Activities and Outputs of a Clinical Faculty: an Intellectual Capital Concept Map

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Abstract: The concept of intellectual capital (IC) was used to evaluate the activities and outputs of a university medical department. First, a conceptual framework was developed to highlight the importance of various activities as dimensions of IC. The conceptualization of IC was further developed using concept mapping (CM). The authors first considered the problem of what comprises IC and determined whether previous researchers have defined IC in terms of activities. The importance of IC, its definition as an organizational resource and activity, the link between IC and value creation and extraction activities, and the problem of the associated composition of IC taken from existing European guidelines and regulations were discussed. To begin to construct a classification of activities and outputs, the information currently employed for assessing the research, education, and related academic activities and outputs of faculty members were analyzed. Four different evaluation approaches were compared to identify the activities and outputs of a university medical department, and to consolidate the information being collected for evaluation of universities, university-affiliated research institutes, researchers within universities, and faculty within university departments into an inclusive set of activities and outputs. These were two forms of IC reporting, one used in Austrian universities and the other at a university-affiliated Swedish research institute together with two other long-established means of assessing faculty, the Research Assessment Exercise in the UK, and the faculty evaluation and promotion requirements at the University of Toronto in Canada. Education administrators' perceptions were solicited to derive the IC used in a research faculty of a Canadian university. The results indicate that IC can be understood in terms of both activities and outputs. Clinical faculty can be expected to engage in research and its supervision, education, obtaining qualifications, clinical and professional practice, and service. Within these categories, individual activities and outputs were not considered to be of equal importance or impact. Among seventy activities and outputs, articles in internationally refereed journals was ranked as most important, whereas teaching awards was ranked as having the most impact by the most participants. This study extends existing research by using CM to generate a conceptual framework of IC for a department of medicine.

Keywords: intellectual capital, guidelines, concept mapping, university medical department, clinical faculty, education administrators

1. Introduction

Intellectual capital (IC) is a major source of competitive advantage for any organization. Since the beginning of the 1990s, a number of researchers have defined, classified, and measured IC to examine relationships among its components and its influence on performance in organizations (Castellanos, Rodríguez, & Ranguelov 2004; Leliaert, P.J.C., Candries, W., & Tilmans, R. 2003; Menor, Kristal, & Rosenzweig 2007). While there is still no generally accepted conceptual framework, new guidelines for reporting IC within organizations have been published. The MERITUM (Measuring Intangibles to Understand and Improve Innovation Management) guidelines represent an important consolidation of IC research (MERITUM Project 2002).

IC research, however, is still in the exploratory phase with no consensus on its meaning. Karl-Heinz Leitner (2004) is among a group of researchers currently investigating IC in European universities. Austria is the first country in the world to introduce compulsory IC reports for their universities. In a study of the specifics of IC reporting in Austrian universities, he states that IC reporting "…focuses on the identification of various forms of IC and tries to link them to outputs of the universities" (p. 137).

In light of the theoretical and empirical evidence, it is suggested that entire universities and departments in North America may not understand the use of IC and, in particular, the need to identify and manage their IC. The primary purpose of this study is to investigate the composition of IC in universities. The conceptual framework in Figure 1, adapted from models by Cañibano et al. (1999), Castellanos, Rodríguez, and Ranguelov (2004), Martínez-Torres (2006), Menor, Kristal, and Rosenzweig (2007), and the MERITUM Project (2002), will be used to understand the importance of activities and outputs relative to other dimensions of IC. We propose that activities undertaken in

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universities to create, disseminate, and use knowledge (e.g., research and education) and to develop operating capabilities (e.g., process changes and innovation) are an important part of IC.

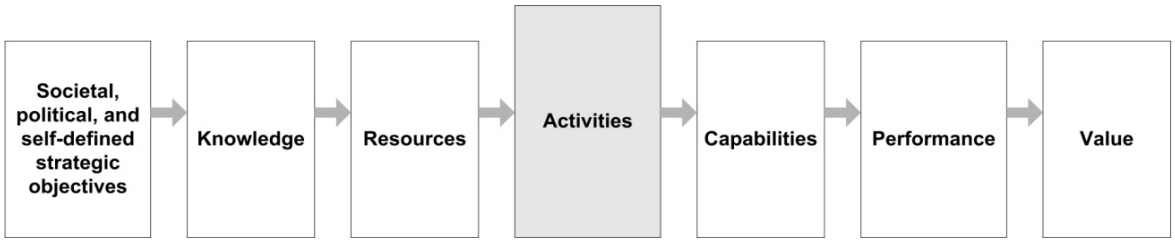

Figure 1: A framework of intellectual capital, capabilities, performance, and value

The primary research question raised in this study is what are the activities and outputs which comprise the IC of a Canadian university medical department.

- Is understanding the identification and measurement of IC considered useful?
- Is there any attempt being made to identify and measure IC?
- What data are currently available?
- What are the possible groupings of IC activities and outputs?
- How are these activities and outputs rated in terms of importance and impact?

2. Literature review

2.1 Importance of Intellectual Capital

The nature and value of IC and intangibles within organizations as a source of competitive advantage, although said to be extremely important, is not well understood (Bontis 1999; Swart 2006). In a review of the literature since 1997, Kaufmann and Schneider (2004) found that IC research "…is characterized by a large variety of views and interpretations—dominant schools of thought have yet to develop" (p. 366). Underlying the range of views and interpretations held by economists, accountants, managers, and researchers are the problems of the composition and measurement of a conceptual asset, not immediately embodied in physical form, which is intended to generate value. Patrick H. Sullivan (2000) refers to value creation as "…the generation of new knowledge and its conversion into innovations…" and value extraction as "…converting created value into a form that is useful to the organization…this often involves…cash or…some form of strategic position" (p. 226). To link IC to value creation and extraction processes, several international and intergovernmental organizations and national governments, mainly in Europe, have taken the lead in sponsoring the development of guidelines and regulations for reporting on IC.

