007; Dumay, 2009; Mouritsen, 2006). In essence, after a first wave of studies strongly focused on the production of IC numbers, in the second and especially in the third waves, the research gradually moved towards a critical analysis of the consumption of IC measurements.

As mentioned, only few studies have analysed both the production and the consumption of IC measurements, highlighting aspects that had been overlooked previously. For example Johanson *et al.* (2001a, b) underline that in some cases IC measurement can lead to its management only if measurements are associated to other "routines" such as mobilizing attention, performing surveys, disseminating measurement results, awarding salary bonuses, etc. Some scholars (Chaminade and Roberts, 2003; Chiucchi and Dumay, 2015; Dumay, 2009) point out that in certain instances IC management tends to be overlooked, as the measurement can "lock-in" IC within the accounting domain or attract more the managerial attention, i.e. a sort of IC "accountingisation" can occur. To put it differently, the production of numbers does not necessarily lead to their consumption, but, paradoxically, can also lead to their non-use. Other researchers have highlighted that the "aptitude" of IC measurements to be used depends not (or not only) on their qualities (Giuliani and Marasca, 2011) but more on the meaning the management has given to them and on the label used for their identification (i.e. the "name" of the indicators) (Catasús *et al.*, 2007; Catasús and Gröjer, 2006; Mouritsen, 2009). Some point out that measuring IC can lead to the identification of new managerial objects to be managed or to new perspectives to consider (Giuliani, 2013b, 2015b; Mouritsen, 2009).

As shortly abovementioned, in comparison to previous studies, this one does not focus only on the managerial and organizational aspects related to the design and implementation of IC measurements or on their actual use, but attempts to approach them simultaneously adopting a longitudinal view (Catasús *et al.*, 2007; Catasús and Gröjer, 2006; Chaminade and Roberts, 2003; Mårtensson, 2009; Mouritsen, 2009; Mouritsen and Larsen, 2005; Mouritsen *et al.*, 2001). Moreover, this study does not adopt a theoretical perspective on how the indicators are designed and consumed (Mouritsen, 2006, 2009) but is aimed at investigating how these indicators are produced and consumed "in practice" (Dumay, 2013; Guthrie *et al.*, 2012). Finally, this study focus on the interplay between production and consumption of indicators, i.e. on the use of IC measurements in relation to the peculiarities of their production process (Chiucchi, 2013b; Chiucchi and Dumay, 2015; Chiucchi and Montemari, 2016; Giuliani, in press).

3. The research method

In order to fulfil the aim of this paper, a case study referred to the production and consumption of a system for measuring and reporting IC is presented. The case study method was considered appropriate for disentangling the dynamics that have led to the

use or non-use of the measurement system and to understand the different meanings managers have attached to the system and to IC.

The actual research project was undertaken using an interventionist approach between 2007 and 2014 (Jönsson and Lukka, 2005; Lukka, 2005). This is based on a collaborative process between the researcher and the organization, with critical inquiry into problems of social practice in a learning context (Argyris *et al.*, 1985, p. 237; Coghlan and Brannick, 2001). The interventionist approach was chosen because it allows scientific research and innovative practical solutions to be developed (Kaplan, 1998; Kasanen *et al.*, 1993; Labro and Tuomela, 2003). Moreover, it offered the possibility, to the researchers participating in the project, to achieve an in depth knowledge of the context, the variables and the process under analysis. Finally, an interventionist method was used because there is a strong call for case studies to be developed following this approach, in order to test and observe concepts, methods and tools in practice (Marr and Chatzkel, 2004; Mouritsen, 2006). In fact, this should allow to bridge the gap between theory and practice and to enhance the relevance of management accounting studies (Jönsson and Lukka, 2005).

It is also important to underline that the case study is examined from a longitudinal perspective. Since the interest lies in the adoption and use of the IC measurement framework, it is important to analyse the evolution of the process over time in order to interpret properly the collected evidence. In fact, the longitudinal analysis makes it possible to investigate if and how IC has continued to be measured and if and how the indicators have been used (Chiucchi and Montemari, 2016; Giuliani, 2009, 2015a; Skoog, 2003).

Alpha[1] was deemed an appropriate subject for this study for the following reasons. First, Alpha's management is focused on IC: they strongly believe that the company can compete and survive in the market only by creating value-added products, and that this is only possible using its IC as a lever. Second, the company was interested in a long-term cooperation with the university researchers (Kasanen *et al.*, 1993; Labro and Tuomela, 2003) and consequently, it was an opportunity to understand and investigate the measurement and valuation process "in vivo" or "in practice" instead of merely "in vitro", as usually happens (Dumay, 2013).

Besides collecting data through participant observation and informal meetings, multiple other sources were also used, such as annual reports, stakeholder impact reports, internal strategy reports, semi-structured interviews and focus groups.

