Perceptions on Complexity of Decisions Involved in Choosing Intellectual Capital Assessment Methods

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Abstract: Intellectual capital (IC) is increasingly acknowledged as a dominant strategic asset and a major source of competitive advantage for organisations. Despite an overwhelming body of literature on methods, models, systems and frameworks for assessment of IC, and increased awareness of the need for such assessment, relatively few organisations are actively and comprehensively assessing their IC. Choosing an appropriate method is problematic. It has been argued that, due to the complexities involved in choosing (selecting and customising) an appropriate method for assessing intellectual capital in a particular context, management support systems with knowledge components are needed for managing the evolving body of knowledge concerning the assessment of intellectual capital. To empirically test this argument, a survey making use of a self-administered questionnaire was performed to test perceptions of suitable consultants, practitioners and researchers on the complexity levels of decisions to be made in selecting and customising methods for assessment of IC. Respondents were selected through convenience sampling coupled with snowball sampling. Data collected on respondents themselves confirms their expert status regarding IC and aspects thereof. The majority of these respondents indicated that, given any particular context, the decisions involved in selecting and customising an appropriate method for assessment of IC is often or always very complex. Decisions involved in selection are perceived as marginally more complex than decisions involved in customisation. Respondents provided valuable insights and rich examples of scenarios on the higher and lower regions of the complexity scale for the decisions involved in the selection, as well as, for the decisions involved in the customisation of IC assessment methods. It is concluded that the perceived complexity of the decisions involved in choosing IC assessment methods supports the notion that supporting systems are required to assist human decision makers in making sense of the complexities involved in choosing IC assessment methods.

Keywords: intellectual capital, intangible assets, methods of assessment, complexity of choice, management support systems

1. Introduction

Intellectual capital (IC) – also referred to as intangible assets, knowledge assets, core competencies or goodwill – is increasingly acknowledged as a dominant strategic asset, and a major source of competitive advantage for organisations (Teece 2003; Koulopoulos & Frappaolo 1999; Harrison & Sullivan 2000; Sánchez, Chaminade & Olea 2000; Housel & Bell 2001; Kalafut & Low 2001; Holsapple 2003; Kannan & Aulbur 2004; Mouritson, Bukh & Marr 2004; Park 2005). Despite an overwhelming body of literature on methods, models, systems and frameworks for assessment of IC, and increased awareness of the need for such assessment, relatively few organisations are actively and comprehensively assessing their IC (Andriessen 2004b; Best Practices, LLC 1999; Chen, Zhu & Xie 2004; Bontis 2001; Green 2005; Marr 2005; Pretorius & Coetzee 2005; Smith & McKeen 2003).

Smith and McKeen (2003:354) note that both practitioners and academics have conveyed "frustration and dissatisfaction" with the capability of current methods to assess intangibles such as IC. According to Klein (1998:6) the IC of professionals (constituting the building blocks of the IC of organisations) is typically measured by "rough indicators such as education and years on the job". Van Buren (1999:72) notes that organisations have "only a vague understanding of how much they invest in their IC, let alone what they receive from those investments". Almost a decade later Sullivan and McLean (2007:36) refer to assessment of this kind as the "confusing task of measuring intangible value".

Pretorius and Coetzee (2005) argue that, due to the complexities involved in selecting and customising an appropriate method or combination of methods for assessment of IC, there is a need for management support systems with knowledge components to manage (organise, store and retrieve) the evolving body of knowledge concerning such assessment. Since the sensibility and usefulness of any supporting system for choosing (selecting and customising) IC assessment methods is critically dependent on judgement concerning the complexity of this process, perceptions on the levels of complexity involved in choosing IC assessment methods need to be tested empirically

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before proceeding to design and develop such systems. This paper reports on the methodology and results of a survey performed to test perceptions of suitable experts on the complexity levels of decisions to be made in selecting and customising a method (or combination of methods) for assessment of IC. (These results confirm but also complement interim results based on a smaller sample, as reported in Pretorius and Coetzee (2007).)

2. Terminology

The following sub-sections explain some of the terminology of this paper.

