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Systemic Complexity in Integrated Thinking

Erik Bjurstom Tadanori Yosano
Ulf Johanson

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Authors

Erik Bjurström[1], Tadanori Yosano[2] and Ulf Johanson[3]

Abstract

In this article, we set out to understand and interpret the meaning of Japanese lenders perspective on non-financial, or soft, information of technology based small and medium sized enterprises (SMEs) and look for its implications for the IR agenda. To our surprise, the initial findings showed a focus on network relations, at the cost of just about any other item of soft information about corporate strategy, organizational structure, human resources, technologies and intellectual properties. However, a deeper factor-analysis found a strong correlation between the different factors, revealing a holistic thinking among lenders with regard to the companies' soft information. In other words, lenders have difficulties in measuring detailed soft items. In consequence, the details did not matter as much as the broader picture, in which detailed measures of different items were interpreted through the firms' credibility, revealed by their network relations. We further conceptually generalized this insight as an expression of the concrete character of the business reality of the companies, as interpreted through the lender-borrower relationship.

Key words

Integrated Reporting, Integrated Thinking, Network, Lender-borrower relationship, SME's, Industry strategies

[1] School of Innovation, Design and Technology, Märlardalen University, Eskilstuna, Sweden.

[2] Graduate School of Business Administration of Kobe University, Kobe, Japan

[3] School of Sustainable Development of Society and Technology, Märlardalen University, Västerås, Sweden.

1. Introduction

There is an increasing sense of urgency to restore confidence in businesses through the establishment of integrated reporting (IR). However, while the need for improvement can hardly be denied, there is a risk that this urgency makes us overlook fundamental challenges to the project to provide a clear and concise representation that reflects the commercial, social and environmental context within which the company operates. As our example will show, there is an evident risk to underestimate the complexity of such a task. While *integrated thinking* is needed to understand the relationships involved in the value creation process, the greatest challenge involved may be to understand the very *character* of those relationships, even when only considering the perhaps most narrow conception of IR in the most traditional contexts, namely lenders' perception of valuable non-financial information about technology based manufacturing companies. Acknowledging the full range of stakeholders and dimensions that would need to be involved in a more full account of the company's impact and responsibility in society legitimately adds further complexity to this challenge. Notwithstanding, society can hardly afford a failure of IR. However, in order to be successful, we believe that considering the very *character* of the relations in any representation of the business reality is crucial for building a strong conceptual basis for IR.

The idea of creating a connectivity of information indeed lies at heart of the IR agenda. However, as we are going to emphasize, this connectivity of information must in turn go beyond the surface of representation in order to create an understanding of the underlying relationships in the value creating process in terms of the very *character* of those relationships. As our findings point out, the kind of relationships that are increasingly relevant already in traditional technology based manufacturing industry are those of *interactive systemic complexity*, rather than of simple, linear logics. Such relationships are even more relevant for describing service and knowledge intensive work. Consequently, we argue that the *integrated thinking* able to promote IR as a successful future standard vehicle for reporting must emphasize the *interactive systemic complexity* characteristic for value creation processes even in the eyes of the most traditional stakeholders, the lenders, and in respect to even the most traditional industries. This notion goes against the grain with most established thinking in economics and reporting expressed e.g. through notions of the production function of the firm.

In this article, we set out to understand and interpret the meaning of Japanese lenders perspective on non-financial, or soft, information of technology based small and medium sized enterprises (SMEs) and look for its implications for the IR agenda. To our surprise, the initial findings showed a focus on network relations, at the cost of just about any other item of soft information about corporate strategy, organizational structure, human resources, technologies and intellectual properties. However, a deeper factor-analysis found a strong correlation between the different factors, revealing a holistic thinking among lenders with regard to the companies' soft information. In other words, lenders have difficulties in measuring detailed soft items. In consequence, the details did not matter as much as the broader picture, in which detailed measures of different items were interpreted through the firms' credibility, revealed by their network relations. We further conceptually generalized this insight as an expression of the concrete character of the business reality of the companies, as interpreted through the lender-borrower relationship.