With reference to the semi-structured interviews, the main interviewees were the CEO, the CFO (who was in charge, ad interim, of the HR and IT departments), the area managers, the purchase manager, the R&D manager, the design manager, the production manager, and the employees responsible for specific activities that were relevant for the project. Approximately 15 interviews lasting about one and a half hours each were carried out and some shorter meetings were held to clarify or confirm aspects that had emerged during the interviews. Regarding the focus groups, it was established by the CEO and consisted of the researchers, the CFO, the area managers, and the CEO himself. The focus group meetings were based on a semi-structured agenda proposed by the participating researchers, discussed with the CEO and the CFO, and then modified for use. Overall, there were seven meetings (considering both the releases of the IC Report) that lasted about four hours each. Based on the specific requests of the CEO and of the CFO, the researchers supported Alpha's management in coordinating and supporting the discussions and development process needed to

design and implement the system. In all, during the meetings of the focus groups, the researchers offered a scientific point of view and a methodological support that helped the company to develop a practical solution that is the result of the combined efforts, expertise and knowledge of both the practitioners and the researchers.

However, multiple other sources were also used, such as annual reports, stakeholder impact reports, internal strategy reports, etc., as required by an interventionist research project (Rock and Levin, 2002).

4. Investigating IC measurements at Alpha

Alpha is an Italian manufacturing company (turnover Euro 23 million; 98 employees) which operates in the die-casting sector and sells its products worldwide. When the project started, the company was expanding abroad through joint ventures and delocalizing part of its manufacturing process. Product design and innovation are essential for the company. As a subcontractor of large multinational companies, Alpha has to keep high-level competencies in the co-design activity and high quality standards in all its processes. As a manufacturer of its own brand products, Alpha relies on high quality standards and innovation.

The promoter of the IC project was the CFO. The CEO was the official sponsor of the project; he and the CFO, who was also the company project leader, were intended to be the main users of the IC Report, even if it was supposed to be submitted also to the other top managers and to some selected stakeholders (e.g. partners, banks, etc.).

When the project was launched, the management accounting system adopted by Alpha was predominantly based on financial indicators (e.g. turnover, production costs, quality and non-quality costs, etc.). There was a very well-developed quality system, which was composed of non-financial indicators (e.g. number of the orders, numbers of mistakes and amount of waste, etc.) focused on the company's most relevant processes. The management strongly relied on these indicators to make decisions and run the company. These indicators were used as starting points to develop discussions about the strategy of the company, about investments, about organizational processes, etc. In other words, the managerial culture was based on a "managing by numbers" approach. This was not surprising, considering that the CFO was the CEO's right-hand-man.

The IC project was seen as a solution to the difficulties, perceived by the CEO and the CFO, regarding the management and reporting of the company's strategic resources that were mainly intangible. In fact, despite the fact that the company was operating in a product-focused market, Alpha had decided to focus not only on the technical features of the product, but also on the design and post-sale services:

> Nowadays everybody can get access to the same technology, even producers in recently developed countries like China and Brazil. The difference is in how you use the technology and in the competences and services you are able to offer in order to tie your customer to your company (the CEO).

Therefore, the company defined the following two strategic objectives: the first was to develop its design and technical know-how in order to be able to offer high quality standards; the second was to change its relationships with its customers, to evolve from a supply relationship to a partnership.

According to mentioned strategic goals, the IC project was aimed at developing a management accounting system that would be able to support the visualization,

measurement and management of its IC. These were seen as crucial for successful implementation of the strategy:

> The aim of the IC project is to have a picture, after 30 years of history, of the value that our people and our organisation have achieved. We want to get to the bottom of our IC that we believe is very important to our company and that makes the difference between our company and our competitors (the CFO).

The first step of the project was to achieve a consensus on the meaning and content of the object labelled "IC". In fact, to most of the participants the word "IC" was meaningless or ambiguous, an object with uncertain and blurred boundaries: "What do you mean by IC?", "What are we talking about exactly?" were frequently asked questions. Considering the aim of the research project, the researchers proposed defining IC as "the intangibles which have strategic relevance" (Meritum, 2002). This definition was chosen since it allows the development of a selective accounting system, able to focus management's attention only on the most relevant IC resources.

This definition was then discussed and adopted by the managers who, with the scientific support of the researchers, decided to define strategic IC resources as "the ones Alpha needs to achieve the established future targets". The Meritum (2002) tri-partite model, in which IC is subdivided into human capital, relational capital and organizational capital, was adopted to facilitate the identification and visualization of the intangible resources. In order to identify these, a cause-and-effect approach based on top management perceptions was used. By way of example, to achieve the desired level of technical know-how, the company needed to have qualified and stable human resources supported by an up-to-date information system and specific technologies, databases and processes, i.e. specific IC, tangible and financial resources. Moreover, in order to have some external information with which to benchmark their results, the managers asked the researchers to check which strategic factors and IC resources were usually monitored in the die-casting industry. This would also support the group in deciding on possible modifications. So, the project started with the construction of the "conventional object" named "IC", i.e. an object which can be understood and recognized only by a part of the society (as in the case study, the members of the focus group) (Ijiri, 1967).

During the interviews with the IT manager and the CFO, the importance of integrating the IT systems at headquarters and at the foreign branches emerged. A new object of analysis, "IT integration", was then created and it was interpreted as the level of shared software and data between the headquarters and company subsidiaries situated abroad. Thus, the IC mapping phase led also to the identification of new measurement objects.

After the visualization step, the group moved on to consider the design of a panel of indicators that would be able to monitor IC performance, as well as the activities carried out to create or develop IC. The idea of focusing on both resources and activities was suggested by the researchers in keeping with the Meritum (2002) model. The focus group discussed and then accepted it, because it was considered appropriate to monitor both the efforts made (activities) and the results achieved (performance), effectively combining the static and the dynamic approaches.