2.1 Intellectual capital

According to Brooking (1999) "intellectual capital" refers to the collective intangible assets that enable an organisation to function, including market assets, intellectual property assets, human centred assets and infrastructure assets. As illustrated in Figure 1, similar to the components of IC identified by Brooking (1999), but not explicitly including intellectual property assets, Sveiby, as cited by Bontis (2001), refers to three of these categories as individual competence, external structure and internal structure respectively. Stewart, as quoted by Smith and McKeen (2003:356), states that it is "generally agreed by academics" that IC consists of "at least" three categories, namely human capital, structural capital and customer capital. This third category is also referred to as relational capital, including in that notion not only relationships with customers, but also relationships with other stakeholders. De Pablos (2004:231), for example, defines relational capital as "knowledge in the form of business connections with customers, suppliers, shareholders, alliance partners and other agents". Edvinsson and Malone, as cited by Kannan and Aulbur (2004), subdivide structural capital into organisational capital, process capital and innovation capital.

	Brooking	**Sveiby**	**Stewart**	**Edvinsson and Malone**
Intellectual Capital (IC)	Human Centred Assets	Individual Competence	Human Capital	
	Market Assets	External Structure	Customer Capital	
	Infrastructure Assets	Internal Structure	Structural Capital	Organisational Capital
				Process Capital
				Innovation Capital
	Intellectual Property Assets			

Figure 1: Components of IC source: extended from Pretorius and Coetzee (2005)

2.2 Assessment

Although the terms "measurement", "(e)valuation" and "assessment" are often used interchangeably, authors such as Andriessen (2004a), reflecting on the work of Rescher and Swanborn, notes a distinctive difference between measurement and (e)valuation: Rescher (1969:61) portrays "valuation" (employing the term "evaluation") as "a comparative assessment or measurement of something with respect to its embodiment of a certain value". Swanborn (1981:61-62), on the other hand, describes "measurement" as "the process of assigning scaled numbers to items in such a way that the relationships that exist in reality between the possible states of a variable are reflected in the relationships between the numbers on the scale". In this paper the word "assessment" includes measurement, (e)valuation and all other such notions for determining value.

2.3 Context

Existing literature suggests that the appropriateness of assessment methods depends on factors or dimensions such as:

- Audience (Sveiby 2007);
- Business sector (Malhotra 2003);
- Goals and objectives of organisation (Harrison & Sullivan, 2000; Smith & McKeen 2003);

- Industry and line of business (Van Buren 1999);
- Level of assessment (Sánchez, Chaminade & Olea 2000; Smith & McKeen 2003);
- Purpose of or motivation for assessment (Andriessen 2004a; Housel & Bell 2001; Sveiby 2007);
- Level of resources the organisation is willing to commit towards assessment of IC (Harrison & Sullivan 2000); and
- Size of organisation (O'Sullivan 2005).

"Context" is here interpreted as a vector comprised of factors such as these listed above, them being viewed as variables to the process of selecting an appropriate method for assessment of IC, given any particular context.

2.4 Choosing, selection, customisation, implementation and application

The term "*choosing"* (of IC assessment methods) as illustrated in Figure 2, is employed in this research to include both the *selection* and the *customisation* of an appropriate method (or combination of methods) for assessment of IC, given any particular context. It should be noted that the *selection* process (of IC assessment methods) includes consideration of the *customisability* of the selected method to suite a particular context. In this paper the term "*customisation"* (of an IC assessment method) is used to refer to the adaptation of a method (or methods) to suit a particular context, i.e. the detailed design of the manner in which a particular selected method (or methods) will be implemented or applied in a particular context. The term "*implementation"* is employed to refer to the *putting into operation of* a method and the term "*application" to* refer to the *customisation and implementation* of a method (refer to Figure 2).

<table>
<tr><td colspan="2">Choosing</td><td></td></tr>
<tr><td>Selection</td><td>Customisation</td><td>Implementation</td></tr>
<tr><td></td><td colspan="2">Application</td></tr>
</table>

Figure 2: Usage of the terms "choosing", "selection", "customisation", "implementation" and "application"

3. Methodology

Let us consider the research question and objectives, the research design, the data collection and the instrument used for data collection.