2.2 Defining Intellectual Capital as an organizational resource and activity

The term IC was introduced by John Kenneth Galbraith in 1969. Interest in the nature of intangibles, considered by some to be analogous to IC, can be traced much further back to Yang in 1927 (in European Commission 2003: 15). Awareness of the increasing importance of investments in intangibles and IC within organizations has been followed by attempts in many fields to define and classify these terms as a basis for generating new information. In a review of major publications between 1997 and 2003, Kaufmann and Schneider (2004: 374) found that definitions for IC and related terms all can be characterized as being broad "…very abstract…and offer little help for practitioners or researchers". Past literature reviews (Brennan & Connell 2000; Cañibano, García-Ayuso, & Sánchez 2000; Kannan & Aulbur 2004; Petty & Guthrie 2000) and recent guidelines and regulations on IC reporting agree on the knowledge and value attributes of IC.

Current research suggests that in thinking about the composition of IC it is the interrelationships and interactions between resources and activities that are important. Table 1 shows definitions and example of the terms intangible resources, intangible activities, and critical intangibles from the MERITUM guidelines on IC reporting. In this study, the concept of IC is perceived as a knowledge-based asset which exists in different states within an organisation; as either an intangible resource (an immaterial, embodied, objectified, or static state) or an activity (a dynamic state of transformation) of value that can be measured in terms of indicators.

Table 1: Definitions and examples of the terms intangible resources, intangible activities, and critical intangibles from the MERITUM project (2002) guidelines

Terms	Definitions	Examples
Intangible resources	"…the stock or current value of a given intangible at a certain moment in time. They may or may not be expressed in financial terms" (p. 65)	Worker competencies (HC), intellectual property rights (SC), agreements with suppliers (RC)
Intangible activities	"…imply an allocation of resources aimed at: a) developing internally or acquiring new intangible resources, b) increasing the value of existing ones, or c) evaluating and monitoring the results of the former two activities" (p. 65)	Training (HC), R&D (SC), Employee surveys (RC)
Critical intangibles	"…the main factors, the key drivers, which contribute most to the value creation process. They embrace the core competencies the company possesses or needs to develop in order to attain its objectives" (p. 68)	Increase market share

2.3 Linking Intellectual Capital and value creation and extraction activities

2.3.1 The role of Intellectual Capital in organizations

Organisations require a stock of knowledge-based resources to function. The value created and extracted from resources by means of investments in, for example, research and education, is largely unmeasured. It is understood that organizations invest in IC to increase knowledge, reduce uncertainty, gain first access to market advantages, and create scalability and network effects (European Commission 2003). Realisation of the importance of valuing and measuring IC has emerged with the recognition of the existence of a large unquantified stock of intangibles that may be more beneficial to production and growth than cash, fixed capital, and tangible assets. It is not only the stock of resources which is of importance, but its use as a means of creating and extracting value (Hunter, Webster, & Wyatt 2005; MERITUM Project 2002; Sullivan 2000).

2.3.2 IC Reporting

A generally accepted means of analyzing IC in organisations for determining value does not exist. Guidelines for IC reporting are part of the ongoing effort to understand IC and find a means of generating comparable data. IC reporting for organizations is unique among instruments devised for management in that it is not based on measuring results by indicators (performance management) or assessing efficiency and effectiveness (evaluation), but the identification, measurement, and management of IC or intangible resources and activities (Leitner 2004).

2.4 The problem of the composition of Intellectual Capital

2.4.1 An overview of the European Intellectual Capital report

In the last decade, various guidelines and regulations for IC reporting have been developed for organisations in order to report information on IC that are not dealt with in financial statements or management reports. Prominent among the many sources of guidelines and regulations for IC reporting in Europe are the MERITUM Project, various accounting standard-setting bodies, and several governmental agencies, such as in Austria, Denmark, France, Germany, and Spain. Denmark was the first country in the world to publish a national guideline for IC statements in 2000, followed by legislation in 2001 that requires companies to disclose information on IC in their management reports. There is some agreement that the MERITUM guidelines contain the strongest and most rigorous conceptual framework (Guimón 2003). The MERITUM guidelines were selected here for comparison with the Austrian regulation for IC reporting to explore the role of IC in universities.

2.4.2 The MERITUM guidelines

In 2002, the MERITUM Project published guidelines for the management and reporting of information on intangibles. The guidelines were the result of research between 1998 and 2001 on intangibles (Bukh & Johanson 2003). Researchers from Denmark, Finland, France, Norway, Spain, and Sweden

participated in the MERITUM Project, directed by M. Paloma Sánchez, professor of applied economics, Autonomous University of Madrid.

2.4.3 The Austrian regulation on university Intellectual Capital report

Each Austrian university began publishing IC reports annually from 2006. The IC report is one of several reports in a complex university reporting system that is a consequence of the restructuring of the educational and legal framework of universities.

2.4.4 Intellectual Capital composition

In both the MERITUM guidelines and Austrian university regulation, the question of what IC is composed of is answered in terms of broad categories. In conceptualising IC, the guidelines identify and define different types of intellectual capital and intangibles, namely human capital (HC), structural capital (SC), relational capital (RC), intangible resources, intangible assets, intangible activities, and critical intangibles. The difference between intangible resources and intangible activities is of central importance to understanding the nature and composition of IC. Intangible resources classified as assets and skills are static and measurable at any given time. Intangible activities are dynamic and involve the allocation and use of intangible resources.