The researchers proposed an initial selection of indicators that were discussed and refined with the project leader (the CFO) who made comments and in turn, proposed changes and/or integrations. Then, the new selection of indicators was shared with the other managers and after some discussions and further refinements, a final panel was defined. The members of the group also determined how each indicator

would be calculated, including the source of the data, as well as the person responsible for its implementation.

The design of the indicators offered the opportunity to discuss also about new managerial initiatives and to share the strategy among the top managers. With reference to the first aspect, for example, the risk of losing some employees who were holding key positions had repeatedly emerged as a concern during managers' interviews. Therefore, the CEO, the CFO and the other managers, with the support of the researchers, started a discussion regarding the company's key positions and how to improve them. In particular, they decided to focus (and then to monitor through some specific indicators) on: the risk of losing competences (number of employees per key position); how quickly this risk could be brought down (number of employees "on the bench"); the competence level per key position; and the activities undertaken to increase the competences in key positions (hours of training on-the-job or other training). At the end of this process, specific managerial actions (e.g. coaching, training, recruiting, etc.) for each key position were planned to deal with risky situations.

An example regarding to the strategy sharing issue is the following. As mentioned before, the project started in 2007, just when the financial crisis hit the global economy. In one of the company meetings, the CEO, with reference to Alpha's main customers, underlined that "it is more expensive and difficult to acquire a new [big] customer than keeping an old one" and therefore he pointed out that the strategy of Alpha should be focused not on the acquisition of new (big) customers but on increasing the relevance of Alpha for them, or at least on non-decreasing. Therefore, the managers and the researchers included in the panel of indicators useful to monitor the "relevance", the profitability, the penetration rate and the risk of losing the customer.

During the design of the panel of indicators, the need to not to overload the employees with additional work emerged. Thus, the idea promoted by the CFO was to re-use, as much as possible, the already existing indicators. Even if these measurements had been already meaningful to the management, their inclusion in the IC Report implied that they acquired a different meaning. For example, in order to monitor the competencies of the employees, it was decided to combine the "old" indicator named seniority index with a "new" one named "career track". The assumptions made, which were validated at Alpha, were the following: the greater the time spent doing a certain activity, the better the employee performance; and for there to be a progression in career level there needs to be an expansion in competencies above and beyond those already possessed. Therefore, the seniority index, which was always used to describe the status of the company employees, became part of a proxy useful to monitor the depth (seniority index) and breadth (career tracking index) of employee competencies.

As the idea was "to have a picture" and to start understanding what IC does within the company, the system was designed to be backward-looking and not forward-looking as the management wanted to test the system and better understand the object, its lever and how the measurements worked before introducing it into the company planning process and starting to think about IC-related goals. In light of these considerations, the indicators were implemented over a three-year period (2004-2006).

Calculating IC indicators over those three years was deemed useful for understanding if and how the company IC had changed in quality and quantity. The data were partly extracted from the Alpha's information system and partly collected through interviews, questionnaires, etc.

As the project progressed, the CFO became more and more interested in establishing several indicators which could provide a complete picture of the activities undertaken.

This interest was twofold. A complete panel of indicators would better support his decision-making process as the IT and HR manager, on the one hand. On the other, he was worried that, since the phenomenon was "multifaceted", the lack of some indicators could be misleading and could allow ambiguous interpretation by the CEO himself. Therefore, when preparing the IC Report the CFO felt the need to explain thoroughly the phenomenon through all the indicators that had been established during the design of the system:

> The entrepreneur will look at the indicators, so in the report we will describe what happens, to be sure that all the IC policies and elements are well explained and clear […] but he will predominantly look at the numbers and at whether they have changed […] (The CFO).

Three reports, each devoted to the three "Capitals", Human, Organizational and Relational were prepared. Each report contained indicators and comments on their trends over the three years and were addressed to the managers in charge of these "Capitals". Finally, they were systematized in a single IC report, which was presented to the CEO. The IC Report contained 177 indicators and one consolidated IC index with amply commented (25.946 words) trends and meanings.

The idea of the CEO and the CFO was to update regularly the report every two-three years, as they believed that by repeating the measurement over time, their knowledge (and consequently their capacity to manage IC) would improve over time:

> I am satisfied with what we have achieved even if there is room for improvement. The issue of IC is new for us and we don't have any experience with it so I didn't expect to find the best solution for us […] I see it more as a process of continuous improvement that will lead us to more and more satisfactory and concrete results (the CEO).

> The idea is to update the system every two to three years. We will not update it every year because the changes in our environment are not that fast: it takes some time to show results. Moreover, we need some time [between the two releases of the IC Report] to see if and how the actions taken as a result have improved the level of our IC (the CFO).

Therefore, it seems that the idea of a regular report lies not just in comparing the latest release with the previous one, but also in having the opportunity to consume the IC Report, i.e. to talk about IC and to try to understand what has happened. This idea is also stressed by the CEO who said after the presentation of the second release:

> It's always interesting to talk about these things (the CEO).

The CFO also considered measuring IC as a useful practice:

> We absolutely think that continuing to measure IC is a "must" for our company […] it is a managerial tool useful for checking whether the actions carried out gave the expected results (the CFO).