3.1 Research question and objectives

As mentioned above, perceptions on the complexity levels of choosing (selecting and customising) IC assessment methods need to be tested empirically. We have taken the research question to be as formulated in Figure 3.

What are perceptions on the complexity levels of decisions involved in choosing IC assessment methods?

Figure 3: Research question

Corresponding to this research question, we have taken the objective of this research to be as to test perceptions of suitable experts on:

- complexity levels of decisions to be made in *selecting* a method (or combination of methods) for assessment of intellectual capital; and
- complexity levels of decisions to be made in *customising* a method (or combination of methods) for assessment of intellectual capital.

This research departed from the assumptions that:

- Individuals knowledgeable on intellectual capital or aspects thereof can be considered to be suitable experts.
- Such experts may be recruited from amongst authors or co-authors of peer-reviewed publications on IC or aspects thereof.
- Such experts could be located through their involvement in recent international conferences focussing on or containing streams on IC.
- Such experts could contribute to the location of additional suitable experts (by providing contact details of such experts).

Note that the intention was to collect expert opinions on the complexity of the decisions involved in the process of selecting and customising appropriate methods for assessment of intellectual capital and not to obtain generalisable quantitative measurements nor to test a hypothesis of any nature.

3.2 Research design

Table 1 summarises the research design according to the eight *descriptors of research design* (appropriate for collection of primary data) proposed by Cooper & Schindler (2006:139-143). The options chosen for addressing the research question are highlighted.

Other classification schemes for research design types include those by Mouton (2005:144-180), Welman, Kruger and Mitchell (2005:78-101) and Babbie (2008:95-117).

Table 1: Descriptors of research design source: adapted from Cooper & Schindler (2006:139)

Code	Description	Options
D1	"degree to which the research questions has been crystallized"	exploratory study formal study
D2	"method of data collection"	monitoring communication study
D3	"power of the researcher to produce effects in the variables under study"	experimental ex post facto
D4	"purpose of the study"	descriptive causal
D5	"time dimension"	cross-sectional longitudinal
D6	"topical scope—breadth and depth—of the study"	case statistical study
D7	"research environment"	field setting laboratory research simulation
D8	"participants' perception of research activity"	actual routine modified routine

3.3 Instrument

Communication approaches include self-administered questionnaire, phone interview and personal interview (Cooper & Schindler, 2006:140). Taking into account the wide geographical spread of potentially suitable respondents and the nature of the questions that need to be posed, a self-administered questionnaire (Olivier 2004; Cooper & Schindler 2006:253-259) was chosen as communication approach.

- Part A tests perceptions on the complexity of the decisions involved in the *selection* and customisation *of* an appropriate method for assessment of IC, given any particular context. For

both *the decisions involved in the selection* and *the decisions involved in the customisation* of an appropriate method for assessment of IC, respondents were asked to select one option per row in a matrix like the one illustrated in Table 2 below. The matrix contains multiple rows to cater for the possibility that respondents may not perceive such decisions to be equally complex in all situations (contexts). Respondents were further asked to, optionally, provide scenarios for which decisions fall in the *more complex* range of this complexity spectrum and scenarios where such decisions fall in the *less complex* range.

Table 2: Matrix used in Part A of questionnaire

	Complexity	A	B	C	D	E
1	*not complex at all*	never ☐	sometimes ☐	often ☐	always ☐	none of the options in this row apply ☐
2	*slightly complex*	never ☐	sometimes ☐	often ☐	always ☐	none of the options in this row apply ☐
3	*moderately complex*	never ☐	sometimes ☐	often ☐	always ☐	none of the options in this row apply ☐
4	*very complex*	never ☐	sometimes ☐	often ☐	always ☐	none of the options in this row apply ☐

- Part B tests perceptions on the importance of various factors in determining an appropriate method for assessment of IC and is outside the scope of this paper.
- Part C contains questions relating to the respondent profile, including number of years of involvement in assessment of IC as consultant, practitioner and/or researcher respectively, the methods consulted on, used in practice and/or tested empirically, and the number of different methods studied.
- Part D provides space for additional comments.