We draw the conclusion that in order to become a useful tool in restoring confidence in business, IR has not only to make the intended move from a systematic to a systemic view, through *integrated thinking* reflected in the connectivity of integrated reports. Instead, the systemic view also needs to move away from simple and linear logics of notions of production functions or value chains in its view on value creating processes and quite contrary assume *interactive systemic complexities* as increasingly being the normal case in business. We build up our argument by first reviewing the move of IR from a systematic into a more systemic view on business and its reporting. We thereafter present the empirical findings from the Japanese Ministry of Economy, Trade and Industry's (METI) survey of 336 lenders judging the value of soft information of technology based manufacturing SMEs. In the following chapter we extend our analysis with the aim of conceptual generalization of the empirical findings. Finally, we discuss our conclusions and their possible implications for the future IR agenda.

2. Integrated thinking: towards a systemic view

IR is essentially a process of communication, however most visible in the establishment of periodic integrated reports about a company's value creation over time. Not least important is the idea of integration of different aspects of a firm's activities in relation to a broad range of stakeholders. A key feature for realizing the concept of IR is the notion of *integrated thinking*, thought of as an ability of an organization to understand the relationships between its organizational units, capitals and effects. The basic notion is to move away from 'silo thinking' and instead establish an account of the connectivity and interdependence of a full range of factors affecting the company's value creation in the eyes of a broad range of stakeholders. In the practical considerations of how to establish such reports, such communication procedures and such integrated thinking issues of reporting boundaries and the optimal level of aggregation and information loads soon become critical. In a broad sense, the ambitions of integration, connectivity and reconsideration of organizational borders marks a move away from the traditional *systematic* focus of accounting, sorting everything into a classification apparatus not even remotely resembling the value creating activities and processes out in the real world, towards a more *systemic* ambition to depict the components and relations involved in creating the value that constitutes an organization's raison d'être.

While attempts are being made as to break accounting's tradition of ignoring the systemic realities of value creation for the sake of systematic order and notions of accountability as delimited by organizational silos, it is hard to break out of a long tradition immediately. Striking examples are the illustrations below that can be found in the prototype framework of IR. While these general descriptions by necessity will tend to lack any specificity and detail, the point here is that the even though efforts are made to approach the value creating realities of real life processes, their depiction in IR frameworks barely break out of the accounting tradition of emphasizing orderly classification rather than models that illustrate any flow or interaction creating the value accounted for in the reports. Hence, it is striking that even the illustrations of IR try to demonstrate such flows by seeing the organization and its business model in terms an input-output model in practice only balance between this attempts to a systemic description and the more traditional approach to simply classify and list different items of assumed importance. In other words, the first two illustrations of the IR

framework are in practice little more than a clssification of different capitals relevant as organizational inputs and outputs, or a classification of things relevant for the firms business model.