An updated version in 2010 referred to the years 2007-2009, and the researchers were again asked to participate in its preparation. The CFO made a clear request to reduce the amount of indicators, to cut down on the work-overload required for preparation, and to facilitate comparison between the two reports by keeping the "old" indicators instead of substituting or adding new ones.

Interviews with the managers were carried out in order to understand whether strategic changes had occurred and thus verify whether the "old" indicators were still appropriate for monitoring the company's IC. An attempt to reduce the amount of indicators was made, but with poor success. The CFO and the other managers involved

considered the existing indicators all relevant to describe Alpha's IC and, therefore, the overall numbers of indicators went up slightly instead of going down.

Table I shows that, from the first to the second release, the amount of indicators increased while the number of words used to explain the indicators and the value creation process decreased. This was because, after the first IC Report which was considered by the managers as "too long", the CEO and some of the managers themselves shew clearly their preference for short power point presentations containing "more numbers" and very short comments, hence the changes.

During the presentation of the second release the CEO said:

> I think that the "picture" we made of our IC is quite realistic. In fact, the numbers show the organizational changes we made in the past, the effects of some of the managerial decisions we took, the impact of the economic crises on our company, the growth of the Chinese market we are experiencing […] Anyhow, if today we take an updated picture of our IC it would be different […] Everything changes so quickly (the CEO).

Even if initially planned, no other releases of the IC Report have been prepared to date. The reasons for quitting the "IC project" can be identified as follows. First, during the recent interviews it emerged that, except for the meetings where the IC Report was officially presented to the CEO, the IC Report has never been used in other company meetings or by single managers for making decisions. Second, even if IC measurements were considered by the CEO and the CFO as "interesting" and "stimulating" they were also deemed "unreliable" and therefore "too immature to be used for planning", as the CFO said. From this perspective, it seems possible to argue that IC measurements were considered as useful "to have a picture" and to discuss about the organizational past performance but at the same time inadequate to be used for really managing the organization. Third, the need to get acquainted with a new "object", IC, had pushed to produce a relevant number of indicators (approximately 180) and to calculate them, in the first release of the IC Report, over a five-year period and in the second release, over a three-year period. Consequently, the effort and the time requested to produce the IC Report were perceived as very relevant if compared to the benefits and the significant time lag between the production and the consumption of the IC Report made it out of date. Fourth, the CFO, who was the project leader and one of the main supporters of the project, resigned in 2014 and the new CFO was not interested in carrying on the project. In fact, the new CFO did not have knowledge on the topic (he did not know-how to produce and to interpret the IC measurements) and he perceived that the CEO had other priorities rather than updating the IC Report.

It has to be noticed that even if the IC Report disappeared and was not used, some of the IC measurements included in the report have survived and are still in use. The "old" measurements, i.e. the ones already existing before the IC project, continue to be used but they have got an enriched meaning; the "new" ones, i.e. the ones designed ad hoc for

Table I. Comparison of IC indicators and narratives between the two releases

	IC report (2009) (years 2004-2008)	IC report (2010) (years 2007-2009)	Variation (%)
Human capital indicators	35	36	2.86
Organizational capital indicators	25	28	12.00
Relational capital indicators	117	120	2.56
Total indicators	177	184	3.95

monitoring specific IC resources or activities have, like the mythological phoenix, "died" in the IC Report but have been "resurrected" to be used locally. For example, some of the IC indicators referred to HR and IT became part of the panel of indicators used to plan activities referred to IT and personnel management. Moreover, the lack of adequate measurements and a related managerial policy regarding HR has convinced the CEO to introduce a new system based on competences for personnel selection, development, career planning and evaluation and to review the incentive system and to measure the company climate.

5. Discussion

From the analysis of the case study the first aspect that emerges is that in Alpha the consumption of these measurements did not follow their production (Bourne *et al.*, 2000; Ferreira and Otley, 2009; Neely and Bourne, 2000; Otley, 1999) but was instead, simultaneous at several moments in time. In fact, it was mainly during the production phase that consumption occurred, for instance, in terms of the definition of new objects of intervention and initiatives, discussions and new interpretation of the existing indicators, identification and understanding of cause-and-effect relationships, etc. Paradoxically, when the IC measurements got reported their use stopped: between the first and the second release none of the managers used the implemented complete IC Report. Therefore, unexpectedly, in the case study it emerges that IC reporting is not where IC measurements start to be used, but where they "die". This phenomenon seems to support the idea that in an IC project, more than the "result" it is the activated understanding and learning process that matters (Chiucchi, 2013a; Giuliani and Marasca, 2011). In fact, the main discussions arose not when the IC Report was presented, i.e. after its production, but during the process of construction and analysis of the whole panel of indicators.