The Austrian regulation on university IC reports groups information on IC into three broad categories—IC, core processes, and the output and impact of core processes. The *Universities Act 2002* states that an IC report "…shall, as a minimum, present in itemised form:

- the sphere of action, social goals and self-imposed objectives and strategies;
- its intellectual capital, broken down into human, structural and relationship capital;
- the performance processes set out in the performance agreement, including their outputs and impacts" (s. 13).

In these two IC reporting concepts, IC is depicted as either a network of intangible resources and activities or a portfolio of inputs, processes, outputs, and impacts. It is questioned, here, whether inputs and outputs can be clearly demarcated, whereas the distinction between resources (i.e., assets and skills) and activities may be a more suitable structure for the identification of IC.

3. Methodology

IC research is still in its infancy. Recent applications of concept mapping (CM) suggest that this is a method uniquely suited to identifying and classifying the dimensions of IC (Burke et al. 2005). This study deals with the use of the IC of a university department and an exploration of education administrators' perceptions of the activities and outputs of a clinical faculty. This is the first use of CM to consider the components of IC in a university medical department. The Trochim approach of CM was used to structure the collection and analysis of the data for this study. In brief, there are six phases in this form of CM: (1) preparation, (2) generation, (3) structuring, (4) representation, (5) interpretation, and (6) utilization. Below, we describe how each phase was adapted to address the primary research question.

3.1 Preparing for Concept Mapping

In the first stage of CM, the major research question was decided and participants selected. We focused on activities that develop new or improve existing resources together with outputs because of the difficulty in demarcating activities from outputs. Given our primary interest in what comprises the IC of a university medical department, we selected senior academic medical education administrators at the University of Toronto (U of T), Canada, as the study population. These persons are policy makers, decision makers, educators, and researchers. The sample consisted of twenty-four participants from the Faculty of Medicine. Seven of 24 (29%) participants responded.

3.2 Generating a list of knowledge-based activities and outputs of clinical faculty

The first research goal was to quickly generate a list of activities and outputs of a university medical department. The focus statement used for generating the list was: "A specific activity or output that a clinical academic undertakes to acquire, produce, or increase the medical department's stock of intangible resources (e.g., knowledge, internal processes, and industry relationships) is..."

It is believed that an agreed classification system with shared meanings is a key component of an IC conceptual framework. The information currently employed for assessing activities and outputs for universities was analyzed from four sources: 1) the Austrian government's (2006) *Regulation on Intellectual Capital Reports* for universities, 2) the British Medical Association's (2005) report entitled *Research Assessment Exercise 2008 - Survey of Clinical Academics and Research Staff*, 3) the *Intellectual Capital Report 2004* of the Center for Molecular Medicine, Karolinska University, Sweden, and 4) the internal faculty evaluation and promotion documents of the Department of Medicine (DOM), U of T, published on their *Career Advancement* website. These four different forms of evaluation were compared to identify distinctive activities and outputs, and to consolidate the information being collected into an inclusive set of seventy items.

3.3 Structuring the activities and outputs

Structuring tasks involved obtaining the participants' perceptions of a consolidated list of seventy activities and outputs of the clinical faculty. For data collection, each participant received access to the CM questionnaire online. The first structuring task was to obtain groupings of the activities and outputs. For the grouping task, participants received the following instruction: Group these activities and outputs according to a common concept or in other words "place the items into piles in whatever way makes sense to you" (Kane & Trochim 2007). Next, participant ratings were collected on two measures of interest: importance and impact. Participants were given a Likert-type scale with '1' indicating little importance or impact, '2' indicating some importance or impact, '3' indicating medium importance or impact, '4' indicating much importance or impact, and '5' indicating a lot of importance or impact.

The research protocol received approval by the Social Sciences, Humanities and Education Research Ethics Board at the U of T prior to recruitment. Informed consent was obtained from the participants at the start of data collection. Each participant received a monetary reimbursement of $10 for their contribution.

3.4 Representation, interpretation, and utilization

Concept Systems (CS) software was used to collect and analyze the participant data using multidimensional scaling (MDS) and hierarchical cluster analysis (HCA) and to represent it in the form of various concept maps and quantitative summaries. MDS locates items as separate points on a map with items closer to each other showing stronger affinities. HCA partitions items into clusters. Average ratings were computed for each item and cluster. The two ratings were compared and analyzed using pattern matching and go-zone graphs.

4. Grouping and rating of clinical faculty's activities and outputs

CM structuring "…yields a conceptual framework for how a group views a particular topic or aspect of a topic" based on data about the similarity and rating of a set of items (Galvin 1989; Trochim 1989 cited by Burke et al. 2005: 1393).

4.1 Point and point cluster maps

The point map of the seventy activities and outputs of the clinical faculty is shown in Figure 2. A stress value of 0.2263 implied that the point map is a close approximation of the group similarity matrix. The point map has a point for each item. Their proximity (not exact location, but distance between them) shows items most likely to have been grouped together by participants.

The next analysis of the sorted data was a grouping of the activities and outputs to reflect similar concepts using HCA. The type of HCA used was Ward's HCA which partitioned the X-Y MDS scaling coordinate values into clusters on a point cluster map. Figure 3 shows the activities and outputs grouped into 6 clusters on the point cluster map. The authors chose the number of clusters based on the average number of groupings and an examination of the items being merged by participants. Each cluster contains activities and outputs that were most likely to have been grouped together by participants. Together, the point and point cluster maps constitute the conceptual framework generated. A list of the activities and outputs in each cluster is given in Table 2. Based on an analysis of the cluster labels provided by the CS core program, the contents of each cluster, and the suggested labels of the participants, the terms that seem to best describe the 6 clusters are (1)

Research, (2) Research Supervision, (3) Education, (4) Clinical and Professional Practice, (5) Service, and (6) Qualifications.