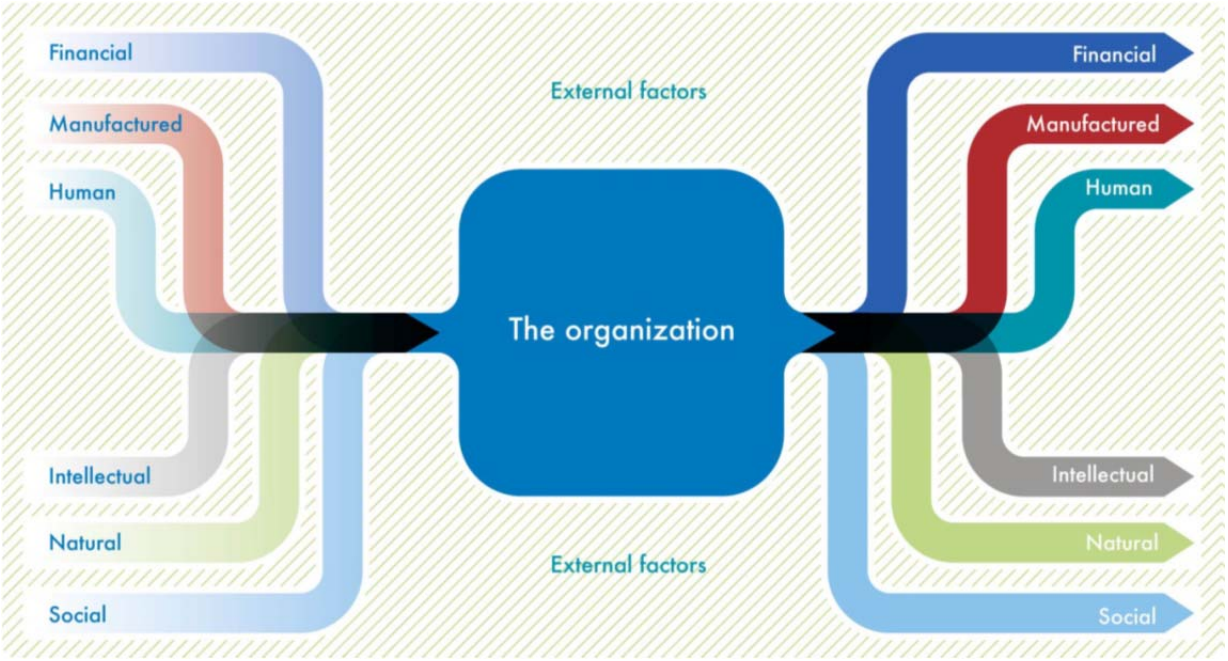

Figure 1 ”The organization”, from the IR prototype framework p. 8, www.theiirc.org

Figure 2 ”The business model”, from the IR prototype framework p. 9, www.theiirc.org

While systemic descriptions can be expected to be much more specific on a company level, and even better on a business unit level, the issue of becoming truly systemic in the view of an organization has further implications than only pointing out directions of flows and assumed causalities between different events in the interplay between actors, resources and activities. In the debate, most voices agree with the ambition towards more integrated or systemic views on a

company's activities. However, the very character of such relations has not been sufficiently debated. Rather, for accounting scholars, notions of value creation processes are often swiftly converted in to notions of the production function, i.e. mathematically simulating its logic, or more simple and linear illustrations of the successive adding of value in different steps in a value chain analysis.