With reference to the non-consumption of the IC Report after its production, it can be related to the fact that the proposed IC measurements did not reflect the cognitive process of the whole management group but mainly of the CEO and of the CFO. In fact, "numbers" often do not objectively measure the underlying reality but they tend to reflect the management's interest and cognitive process (Mouritsen, 2009; Robson, 1992; Roslender and Fincham, 2004). In Alpha, both the object and the measurements were mainly a representation of the visions of the CEO and the CFO about what IC is and how it can be represented. More in depth, while all the managers were involved in defining the company IC resources and IC activities, the part of the production process related to the design and implementation of the panel of IC indicators was mainly guided by the CFO and the CEO. In fact, here, the other managers had a limited role as they were involved mainly to validate the indicators "produced" by the CEO and the CFO. This was particularly evident in the discussions concerning single indicators such as the ones related to "IT integration" and "integration with suppliers" where the CFO and CEO designed the indicators according to their own visions and with the intent of "not creating expectations" or avoiding the risk of "misinterpretation" of the indicators. The limited participation of the managers in the production of the IC Report implied that, in Alpha, IC never acquired an organizational meaning but it remained a kind of a "language" mostly understood only by few people, i.e. by the CEO and the CFO (Bay *et al.*, 2014). Consequently, when these people quit the organization (as the CFO did) or changed their interests (as the CEO did), the IC project faded and even its circumscribed consumption stopped. In all, this finding enriches the idea that the actors involved in the production of the IC Report not only determine the implementation trajectories of IC

projects (Chaminade and Roberts, 2003) and play "a significant role as driving forces during the early stages in measurement routine development" (Johanson *et al.*, 2001a, p. 418) but also determine whether the produced measurements will be consumed or not.

The abovementioned considerations are also supported by the fact that some single measurements survived to the "death" of the IC Report. These IC measurements "survived" probably for one or more of the following reasons:

(1) they were the ones that "made sense" for the actual consumers as they had been produced with the support of the users (Giuliani, in press);

(2) they were considered as understandable and useful to satisfy an information need (such as the ones related to the IT integration or to the employees' level of competences) (Chiucchi, 2013b); and

(3) the labels of the new measurements were able to catch managerial attention (such as the "employees on the bench") (Catasús and Gröjer, 2006).

The paper sheds light also on the role that the qualities of IC indicators can have in hindering their use (Chiucchi and Montemari, 2016; Giuliani, in press; Giuliani and Marasca, 2011; Mouritsen, 2006, 2009). During the meetings where the IC Report had been presented and discussed, the indicators were deemed able to represent the company's IC growth/decline over time. Nevertheless, when the researchers suggested to go forth with the project and to begin to set objectives referred to IC indicators, the CEO and the CFO refused, arguing that the IC indicators were "unreliable", "too immature for planning". Therefore, actors were looking for a level of accuracy, understandability, stability, completeness closer to the world of tangibles rather than to the one of intangibles. This can be among the reasons that led to the rejection and non-use of the implemented IC indicators.

In addition, this findings permit also to add to the literature on the role that scores have in mobilizing actions upon IC (Catasús and Gröjer, 2006; Chiucchi and Montemari (2016)). The proposed case study shows that indicators can be not problematized when their score confirms the users' expectations. Nevertheless, the consistency between users' expectations and indicators' scores can be not deemed sufficient to prove the validity of the IC indicators and, thus, to support their use.

As mentioned, even if the IC Report was not consumed after its production, it was actually used during the production phase. The effects of this consumption are several. A first effect of the consumption is represented by the identification of new managerial objects. The evidence is consistent with the results achieved by Mouritsen (2009) and by Giuliani and Marasca (2011). The additional contribution offered by this case study relates to the evolution of these objects. The object called "IC", although designed and constructed by the management, was never able to fully grasp their attention and be managed in an on-going fashion, apart from the moments when it was constructed. In other words, at Alpha the life of "IC" as an object of managerial attention started with its definition and ended with its reporting. Regarding some of the new managerial objects like IT integration and company climate, as they began to be managed, they started "shining" on their own, independently of their inclusion within the IC measurement system. In other words, the design of an IC measurement system can offer the opportunity to identify new objects that can survive regardless of the use (or not) of the wider IC object. In conclusion, measuring can lead to the emergence of new managerial objects that can survive in spite of the frequency of the measurement itself or be imprisoned within the measurement process, i.e. when the measurement stops the

object disappears. According to the evidence collected, a factor that seems to influence the fate of these objects is how complex the object is; simpler objects are easier to comprehend while complex ones tend to disappear when the measurement process is interrupted because measurements become the main device for making reality understandable.

A second effect of the consumption is represented by the identification of new initiatives to manage IC or single resources (Chiucchi, 2013b). At Alpha this emerged with reference to the management of "key positions", since the measurement of the risk of losing competences promoted a more focused planning of the investments in coaching and on-the-job training in order to deal with risky situations. Implementing these kinds of indicators, referred to the so-called "Intellectual Liabilities" (De Santis and Giuliani, 2013), has captured the attention of the managers who started using the measurements without waiting for the whole project to end.

Another effect is related to the assignment of new meanings to the already existing measurements. In fact, the inclusion of old indicators within the IC measurement system can lead to a change in their meaning (Giuliani, 2013a, in press). This change happens because "old" indicators get related to one another in an unusual way, generating discussions on aspects and cause-and-effect relationships that tend to otherwise be overlooked, and also because combining "new" and "old" indicators can result in the latter being given new roles.

All these effects of the consumption can be also related to the fact that the production process followed, in general, a very limited "interactive" approach, i.e. an animated process, more or less organized/controlled by the CEO and the CFO, where all the participants were allowed to offer a contribution in circumscribed moments, namely at the beginning of the process (during the strategic and organizational analysis) and at the end, to validate indicators and to comment upon results.