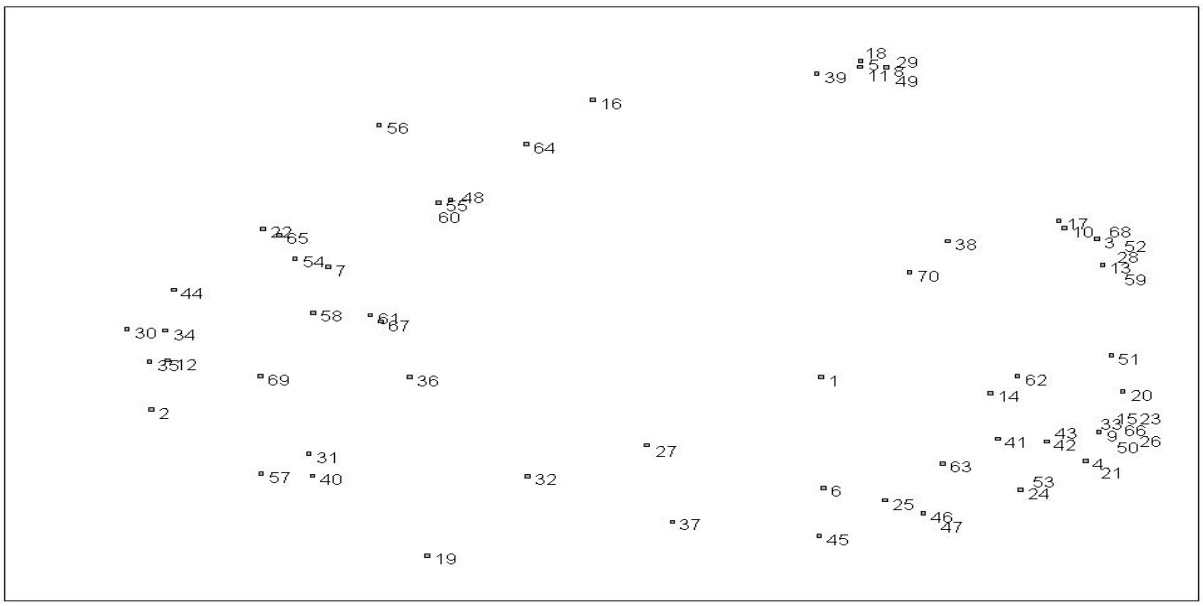

Figure 2: Activities and outputs point map

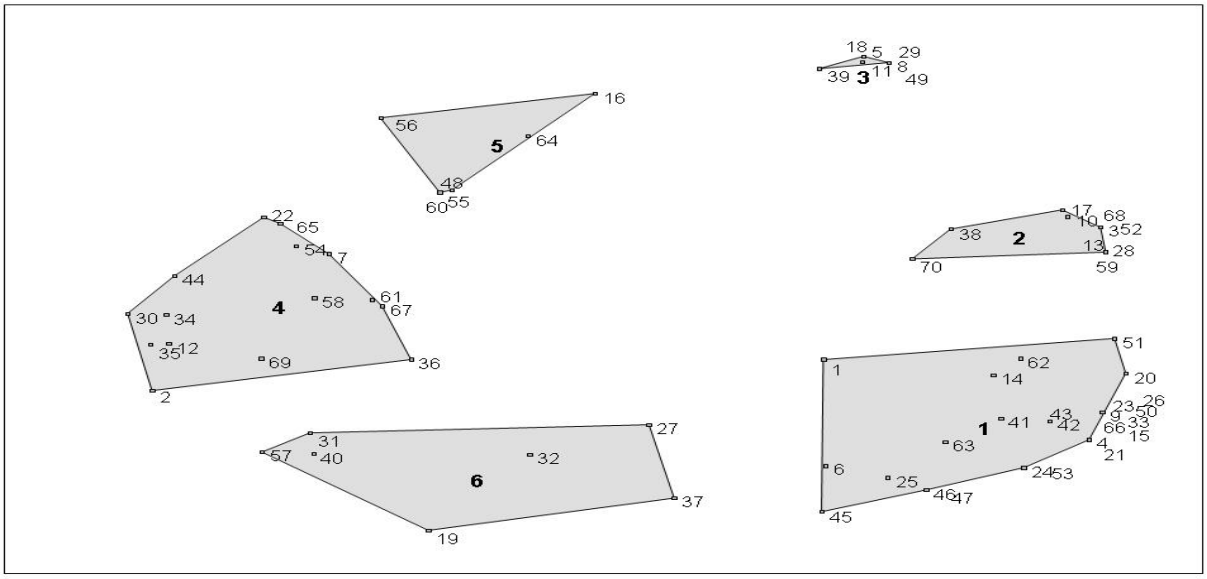

Figure 3: Activities and outputs point cluster map

4.2 Point and cluster ratings

Participants were asked about the level of importance and impact they attached to the seventy activities and outputs. *Importance* refers to how important the activity or output is for the purpose of assessing the performance of the clinical faculty. The average levels of importance ranged from 2.14 to 5. *Publications: Articles in international refereed journals (53)* was ranked as most important with an average importance rating of 5 by participants, followed by *Publications: Research papers (4)* with an average importance rating of 4.86. An additional 24 items were also ranked highly (i.e., of much and a lot of importance). *Impact* refers to how the activity or output gives rise to results which contribute to a department's strategic objectives and are measurable. The average levels of impact ranged from 2.43 to 4.86. *Teaching awards (11)* was ranked as having the most impact with an average impact rating of 4.86 by most participants, followed by *Publications: Articles in international refereed journals (53), Publications: Research papers (4), Number of hours of formal teaching (i.e., scheduled) (29), and*

Honour, prizes, or awards received (32) each with an average importance rating of 4.71. An additional 23 items were also ranked highly (i.e., of much and a lot of impact).