3.4 Data collection

Conference proceedings and/or other conference documentation and correspondence of four relatively recent international conferences were scanned for authors of papers on IC, intangible assets, knowledge assets or components thereof, e.g. human capital.

The 128 resulting authors were contacted via e-mail and requested to respond to a questionnaire. Note that these 128 authors could be considered a non-probability sample (attained through convenience sampling) of a larger population. In addition, snowball sampling was employed in that respondents were asked to, optionally, provide contact details of other suitable candidates. The snowball sampling component yielded another 14 candidates who were then also requested, via e-mail, to fill out the same questionnaire.

During the first two weeks 18 completed questionnaires were received and another three during the next four weeks. Follow-up requests were made to candidates who had not responded after six weeks. A total of 142 questionnaires were distributed, harvesting 38 completed questionnaires over a three-month period, representing a response rate of 26.76%.

Where responses were incomplete, were unclear and/or appeared contradictory, respondents were requested to improve completeness and clarity (provided that they had indicated their acceptability to be contacted for further details). Where incomplete or contradictory responses to questions considered critical for processing of questionnaires (e.g. responses pertaining to the matrices in Part A and Part B) could not be resolved, questionnaires were removed from the sample, reducing the

sample size from 38 to 31. Where unclear statements (in optional comments) could not be resolved satisfactorily, such statements (and not the whole questionnaire) were excluded from the subsequent analysis.

Note that since a probability (random) sample was not obtained, it is not possible to perform (statistically) reliable generalisations to a larger population.

4. Results and discussion

As already mentioned, 38 completed questionnaires were received and seven excluded due to possible irregularities. Let us consider the results obtained from the remaining 31 responses. Results are reported under the headings:

- Profile of respondents
- Complexity of decisions involved in selecting appropriate methods
- Complexity of decisions involved in customising methods

Please note that, due to percentages being rounded to the nearest integer, total percentages may not always add up to 100%.

4.1 Profile of respondents

The data collected on respondents themselves was intended to provide an indication of the expert status of respondents and to serve as background for interpretation of the other categories of responses to the self-administered questionnaire. Analysing the data collected on the 31 respondents – whose responses were included in the analysis – it was found that:

- The respondents' area of residence covers 22 countries from a variety of international regions, of which Europe has the greatest representation.
- 48% of respondents classified themselves as researcher only, 26% as consultant, practitioner and researcher; 23% consultant and researcher; and 6% as practitioner only.
- The majority of respondents that classified themselves as consultants (61%), the majority of respondents that classified themselves as practitioners (66%) and half of the respondents that categorised themselves as researchers (50%) reported six or more years of experience.
- Half of the respondents that classified themselves as consultants (50%) indicated that they had consulted on at least six methods, the majority of respondents that classified themselves as practitioners (66%) indicated that they had used at least six methods in practice and almost all respondents that classified themselves as researchers (92%) indicated that they had empirically tested at least two methods.
- Almost all respondents (94%) indicated that they had studied at least two IC assessment methods and the majority (68%) that they had studied six or more methods.

4.2 Complexity of decisions involved in selecting appropriate methods

Responses to Part A, Section 1, of the questionnaire, pertaining to perceptions on the complexity of decisions involved in the selection of appropriate IC assessment methods (given any particular context) provided the following results, as also graphically portrayed in Figure 4:

- 45% indicated that selection of appropriate methods, given any particular context, is often very complex, followed by 26% indicating it is sometimes very complex, 19% indicating that it is always very complex, and 10% indicating that it is never very complex or that the description very complex does not apply. **Adding the percentages for always very complex and often very complex, reveals that 65% (the majority of respondents) perceived the decisions involved in selecting an appropriate method for assessment of IC (given any particular context) as often or always very complex.**
- 55% indicated that selection of appropriate methods, given any particular context, is often moderately complex, followed by 29% indicating that it is never moderately complex or that the description moderately complex does not apply, 13% indicating that it is sometimes moderately complex and 3% indicating that such selection is always moderately complex.