6. Conclusions

The aim of this paper was to disentangle the production and consumption processes of IC measurements, i.e. to reflect on the relationship between design, implementation and use of IC measurements in practice. In order to achieve this aim, a longitudinal case study has been analysed adopting an interventionist approach.

This study shows the peculiarities regarding the production and consumption of IC measurements, from several perspectives. In particular, it emerges that the reporting of IC can, in some specific contexts, lead to the non-use of IC measurements and to the disappearance of the measured object, IC. What is questionable is whether it is the loss of interest in the IC object that has led to the non-use of the IC measurements or if it is the non-consumption of the measurements and their qualities that has implied the disappearance of the measurement object.

In addition, this study sheds a light on the fact that in an IC project the consumption of the measurements can occur not only at the end of the production process, but also (and may be especially) during the production process itself. This consumption can generate different effects such as the identification of new managerial objects, the establishment of new initiatives, the development of a deeper knowledge about how IC works or a change of the sense of some of the existing measurements. In all, the paper underlines the fact that how IC measurements are produced (the process followed and the "actors" involved) affects their actual consumption (or non-consumption).

This paper contributes to the extant literature regarding the production and consumption of IC measurements. Moreover, it contributes to the field of IC "in practice"

as it highlights what happens when an IC measurement system is implemented. Finally, the research work can contribute both to the studies regarding IC as an accounting change and to the ones regarding IC as a tool that facilitates organizational change. From the first perspective, the paper highlights how the introduction of IC has fostered long-lasting changes in the management accounting system, albeit circumscribed to the local (departmental) level. From the second perspective, the paper shows how IC may allow the creation of new managerial objects, thus promoting possible new actions.

It may be argued that the limitations of this study are mainly related to the adopted method. Regarding this aspect, the interventionist method tends to be criticized in dependence of the facts that the researchers can potentially influence the context under examination and be subjective in the analysis (Middel *et al.*, 2006). As far as the first aspect is concerned, the researchers' influence on the observed reality was kept at a minimum and the managers' perception of it was not altered. In fact, the production of the measurement system was interactive and the IC resources and the activities to be monitored as well as the established indicators were chosen through an iterative process. After some discussions and interviews with managers, the researchers made proposals which were first analysed, discussed, refined and integrated by the CFO and finally validated by the managers. As far as the second aspect is concerned, the risk of "going native" (Jönsson and Lukka, 2005, p. 20) was eliminated (or at least mitigated) by establishing periods of absence from the company and by keeping up the researchers' awareness of situations in which the involvement seemed to be too significant in order to keep, as far as possible, the "research gaze".

Future research could follow dual avenues. First, there is a need for more in depth longitudinal studies focused on the interplay between production and consumption of IC measurements from a practical perspective, as well as on the factors that may affect this relationship. In other words, this study opens up for a possible venue of research going beyond studies of how IC accounts are produced to study in which ways accounts are (or are not) consumed. Second, there is the need for additional contributions that can enrich the extant "theory of indicators".

Note

1. Pseudonym

References

Andriessen, D.G. (2004), *Making Sense of Intellectual Capital*, Butterworth-Heinemann, Burlington, MA.

Argyris, C., Putnam, R. and McLain Smith, D. (1985), *Action Science: Concepts, Methods, and Skills for Research And Intervention*, Jossey-Bass, San Francisco, CA.

Bay, C., Catasús, B. and Johed, G. (2014), "Situating financial literacy", *Critical Perspectives on Accounting*, Vol. 25 No. 1, pp. 36-45.

Bourne, M., Mills, J., Wilcox, M., Neely, A. and Platts, K. (2000), "Designing, implementing and updating performance measurement systems", *International Journal of Operation & Production Management*, Vol. 20 No. 7, pp. 754-771.

Catasús, B. and Gröjer, J.-E. (2006), "Indicators: on visualizing, classifying and dramatizing", *Journal of Intellectual Capital*, Vol. 7 No. 2, pp. 187-203.

Catasús, B., Errson, S., Gröjer, J.-E. and Wallentin, F.Y. (2007), "What gets measured gets […] on indicating, mobilizing and acting", *Accounting, Auditing & Accountability Journal*, Vol. 20 No. 4, pp. 505-521.

Chaminade, C. and Roberts, H. (2003), "What it means is what it does: a comparative analysis of implementing intellectual capital in Norway and Spain", *European Accounting Review*, Vol. 12 No. 4, pp. 733-751.

Chiucchi, M.S. (2008), "Exploring the benefits of measuring intellectual capital. The Aimag case study", *Human Systems Management*, Vol. 27 No. 3, pp. 217-230.

Chiucchi, M.S. (2013a), "Intellectual capital accounting in action: enhancing learning through interventionist research", *Journal of Intellectual Capital*, Vol. 14 No. 1, pp. 48-68.

Chiucchi, M.S. (2013b), "Measuring and reporting intellectual capital: lessons learnt from some interventionist research projects", *Journal of Intellectual Capital*, Vol. 14 No. 3, pp. 395-413.

Chiucchi, M.S. and Dumay, J. (2015), "Unlocking intellectual capital", *Journal of Intellectual Capital*, Vol. 16 No. 2, pp. 305-330.

Chiucchi, M.S. and Montemari, M. (2016), "Investigating the 'fate' of intellectual capital indicators: a case study", *Journal of Intellectual Capital*, Vol. 17 No. 2, pp. 238-254.