Participant ratings were combined with the multivariate analyses to produce aggregated average ratings for each statement and cluster. First, the importance and impact ratings were averaged for each statement and then the ratings were averaged for each cluster as shown in Table 2. The Research Supervision cluster received the highest importance rating. Research Supervision was followed by Education, Research, Qualifications, and Clinical and Professional Practice all considered of medium importance and Service of some importance. The Education cluster received the highest impact rating. Education was followed by Research Supervision considered of much impact, and Research, Qualifications, Clinical and Professional Practice, and Service all considered of medium impact.

Table 2: The seventy activities and outputs grouped in six clusters with average importance and impact ratings

Activities and Outputs (Item Numbers)	Importance Rating	Impact Rating
Research		
Publications: Articles in international refereed journals (53)	5.00	4.71
Publications: Research papers (4)	4.86	4.71
Number of grants (50)	4.57	4.29
Investigator of ongoing evaluated research and development projects funded by the university (33)	4.43	4.14
Research fellowships (51)	4.43	4.00
Investigator of ongoing research and development projects supported by third-party funds (26)	4.29	3.57
Type of grants obtained: Local, pharmaceutical (9)	4.29	3.71
Type of grants obtained: Government (23)	4.14	4.29
Publications: Editorials (46)	4.00	4.14
Publications: Authored Books (24)	4.00	3.71
Publications: Systematic reviews (21)	4.00	3.86
Committees: Editor, editorial board (6)	3.86	3.57
Type of grants obtained: Other (15)	3.71	3.43
Publications: Reviews (47)	3.71	3.86
Financial value of grants (43)	3.57	3.71
Committees: Trial steering (14)	3.43	2.86
Type of grants obtained: Charities (25)	3.29	3.86
Patents awarded (20)	3.29	3.00
Other research (66)	3.14	2.71
Publications: Other (45)	3.14	3.29
Committees: Data monitoring (62)	3.14	2.86
Councils: Research society (1)	2.86	2.57
Number of reviews performed by ethics committees (41)	2.86	3.29
Public involvement in research activities (42)	2.86	3.29
Number of patients involved in clinical trials, performance assessments and other clinical studies (63)	2.57	2.71
Average:	**3.74**	**3.61**
Research Supervision		

Activities and Outputs (Item Numbers)	Importance Rating	Impact Rating
Research student supervision: Dissertations completed (59)	4.57	4.14
Research student supervision: PhD (13)	4.57	4.29
Research student supervision: MD (68)	4.29	4.14
Number of presentations held as invited speaker or selected presenter at scholarly events (38)	4.29	4.14
Research student supervision: Funded for research and development projected supported by university or third-party funds (10)	4.14	4.00
Presentations (70)	4.00	4.14
Research student supervision: UG (28)	4.00	3.86
Research student supervision: MSc (3)	3.86	4.00
Number of graduate students (17)	3.86	4.29
Research student supervision: BSc (52)	3.71	3.29
Average:	**4.13**	**4.03**
Education		
Teaching awards (11)	4.71	4.86
Number of hours of formal teaching (i.e., scheduled) (29)	4.43	4.71
Courses taught (49)	4.14	4.29
All types of examination related activities including subject and final examinations and examinations before a committee (18)	3.71	3.86
Number of hours of informal teaching (i.e., non-scheduled, e.g., clinical teaching rounds) (8)	3.57	4.00
Preparation and reviewing of teaching contents (5)	3.29	4.14
Other educational (39)	2.71	2.86
Average:	**3.80**	**4.10**
Clinical & Professional Practice		
Contributions to the development of professional practice (69)	4.29	4.14
New medical treatments or diagnostic programs in progress (34)	4.14	4.29
Exemplary professional practice (12)	4.14	3.86
Treatment and care of patients (30)	3.43	4.00
University, hospital, and other positions held (58)	3.43	3.71
Committees: Universities (61)	3.29	4.00
Administration: Universities (36)	3.14	4.43
Clinical appointments (i.e., positions held) (2)	3.00	3.14
Councils: Professional (7)	2.86	2.86
Other service (54)	2.71	2.71
Administration: Other (67)	2.71	2.86
Public service: Other (65)	2.71	2.57
Number of patients (35)	2.43	3.29
Other clinical practice (44)	2.43	2.57
Other professional (not creative professional activity) (22)	2.14	2.43
Average:	**3.12**	**3.39**

Activities and Outputs (Item Numbers)	Importance Rating	Impact Rating
Service		
Administration: Educational (16)	3.86	4.43
Public service: Research leader in information meetings with patient organizations (55)	3.00	3.43
Public service: Participation in public debates (48)	2.86	3.29
Public service: Media interviews (60)	2.71	3.00
Number of completed training programs for medical specialists (64)	2.71	3.43
Other education and training received (56)	2.57	2.71
Average:	**2.95**	**3.38**
Qualifications		
Honours, prizes, or awards received (32)	4.71	4.71
Professional innovation (31)	4.14	4.29
Professional opinion paper (37)	3.57	3.71
Spin-off company created (27)	3.14	2.57
Other creative professional activity (40)	3.00	2.86
Degrees earned (19)	3.00	3.14
Non-medical degrees (i.e., bachelors, masters or diploma degrees other than medicine) earned (57)	2.71	2.57
Average:	**3.47**	**3.41**

4.3 Pattern matching and go zones

The two rating variables of importance and impact were compared using pattern matching. Figure 4 shows the pattern match for importance versus impact. The figure shows that there was consensus among the participants in the rating priorities for both variables with the exception of the first two clusters Research Supervision and Education. The participants rated Research Supervision of higher importance than Education and Education of higher impact than Research Supervision. The Pearson product-moment correlation of (r = 0.84) showed a strong relationship between the two ratings.