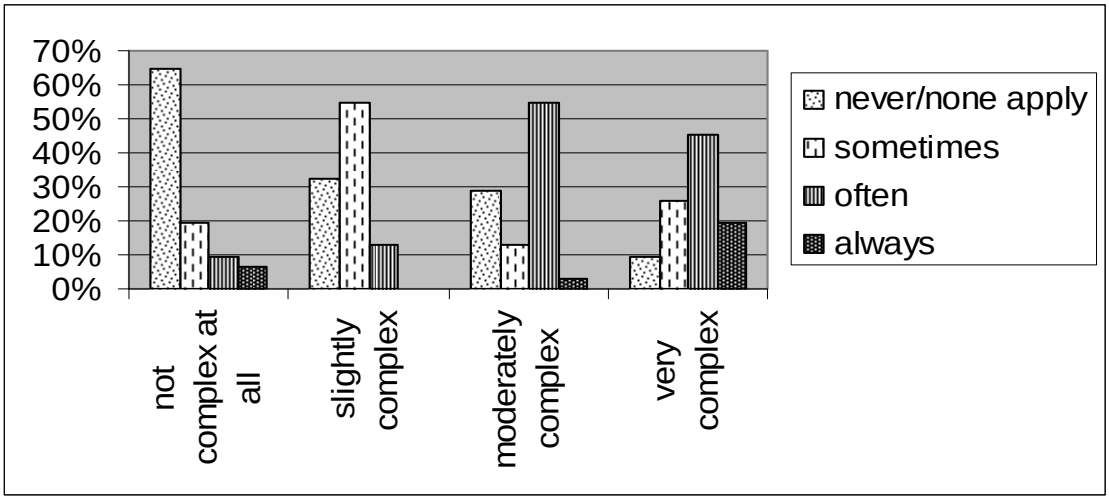

Figure 4: Complexity of decisions involved in *selection* of appropriate methods for assessment of IC

- 55% indicated that selection of appropriate methods, given any particular context, is sometimes slightly complex, followed by 32% indicating that it is never slightly complex or that the description slightly complex does not apply and 13% indicating that such selection is often slightly complex.
- 65% indicated that the selection of appropriate methods, given any particular context, is never not complex at all or that the description not complex at all does not apply, followed by 19% indicating that such selection is sometimes not complex at all, 10% indicating that such selection is often not complex at all and the remaining 6% that such selection is always not complex at all.

Examples of scenarios for which decisions involved in the selection of an appropriate method for assessment fall in the *more complex* range of the spectrum and also of scenarios for which such decisions fall in the *less complex* range, as provided by respondents, are provided in Table 3.

Table 3: Scenarios where decisions involved in selection of IC assessment methods fall in the *more complex range* or in the *less complex range* of the spectrum

Selection of IC assessment methods		
No	Scenarios falling in the *more complex* range	Scenario falling in the *less complex* range
S1	Assessment is performed for the first time.	There is an established model to follow.
S2	Assessing IC for large organisations.	Assessing IC for small to medium size enterprises (SME's)
S3	Assisting a company working from *baseline zero* intending to *clone* a successful business and place it offshore in collaboration with an overseas partner.	Assessing an IP and know-how portfolio.
S4	Context of assessment is not clearly defined.	Context of assessment is clearly defined.
S5	A sophisticated management system (other than an IC management system) already exists.	No competent competing systems are in place.
S6	A range of stakeholders is involved.	The user does not require detail, the results are to be presented in a form that favours a particular methodology or the organisation has a single objective.
S7	No problem diagnosis has been made.	A problem diagnosis has been made.
S8	Top management is not convinced of the need for assessment of IC.	Top management is convinced of the need for assessment of IC.
S9	Some of the prerequisites in Andriessen (2004b:379) Appendix B are not present.	The prerequisites proposed by Andriessen (2004b:379) Appendix B are present.
S10	The project leader does not have sufficient knowledge and experience.	An experienced knowledgeable project leader is available to lead the assessment project.
S11	Assessing IC in emergent markets (more complex markets, a large number of variables).	Assessing IC in mature markets (less complex markets, smaller number of variables).