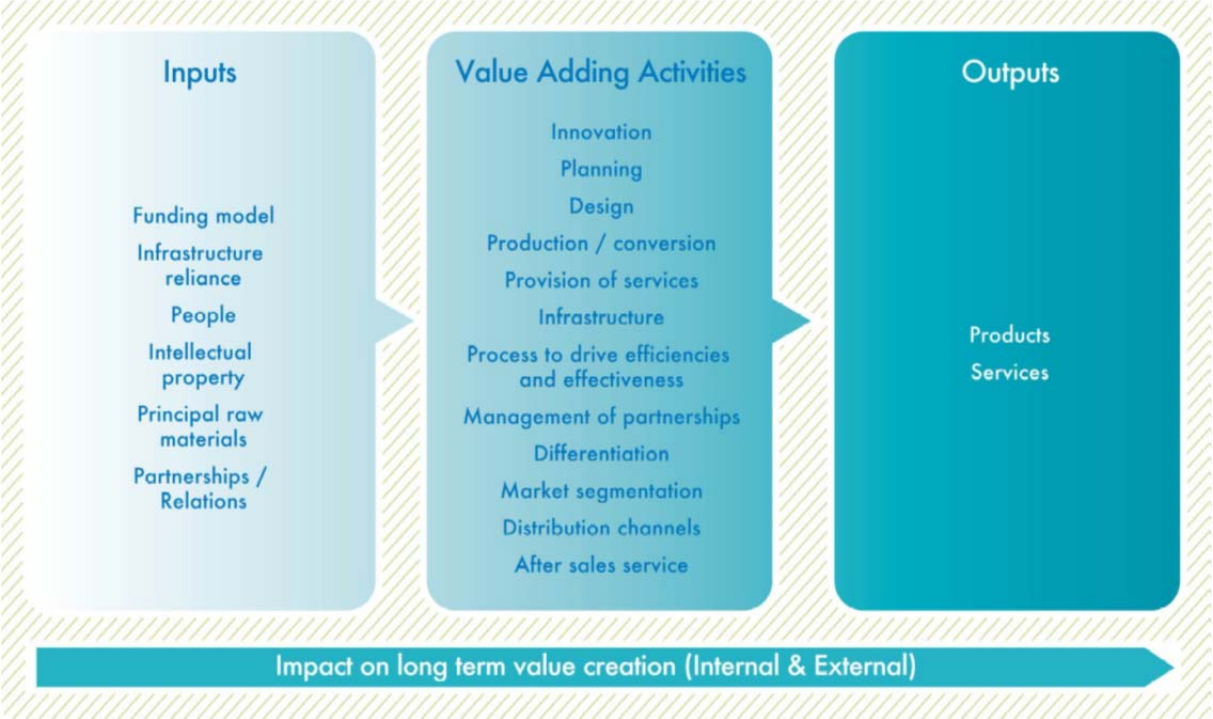

Figure 3 "The value chain", from the IR prototype framework p. 14, www.theiirc.org

The problem with this view is that the notion of a systemic view more or less automatically retorts to a point of reference which is in increasingly irrelevant: the simple and linear logic of the technologically buffered and pretended closed, vertically integrated and hierarchically controlled production system of the heydays of mass production (c.f. Chandler, 1977; Womack et al. 1990). Hence, such a notion of connectivity and relationships between different items and factors of the value creating process may increasingly seem outdated in relation to other views emphasizing a broader range of production technologies ranging from the simple to those characterized by inherent unpredictability as a consequence of interactive complexity.

An often cited reference for this argument is Thomson's (2003[1967]) distinction between pooled, sequential and reciprocal interdependencies in the production technology, where different units work independently, in distinct steps of the value chain, or where units are mutually dependent on each other's output. These different logics of production, or value creation, give rise to three fundamentally different logics in their production technology: a mediating technology where units operate independently, long-linked technology which is typical for traditional serial industrial production, and intensive technology where units work together intimately. Perrow (1984) further developed the argument that while traditional industrial production follows a more linear logic, multi-goal agencies and knowledge intensive work show much more complex and thereby unpredictable patterns of interaction in the production process. Later suggestions have emphasized the need to look at not least service production in terms of value constellations, where actors come

together simultaneously to create maximum value in a more flexible manner at a given moment, rather than as value chains of stable and predictable interaction (c.f. Normann & Ramírez, 1998).

This kind of networking logic can also increasingly be observed in today's manufacturing industry. Karlsson (2003) pointed at the new tendencies of a network approach in manufacturing companies' strategies for industrial system design for the coordination of actors, activities and resources. Hence, the perspective of these strategies are rather from a knowledge based view of strategy, not focusing on the boundaries of the formal organization, but instead emphasizing the flows and structures relevant from a value creating logic. Both globalization and technological development driving automation and information economics are important drivers for this development. The flexibility of the production system facilitates mass customization, in turn eroding established borders between different markets and segments with far reaching consequences both for strategy and operations management. In combination with new distribution systems and business models challenging dominant actors in established markets and niches, the playing field is changing in profound ways. In response to such pressure, large organizations increasingly disintegrate their production system and formal structures to match the flexibility and pace of technological development of new competitors. By experimenting with network arrangements as a somatic response to uncertainty (c.f. Baumard, 2002) vertical integration (c.f. Chandler, 1977) is abandoned for more flexible collaboration with suppliers typical for Japanese manufacturing systems (c.f. Womack et al., 1990). Increasingly, large companies focusing on selling end-products to customer become specialized systems integrators, moving away from the product level to focus on functions that create customer value, making more and more complex offerings rather than managing lower levels of technology. Thus, the core competence of the systems integrator becomes horizontal, focusing on functions and product characteristics that are more directly related to customer value. As a result, industries are increasingly relying on external resources and actors for achieving competitiveness. Hence, there are good reasons for addressing the fundamental question of what a *systemic* notion of integrated thinking would mean.