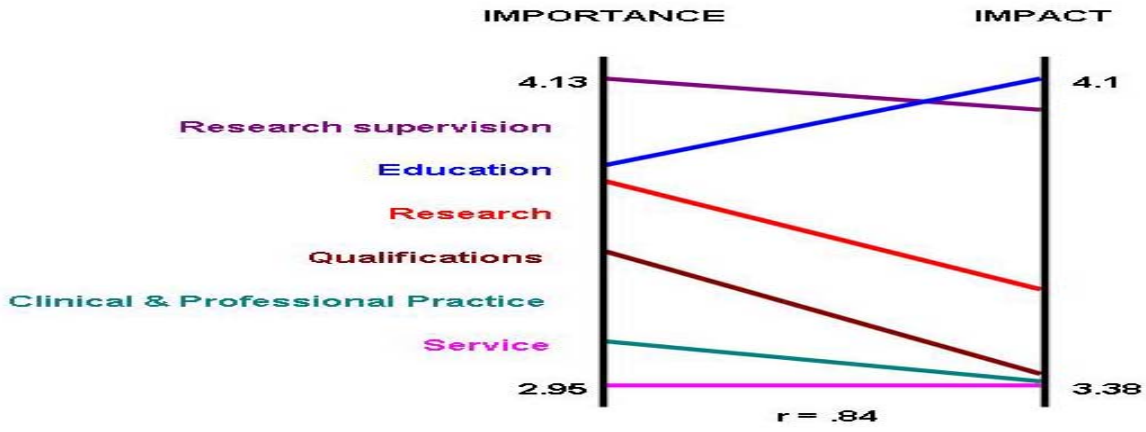

Figure 4: Pattern match for importance versus impact

In summary, there is substantial agreement among education administrators on the following:

- The categorization of seventy possible activities and outputs of clinical faculty as research supervision, education, research, qualifications, clinical and professional practice, and service

- Publications: Articles in International Refereed Journals was the output ranked as being most important for the purpose of assessing an individual's performance
- Teaching Awards was the output ranked as having the most impact for the purpose of giving rise to results which contribute to a department's strategic objectives and are measurable
- The Research Supervision cluster received the highest importance rating
- The Education cluster received the highest impact rating
- For the other clusters, there was consensus in the rating priorities for both importance and impact
- Based on a comparison of the relative ratings of activities and outputs within each cluster for importance and impact, the items in Figure 5 were likely to be more important and have more impact

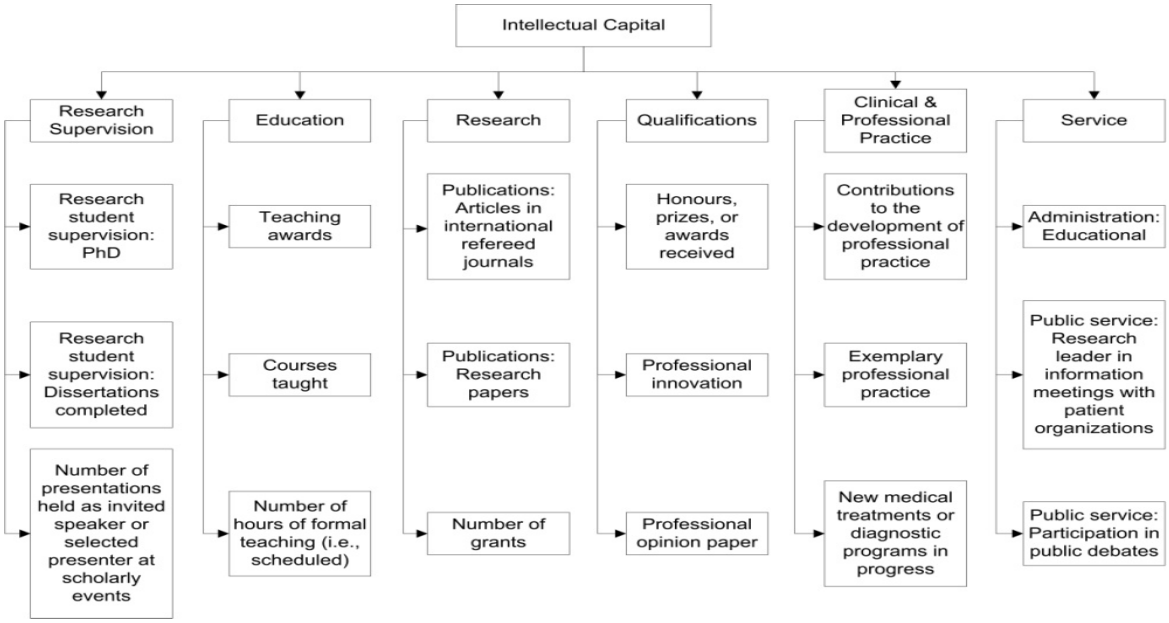

Figure 5: The intellectual capital of clinical faculty in a university department of medicine as described by senior academic medical education administrators

The variables importance and impact were used to consider whether there are differences in the roles of the activities and outputs of faculty for the purpose of assessing individual and departmental performance. The results suggest that there was a perceived difference: the Publications: Articles in International Refereed Journals and Research Supervision activities of clinical faculty were most important with regard to individual performance, while the Teaching Awards and Educational activities of clinical faculty had the most impact with regard to departmental performance.

5. Discussion

This study explored the use of IC in a university department. It extends existing research about the dimensions of IC in universities by examining the possible activities and outputs of a clinical faculty in a university department of medicine and considering education administrators' perceptions of these activities and outputs. The findings of the study are integrated to address six research questions with reference to the literature review, proposed conceptual framework for IC reporting, and CM method.