Coghlan, D. and Brannick, T. (2001), *Doing Action Research in Your Own Organization*, Sage, London.

Cuganesan, S. (2005), "Intellectual capital-in-action and value creation. A case study of knowledge transformation in an innovation process", *Journal of Intellectual Capital*, Vol. 6 No. 3, pp. 357-373.

Cuganesan, S., Boedker, C. and Guthrie, J. (2007), "Enrolling discourse consumers to affect material intellectual capital practice", *Accounting, Auditing & Accountability Journal*, Vol. 20 No. 6, pp. 883-911.

De Santis, F. and Giuliani, M. (2013), "A look on the other side: investigating intellectual liabilites", *Journal of Intellectual Capital*, Vol. 14 No. 2, pp. 212-226.

Dumay, J. (2009), "Intellectual capital measurement: a critical approach", *Journal of Intellectual Capital*, Vol. 10 No. 2, pp. 190-210.

Dumay, J. (2012), "Grand theories as barriers to using IC concepts", *Journal of Intellectual Capital*, Vol. 13 No. 1, pp. 4-15.

Dumay, J. (2013), "The third stage of IC: towards a new IC future and beyond", *Journal of Intellectual Capital*, Vol. 14 No. 1, pp. 5-9.

Dumay, J. and Rooney, J. (2011), "Measuring for managing? An IC practice case study", *Journal of Intellectual Capital*, Vol. 12 No. 3, pp. 344-355.

Edvinsson, L. and Malone, M.S. (1997), *Intellectual Capital*, Harper Business, New York, NY.

Ferreira, A. and Otley, D. (2009), "The design and use of performance management systems: an extended framework for analysis", *Management Accounting Research*, Vol. 20 No. 4, pp. 263-282.

Giuliani, M. (2009), "Intellectual capital under the temporal lens", *Journal of Intellectual Capital*, Vol. 10 No. 2, pp. 246-259.

Giuliani, M. (2013a), "Intellectual capital: an accounting change perspective", in Garcia, L., Rodriguez-Castellanos, A. and Barrutia-Guenaga, J. (Eds), *5th European Conference on Intellectual Capital – Bilbao, Academic Conferences and Publishing International, Reading, 11-12 April*, pp. 174-181.

Giuliani, M. (2013b), "Not all sunshine and roses: discovering intellectual liabilities 'in action' ", *Journal of Intellectual Capital*, Vol. 14 No. 1, pp. 127-144.

Giuliani, M. (2015a), "Intellectual capital dynamics: seeing them 'in practice' through a temporal lens", *Vine*, Vol. 45 No. 1, pp. 46-66.

Giuliani, M. (2015b), "Rome wasn't built in a day […] reflecting on time, intellectual capital and intellectual liabilities", *Journal of Intellectual Capital*, Vol. 16 No. 1, pp. 2-19.

Giuliani, M. (in press), "Sensemaking, sensegiving and sensebreaking: the case of intellectual capital measurements", *Journal of Intellectual Capital*, Vol. 17 No. 2.

Giuliani, M. and Marasca, S. (2011), "Construction and valuation of intellectual capital: a case study", *Journal of Intellectual Capital*, Vol. 12 No. 3, pp. 377-391.

Graham, C. (2008), "Fearful asymmetry: the consumption of accounting signs in the Algoma Steel pension bailout", *Accounting, Organizations and Society*, Vol. 33 No. 7, pp. 756-782.

Gröjer, J.E. (2001), "Intangibles and accounting classifications: in search of a classification strategy", *Accounting, Organizations and Society*, Vol. 26 No. 7, pp. 695-713.

Guthrie, J., Petty, R. and Johanson, U. (2001), "Sunrise in the knowledge economy: managing, measuring, and reporting intellectual capital", *Accounting, Auditing & Accountability Journal*, Vol. 14 No. 4, pp. 365-384.

Guthrie, J., Ricceri, F. and Dumay, J. (2012), "Reflections and projections: a decade of intellectual capital accounting research", *The British Accounting Review*, Vol. 44 No. 2, pp. 68-82.

Hines, R.D. (1988), "Financial accounting: in communicating reality, we construct reality", *Accounting, Organization and Society*, Vol. 13 No. 3, pp. 251-261.

Hopwood, A.G. and Miller, P. (1994), *Accounting as Social and Institutional Practice*, Cambridge University Press, Cambridge.

Ijiri, Y. (1967), *The Foundations of Accounting Measurement*, Prentice hall, Englewood Cliffs.

Johanson, U. and Henningsson, J. (2007), "The archaeology of intellectual capital: a battle between concepts", in Chaminade, C. and Catasús, B. (Eds), *Intellectual Capital Revisited: Paradoxes in the Knowledge Intensive Organization*, Edward Elgar, Cheltenham, pp. 8-30.

Johanson, U., Mårtensson, M. and Skoog, M. (2001a), "Measuring to understand intangible performance drivers", *European Accounting Review*, Vol. 10 No. 3, pp. 407-437.

Johanson, U., Mårtensson, M. and Skoog, M. (2001b), "Measuring to understand intangible performance drivers", *European Accounting Review*, Vol. 10 No. 3, pp. 407-437.