3. Representing Value Creation

This case study is based on an extensive survey among Japanese lenders concerning what information that is deemed critical and relevant for doing credits decisions among technology-based SME's in Japan. The ultimate reason behind this investigation was the double interest of the Japanese government to increase efficiency in lending decisions as well as re-establishing trust in the financial sector. One of the key players in these efforts is the Ministry of Economy, Trade, and Industry (METI), e.g. by striving to strengthen information transference between firms and stakeholders.

Before the 1980's, the Japanese lender-borrower relationship lending was characterized by longevity. This would change after the middle of the 1980's when Japan would enter into a bubble economy. While lenders depended on the economic value of land holdings and real estate to determine trustworthiness when lending money to borrowers, this philosophy will be a myth as land and real estate values keep appreciating. The bubble economy turned in a similar fashion as the U.S. real estate collapse. After this Japanese financial, land value, and real estate crash in the early

1990's, Japan was forced to shift toward another style of securing lending relationships and building trustworthiness. This new method relies more on hard, or financial, information and lending is now to a larger extent based on finance theory consistent with a more typical Western financial perspective. The shift led to two market reactions: 1) high competition between lenders, and 2) low profitability. The lenders' heavy reliance on financial figures limited the advantages between lenders, and high competition meant that not all firms would be able to survive. In the efforts to counteract this market reaction, the Japanese Financial Service Agency (FSA) introduced an action program that was intended to help all lenders survive the harsh market conditions. The "Program for strengthening Relationship Banking Function," introduced in March 2003, enhanced the lender's ability to judge a borrower's trustworthiness using soft information (Yosano and Nakaoka, 2011a). While the FSA works to strengthen lending relationships METI on the other hand, focuses on soft information.

Soft information includes the corporate strategy, technology, intellectual property, human resources, and networks. All of these factors are seen as promising engines for lenders, and the efforts of the METI to promote the utilization and transference of these factors is actually supportive of the FSA's relationship lending action program (c.f. Yosano and Nakaoka, 2011a). Hard information generally involves a corporate financial track record and historically accumulated resources. However, the company is alive and under constant change, therefore, the company should act on real social circumstances according to their corporate strategy. Soft information is able to transform the actual corporate figures into a realistic picture of the borrower's trustworthiness. However, we cannot access soft information directly, because they are naturally, by definition, intangible. Nevertheless, if lenders want to judge a corporation's true trustworthiness, they need a way to evaluate the realistic picture. METI's initiative[4] can motivate us to find the way to judge the actual corporate trustworthiness using soft information as studied in this paper.

We are motivated to see the realistic image of the corporation's business by studying their soft information. With thanks to the METI initiative, we were able to access survey questionnaire data, and analyze how lenders use soft information to create trustworthiness with the borrower. The METI set up a research committee that focused on "investigating and researching credit technologies that utilize evaluation corporate technologies" in the 2008 fiscal year. Before sending questionnaires to lending institutions, committee members first discussed which items are representative of corporate technologies involving intellectual properties, networks, organizations, as well as corporate technological strategies. This list of items was in reference to interview surveys from 6 regional and cooperative banks conducted by the SMRJ (The Organization for Small and

[4] The METI encouraged small businesses to disclose supplemental, non-financial information that could be used to determine the potential for growth and/or sustainability, and to eliminate information barriers for raising funds (Holland and Johanson, 2003). Following this example, the "Organization for Small and Medium Enterprises and Regional Innovation, Japan" (SMRJ), who is an affiliated association of METI, issued The Manual for SME Intellectual Capital Reporting in March 2007. This manual focuses on the specific concerns of small businesses. Non-financial information could further help convince lenders of the small businesses' trustworthiness when they provided IC Reports. This trend is a complete contrast from the "Guideline for disclosing Intellectual Assets Based Management" (GIABM) that focuses on big businesses as illustrated in detail by Sumita (2008) and Johanson et al. (2009). In fact, the number of small business disclosures has increased from thirteen in the 2006 fiscal year to sixty in the 2008 fiscal year. While sixty is a small number, it still reflects a dramatic increase over a two year period.