The first three research questions focused on determining whether universities understand and hold the identification and measurement of IC to be useful, whether there are any attempts being made to identify and measure IC in universities, and, if so, what data are available. The literature on IC suggests that, with some important exceptions, universities do not understand and may not hold the identification of IC to be useful. There are few studies on IC in universities. Wall's (2005) survey of 100 public sector organizations in Northern Ireland, including 24 education institutions and boards, is a notable exception. The literature on IC in universities suggests that, if a similar survey were to be carried out in universities in North America to investigate their understanding of the term IC and perceptions of the usefulness of its identification and measurement, there would be little understanding and consensus largely due to the lack of a commonly accepted definition of the term

and conceptual framework. In universities, associated with this is a basic inability to characterize not only research, but education, service, third missions (relationships with industry, public authorities, and society) and related academic activities because of a lack of data (Schoen, Laredo, Bellon, & Sánchez 2007). Important exceptions are universities in Austria and researchers in universities mainly in Europe who began studying IC in universities only recently.
The literature on IC in universities can be summarized as follows:

- Few researchers are studying IC (mainly in Europe). In Spanish-led research initiatives emphasis is placed on developing universally accepted guidelines for reporting IC. One initiative—the Observatory of European Universities project—aimed to enhance the internal strategic capabilities of universities by developing a methodological framework for the characterisation of university research activities by linking strategic issues and thematic dimensions (i.e., funding, human resources, academic outcome, third mission, and governance) (Schoen, Laredo, Bellon, & Sánchez 2007).
- IC studies are still in the exploratory stage, including, for example, assessing various aspects of IC reporting (Leitner & Warden 2004; Renzl 2006; Sanchez & Elena 2006), the identification of knowledge drivers of R&D&T capital (Castellanos, Rodríguez, & Ranguelov 2004), and the identification of intangible assets comprising IC (Martínez-Torres 2006).
- Austria is attempting to redefine the way its universities view themselves from an IC perspective. Since 2006, twenty-one universities in Austria report IC annually by law. Among these are three independent medical universities established in 2004, from university medical faculties in Vienna, Graz, and Innsbruck.
- There has been recognition of the economic importance of applied as distinct from basic research since the 1970s, and recognition of IC in universities by policy makers, including national governments, the OECD, World Bank, and European Commission (European Commission 2006; Mowery & Sampat 2005; OECD 2006). This has come about due to efforts to use universities as institutions for economic development by forcing universities to become less dependent on public funding.

A literature review indicates that universities in North America do not use the term IC, but they do collect IC data to provide a link between performance and faculty evaluation and promotion or university funding. A fundamental question remains unanswered: What comprises the IC of a university (and every level within it)? To those interested in measuring and managing IC, data on activities related to IC is particularly important. We suggest that the *activities* (or core processes) of an organization is a group which from an IC perspective can be defined as "…an allocation of resources aimed at: a) developing internally or acquiring new intangible resources, b) increasing the value of existing ones, or c) evaluating and monitoring the results of the former two activities" (MERITUM Project 2002: 65).

The literature offers possible definitions of terms, classifications, and conceptual frameworks that universities can use to report IC. Classifications identify possible components of IC, such as human, structural, and relational knowledge-based assets. IC frameworks explain the structural relationships that may exist between, for example, resources and activities, or inputs, processes, and outputs—terms that have meaning within universities. Based on an analysis of exploratory IC research, we

- Defined IC as a knowledge-based asset which exists in different states within an organisation, as either an intangible resource or an activity of value that can be measured in terms of indicators
- Using IC frameworks put forward by Cañibano et al. (1999), the MERITUM Project (2002), and Sullivan (2000), focused on activities as an important dimension of IC in universities with outputs included because they touch on IC, are used as performance measures, and may not be differentiated from activities
- Applied the model for the analysis of intangibles developed by Cañibano et al. (1999) and the MERITUM Project (2002) to generate a list of seventy activities and outputs of clinical faculty (Table 2) from four sources: regulations for university, including medical university, IC reporting; a university-affiliated medical research institute's IC report; a nation's faculty research assessment exercise; and a university medical department's faculty evaluation and promotion requirements
- Found that the specific variables differ in the literature and among the sources used to construct a list of the activities and outputs of clinical faculty in a university medical department

- Assessed these activities and outputs by means of a participant-generated grouping and rating of the importance they attach to and perceived impact of each activity and output

The CM methodology was used to map participants understanding of what comprises the activities and outputs of clinical faculty. It was based on the reporting by universities, a university medical department, and a university-affiliated medical research institute of what clinical faculty are actually doing, i.e., their activities and outputs and also the literature on the topic of IC. A CM or conceptual framework of the activities and outputs of clinical faculty is reported here from the unique perspective of educational administrators at the Faculty of Medicine, U of T. In order of priority based on a comparison of importance and impact ratings, which reflect consensus of thought among participants, faculty in the Department of Medicine at U of T can be expected to engage in the following types of activities: research supervision, education, research, qualifications, clinical and professional practice, and service. In Figure 5, the top three activities and outputs within these six groups are shown (in order of priority based on a comparison of the relative importance and impact of each). In the case of a university department of medicine, the results indicate that faculty's activities and outputs, particularly in research supervision, education, and research, are not only important for assessing the performance of faculty, but give rise to results with contribute to the department's strategic objectives and are measurable. The study suggests that in light of existing guidelines and regulations for IC reporting, the requirements for university internal self-evaluation at the departmental level can provide data useful for IC reporting.