Jönsson, S. and Lukka, K. (2005), "Doing interventionist research in management accounting – GRI Report 2005:6", Gothenburg Research Institute, Göteborg.

Kaplan, R.S. (1998), "Innovation action research: creating new management theory and practice", *Journal of Management Accounting Research*, Vol. 10 No. 2, pp. 89-118.

Kasanen, E., Lukka, K. and Siitonen, A. (1993), "The constructive approach in management accounting research", *Journal of Management Accounting Research*, Vol. 5, pp. 243-264.

Labro, E. and Tuomela, T.-S. (2003), "On bringing more action into management accounting research: process considerations based on two constructive case studies", *European Accounting Review*, Vol. 12 No. 3, pp. 409-442.

Lukka, K. (2005), "Approaches to case research in management accounting: the nature of empirical intervention and theory linkage", in Jönsson, S. and Mouritsen, J. (Eds), *Accounting in Scandinavia – The Northern Lights*, Liber & Copenhagen Business School Press, Malmö, pp. 375-399.

Marr, B. and Chatzkel, J. (2004), "Intellectual capital at the crossroads", *Journal of Intellectual Capital*, Vol. 5 No. 2, pp. 224-229.

Mårtensson, M. (2009), "Recounting counting and accounting. From political arithmetic to measuring intangibles and back", *Critical Perspectives on Accounting*, Vol. 20 No. 7, pp. 835-846.

Meritum (2002), "Proyecto meritum: guidelines for managing and reporting intangibles", Madrid.

Middel, R., Coghlan, D., Coghlan, P., Brennan, L. and McNichols, T. (2006), "Action research in collaborative improvement", *International Journal of Technology Management*, Vol. 33 No. 1, pp. 67-91.

Mouritsen, J. (2006), "Problematising intellectual capital research: ostensive versus performative IC", *Journal of Intellectual Capital*, Vol. 19 No. 6, pp. 820-841.

Mouritsen, J. (2009), "Classification, measurement and the ontology of intellectual capital entities", *Journal of Human Resource Costing & Accounting*, Vol. 13 No. 2, pp. 154-162.

Mouritsen, J. and Larsen, H.T. (2005), "The 2nd wave of knowledge management: the management control of knowledge resources through intellectual capital information", *Management Accounting Research*, Vol. 16 No. 3, pp. 371-394.

Mouritsen, J., Larsen, H.T. and Bukh, P.N.D. (2001), "Intellectual capital and the 'capable firm': narrating, visualising and numbering for managing knowledge", *Accounting Organizations and Society*, Vol. 26 Nos 7-8, pp. 735-762.

Neely, A. and Bourne, M. (2000), "Why measurement initiatives fail", *Measuring business excellence*, Vol. 4 No. 4, pp. 3-7.

O'Donnell, D., Henriksen, L.B. and Voelpel, S.C. (2006), "Guest editorial: becoming critical on intellectual capital", *Journal of Intellectual Capital*, Vol. 7 No. 1, pp. 5-11.

Otley, D. (1999), "Performance management: a framework for management control systems research ", *Management Accounting Research*, Vol. 10 No. 4, pp. 363-382.

Petty, R. and Guthrie, J. (2000), "Intellectual capital literature review: measurement, reporting and management", *Journal of Intellectual Capital*, Vol. 1 No. 2, pp. 155-176.

Potter, B.N. (2005), "Accounting as a social and institutional practice: perspectives to enrich our understanding of accounting change", *Abacus*, Vol. 41 No. 3, pp. 265-289.

Robson, K. (1992), "Accounting numbers as 'inscription': action at a distance and the development of accounting", *Accounting, Organizations and Society*, Vol. 17 No. 7, pp. 685-708.

Rock, T.C. and Levin, B.B. (2002), "Collaborative action research projects: enhancing preservice teacher development in professional development schools", *Teacher Education Quarterly*, Vol. 28 No. 1, pp. 7-21.

Roslender, R. and Fincham, R. (2001), "Thinking critically about intellectual capital accounting", *Accounting, Auditing & Accountability Journal*, Vol. 14 No. 4, pp. 383-398.

Roslender, R. and Fincham, R. (2004), "IC: who counts, controls?", *Accounting and the Public Interest*, Vol. 4, pp. 1-23.

Simons, R. (2000), *Performance Measurement & Control Systems for Implementing Strategy*, Prentice Hall, NJ.

Skoog, M. (2003), "Visualising value creation through the management control of intangibles", *Journal of Intellectual Capital*, Vol. 4 No. 4, pp. 487-504.

Stewart, T.A. (1997), *Intellectual Capital*, Bantam Doubleday Dell Publishing Group, New York, NY.

Sveiby, K.E. (1997), "The intangible assets monitor", *Journal of Human Resource Costing & Accounting*, Vol. 2 No. 1, pp. 73-97.

Tayles, M., Bramley, A., Adsead, N. and Farr, J. (2002), "Dealing with the management of intellectual capital", *Accounting, Auditing & Accountability Journal*, Vol. 15 No. 2, pp. 251-267.

Vollmer, H. (2007), "How to do more with numbers: elementary stakes, framing, keying, and the three-dimensional character of numerical signs", *Accounting, Organizations and Society*, Vol. 32 No. 6, pp. 577-600.

Corresponding author
Marco Giuliani can be contacted at: m.giuliani@univpm.it