Selection of IC assessment methods		
No	Scenarios falling in the *more complex* range	Scenario falling in the *less complex* range
S12	Assessing IC of firms in developed countries.	Assessing IC of firms in developing countries (most IC literature focuses on developed countries).
S13	Assessing IC in the context of product development (more complex, as it is future oriented, uncertain and highly complex).	Measurement of human capital (less complex as there are many indicators available, e.g. education level, network analysis).

In addition to providing the scenarios listed in Table 3, respondents explain that the complexity of decisions involved in selection depends on:

- internal factors: dimension, history, maturity of organisation;
- external factors: complexity of market (a large number of variables), product life cycle (e.g. manufacturing vs. service business), technology involved, intensity of knowledge;
- sophistication of recipients of results, time available to participate, costs, resources available (e.g. large companies tend to have more resources availability than small and medium enterprises (SME's) and would consequently be more suitable for in-depth analysis); and
- the decision maker him- or herself.

Respondents indicating that decisions involved in selecting IC assessment methods are ***always*** *very complex*, explained that:

- The first (often neglected) issue is to pin-point the actual problem to be solved by the assessment (system).
- The most complex component (of the assessment process) is to define intangible assets to be assessed.
- Assessment scenarios are distinguished (not so much by context, but) by the conceptual view of intangibles to be assessed derived from the capturing of operational elements.

Respondents indicating that decisions involved in selecting IC assessment are of limited complexity, presented arguments (similar to each other) such as:

- **A limited number of methods have been validated in practice. To establish whether a method is worthy of being used in practice, it needs to be asked:**
- How many companies are using it?
- How many companies have changed their behaviour as a consequence of using such methods for assessment of IC?
- **Since the capabilities of most existing methods are limited, when faced with real situations, the actual options available are very limited. While methodologies can appear to work when devised, the *only test that counts* is:**
- Can they be used?; and
- Can they deliver useful results in practice? (In this context, "useful" results are defined as results that are *detailed*, *reproducible*, *free from bias* and *actionable*.)

Respondents indicating that decisions involved in selecting IC assessment methods are ***never*** *very complex* explain, e.g., that:

- Selection of an appropriate method is never a problem, because the same method is always used.

Other insights gained regarding decisions involved in the selection of IC assessment methods include:

- Many factors have to be considered before tying the assessment process to a specific method.
- Early IC assessments should have very clear and realistically attainable objectives. An important focus of the initial assessment process may be to obtain buy-in from participants who have to collect/process data and from end-users of the assessment results. As the assessment process becomes established and well accepted, focus can shift to the achievement of highest quality results.

- Particular combinations of context and intention may require the use of techniques from more than one assessment method or induce an evolution from a simpler method (with easier to achieve results) to a more ambitious method (as the requirements of the target organisation develop and its culture becomes more supportive).

4.3 Complexity of decisions involved in customising methods

Responses to Part A, Section 1, of the questionnaire, pertaining to perceptions on the complexity of decisions involved in the customisation of appropriate IC assessment methods (given any particular context) provided the following results, as also graphically portrayed in Figure 5:

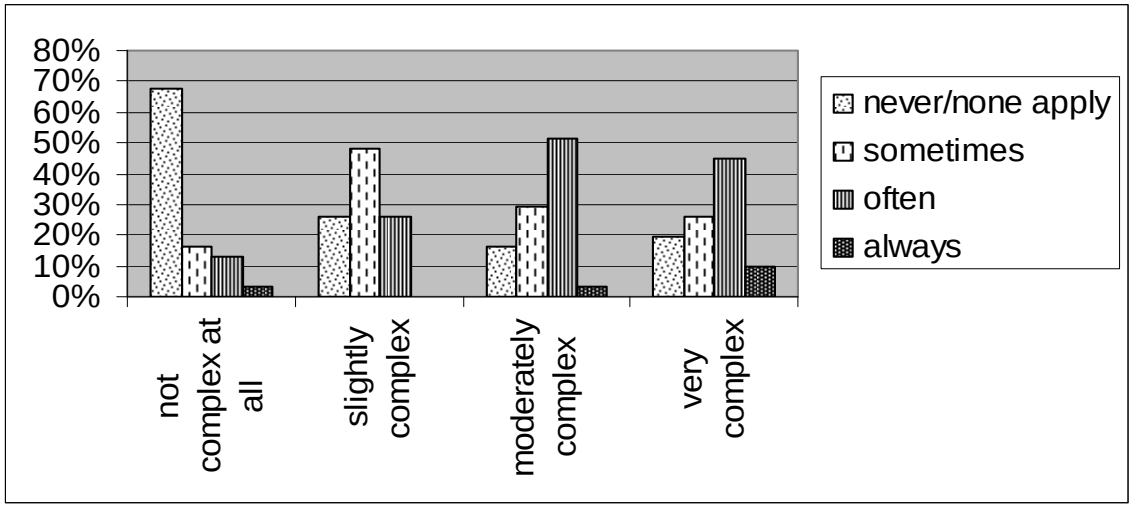

Figure 5: Complexity of decisions involved in *customisation* of methods for assessment of IC

- 45% indicated that customisation of appropriate methods, given any particular context, is often very complex, followed by 26% indicating it is sometimes very complex, 19% indicating that it is never very complex or that the description very complex does not apply and 10% indicating that such customisation is always very complex. **Adding the percentages for always very complex and often very complex, reveals that 55% (the majority of respondents) perceived the decisions involved in customising an appropriate method for assessment of IC (given any particular context) as often or always very complex.**
- 52% indicated that customisation of appropriate methods, given any particular context, is often moderately complex, followed by 29% indicating that it is sometimes moderately complex, 16% that it is never moderately complex or that the description moderately complex does not apply and 3% indicating that such customisation is always moderately complex.
- 48% indicated that customisation of appropriate methods, given any particular context, is sometimes slightly complex, followed by 26% indicating that it is often slightly complex and 26% indicating that such customisation is never slightly complex or that the description slightly complex does not apply.
- 68% indicated that selection of appropriate methods, given any particular context, is never *not complex at all* or that the description not complex at all does not apply, followed by 16% indicating that it is sometimes not complex at all, 13% indicating that it is often not complex at all, and 3% indicating that such customisation is always not complex at all.

Examples of scenarios for which decisions involved in the customisation of an appropriate method for assessment of IC fall in the *more complex* range of the complexity spectrum and also that of scenarios for which such decisions fall in the *less complex* range, as provided by respondents, are provided in Table 4 (even though this was not explicitly asked for).

Table 4: Scenarios where decisions involved in customisation of IC assessment methods fall in the *more complex range* or in the *less complex range* of the complexity spectrum

Customisation of IC assessment methods		
No	Scenarios falling in the *more complex* range	Scenario falling in the *less complex* range
C1	Assessment for enterprises.	Assessment for universities.
C2	Assessment of human capital and relational capital (it is difficult to assess what is *inside people's minds*).	Assessment of structural capital.
C3	Gaining understanding of the strategic value drivers of an organisation.	Identification of intangibles with a market value.
C4	Assessment in monetary items.	Assessment by indicator-based methods.

5. Summary and conclusion

A self-administered questionnaire for data collection was administered to gather information regarding perceptions of consultants, practitioners and researchers on the levels of complexities involved in the decisions to be made in selecting and customising IC assessment methods.

The results indicate that decisions involved in choosing (selecting and customising) an appropriate IC assessment method to be used in a particular context, are indeed perceived as complex by respondents to the self-administered questionnaire, with the majority of respondents perceiving such decisions as always or often very complex. The data collected on respondents themselves indicates that they are a suitable group of individuals for answering questions concerning the complexity levels of the decisions involved in choosing IC assessment methods.

The perceived complexity of the decisions involved in choosing IC assessment methods supports the notion that supporting systems are required to assist human decision makers in making sense of the complexities involved. With a substantial portion of a suitable group of individuals knowledgeable on IC or aspects thereof perceiving the decisions involved in choosing IC assessment methods as always or often very complex, it is deduced:

- that there most likely is a need for supporting systems to assist human decision makers in dealing with the complexities involved in choosing IC assessment methods and for managing the evolving body of knowledge concerning such assessment; and
- that it makes sense to develop such a system.

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