Using the perceptions of educational administrators to create a conceptualization of IC based partly on existing requirements for faculty evaluation and promotion or, in other words, how they account for IC, the study suggests that there is consensus of thought among participants in terms of the grouping and rating of activities and outputs which resulted in a conceptualization of one dimension of IC—activities with outputs that touch on IC mixed in. It is argued that six groups of knowledge-based activities can be used to describe the IC of the DOM at the U of T, and CM can be used to develop frameworks for conceptualizing IC in other university departments based on data about the similarity and rating of activities. Based on these findings, it is suggested that the composition of IC includes open and closed groupings; open groupings for components that can be constantly added and deleted, e.g., types of activities such as research for creating or extracting IC; closed groupings for components that explain relationships between the open groupings—but may have little meaning on their own, e.g., intangible resources and intangible activities.

5.1 Motives for using IC reporting in universities: linking the activities of academics to Intellectual Capital, value creation, and value extraction

Even though a few universities are interested in and recognize the importance of establishing indicators for measuring and managing their IC, there is still no clear understanding of IC on which to base measures. In their article, *Discussing the Dynamics of Intellectual Capital in Universities: A Model for Reporting*, Sánchez, Elena, and Castrillo (2007) stated that, "HE [higher education] organizations should use the Intellectual Capital (IC) framework as a heuristic tool to aid them in their new management challenges and diffuse their intangible resources and activities to their stakeholders and society at large" (p. 3). Yet, evidence is inconclusive about how best to identify, classify and measure IC for internal management reporting purposes (Brennan & Connell 2000: 213). Based on the literature, four assumptions underlying this research were that:

- a university department's performance depends on the IC of its faculty members;
- classifying and measuring IC—resources and activities (which produce resources)—is a necessary step in measuring performance;
- demonstrating that investments in IC lead to improved performance is critical; and
- departments measuring the IC of faculty outperform departments that do not.

IC covers a broad range of resources and activities. It is widely argued that the most important component of IC is HC and, in universities, HC accounts for most of the value created. HC is described as the knowledge, skills, intellect and talent of individuals which varies in terms of its uniqueness and value (Swart 2006). In a discussion of some issues in IC reporting at the Department of Management and Tourism, University of Innsbruck, Birgit Renzl (2006) stated that "The primary objective is more transparency about activities related to intellectual capital" (p. 300). In the 2004 IC report prepared by the Department of Management and Tourism the following activities were identified: research, teaching, further training, services, commercialisation, and networking (Renzl

2006). At the DOM, U or T, elsewhere at the university, and it can be assumed at universities throughout Canada, the process of faculty evaluation and promotion assesses the performance of individual faculty by identifying elements of their research, teaching, service, and related academic activities and outputs. In this way, the capabilities of individuals are being assessed within departments and throughout the university. However, this information is incomplete—it does not show whether and how value has been created or extracted by faculty linked to strategic objectives and performance measures. Undoubtedly, these core functions are related to value. There are many end products of these activities which can be identified and valued, including publications, dissertations, patents, consulting processes, improved organizational efficiencies, and improved innovative capabilities (measured by individual and group-based performance indicators). Given that there is no common international conceptual framework for IC or guidelines for IC reporting, to begin the process of developing an IC reporting system for Canadian universities—based on the results of this study—I suggest that in Canada where faculty embody IC and universities have no prior experience in IC reporting, the activities of faculty compiled from best practices in universities for IC reporting and performance measurement, could serve as a basis for introducing universities to the concept of IC. The conceptual framework for IC reporting in Figure 1 is one possible model for the identification of IC in universities.

In examining past literature reviews on IC, many questions motivating IC research were uncovered about the need to achieve consensus on the definition and classification of IC and intangibles. The observation that universities lack an understanding of IC on which to base performance measures generates the question: "What information do education administrators have to offer that can be used in developing IC measures?" This is appropriate because education administrators are responsible not only for organizing and conducting educational programs, but also for organizing and conducting evaluations of the performance of faculty. Their experience in evaluating faculty in their teaching and research roles provides grounds for optimism about their ability to identify, measure, and manage IC. The suggestion is that education administrators have valuable information that can be used in standardizing guidelines for the managing IC because they understand everyday activities, i.e., faculty in their various education, research, and service roles; management challenges; university and departmental strategy; and indicators. They should also understand the need to invest in IC as part of a culture that understands, values, and raises the profile of IC in university medical schools and work towards standardized guidelines and metrics for IC measurement. In conceptualizing IC in universities, it seems important to not only be clear about the problems that the identification and measurement of IC can solve, but also to ground IC measures in everyday activities.

6. Conclusion

Assuming that activities defined as "…an allocation of resources aimed at: a) developing internally or acquiring new intangible resources, b) increasing the value of existing ones, or c) evaluating and monitoring the results of the former two activities" (MERITUM Project 2002: 65) comprise IC, in the DOM at the U of T where the mission statement is "We prepare future health leaders, contribute to our communities, and improve the health of individuals and populations, through the discovery, application and communication of knowledge" (Dept. of Medicine, *Collaborating for Excellence: Strategic Plan 2005-2010:* 7), based on the perceptions of education administrators, IC in a university department of medicine can be operationalized as a factor to be described and possibly measured in terms of activities. A possible application of this study is to report on activities of faculty in university departments as IC. Future research is needed to continue to explore the concept of IC by:

- Generating concept maps of the activities of other departments from an IC perspective
- Exploring relationships between strategic objectives, activities, and value to develop activity-based IC measures

There are several limitations of this study. The study focused on a very narrow aspect of a complex and not well understood concept. The CM aims to display all of the knowledge-based activities and outputs which comprise IC in a university medical department, show how these activities and outputs are related to each other, and which are more important and have the most impact. The researcher-generated list of seventy activities and outputs may not represent the entire conceptual domain of interest. And, given the small number of respondents, it is not appropriate to generalize the findings. Despite its limitations, this study is an important endeavour to better understand the concept of IC in a university department of medicine which characterizes the activities of clinical faculty as dimensions of IC.

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