Medium Enterprises and Regional Innovation, Japan) in late 2007 (Yosano and Koga, 2008, Yosano and Nakaoka, 2011b).

3.1 Sample and Methodology

Our study focuses on the lenders' development of trustworthiness by utilizing soft information, and therefore, our study sample involves a total of 336 lenders: 4 Mega Banks, 85 Tier I and II regional banks, and 247 cooperative banks.

We used five general factors to conceptualize the notion of soft information: corporate strategy, technology, organizational structure, networks and human resources. These were in turn operationalized in more specific items. Table 1 shows the respective utilization level of soft information for creating trustworthiness during the lending process. 1 = "No usage level," 2 = "Weak Usage level," 3 = "Medium Usage level," 4 = "Strong Usage level," 5 = "Extremely Strong Usage level."

The results are shown in Table 1 and found on the Likert scale that measures credit decider attitudes toward usage, divided into five factors and a total of 65 items (all of these factors and items are shown in Table 1.). The elevated cronbach alpha categorical factor indicates high internal consistency of the model:

- 5 corporate strategy items were combined into one corporate strategy factor (cronbach alpha[5] = 0.9007)
- 9 organizational structure items were combined into one organizational structure factor (cronbach alpha = 0.8776)
- 3 employee items were combined into one human resource factor (cronbach alpha = 0.9751)
- 23 technological and intellectual property items were combined into one technology factor (cronbach alpha = 0.9740)
- 15 network items were combined into one network factor (cronbach alpha = 0.9452)

A remark of general importance to understand the results is that a low score does not necessarily mean that an item is useless or unimportant for a company's vale creation. Rather, it indicates that this factor is of limited value for lenders as they may be hard to judge, i.e. the information value is low. As such, the results rather point at the accessibility of reliable soft information. However, from a lender's perspective, abstract speculation will sooner or later materialize in concrete outcomes, which creates incentives to judge more carefully the information value of different items and thereby also the overarching factors. A general conclusion of this descriptive analysis is that almost all the soft factors seemed more or less difficult to access and judge, with the exception of network relations. Furthermore, many of the most acknowledged items in the debate about intangible resources seemed hard to use as factual underpinning of credit decisions.

For instance, while corporate strategy is made into the backbone of many intangible as well as tangible frameworks (c.f. MERITUM, 2002; Kaplan & Norton, 2001), this factor as a whole

[5] Cronbach alpha is a coefficient for reliability. It is commonly used to measure the internal consistency or reliability of a psychometric test score for a sample of examinees. Here, for example, 0.9007 means that over 90% of the examinees in our sample, who are representative of lenders, consider our corporate strategy category, containing 5 soft items, as a primary factor.

showed to be of very limited value for credit decisions (mean value = 2.84). Not least surprising was the finding that while intellectual properties in general is seen as one of the most reliable soft indicators, the item “Whether the firms utilize their intellectual properties strategically” did score very poorly in the eyes of the lenders. On the other hand, items like “Whether the firms make the most of their uniqueness and specialties in technology when outlining their business plan” and “Management comprehension of technology” showed to be more, albeit not excessively, useful.

The usefulness of items under the factor of organization structure might be even more disappointing reading (mean value = 2.56). At the bottom of the list, the information value of “security systems to prevent technology leaks” and “incentive system for an invention” showed to be of very limited value. Remarkably, even the highest ranked items under this factor, namely “technology conformity to the market demands” and “the use of quality management systems” did not stand out as very useful. On the other hand, public recognition through “public grant and/or awards” showed surprisingly useful for judging credit decisions.

While it logically may seem impossible to dismiss the role of human resources for firm’s future success, the lenders judgment of this factor is a somewhat depressive reading (mean value = 2.52), if not for the sake of human resources, then for the sake of rationality. Neither “expertise”, “knowledge, morale and motivation”, nor “qualified employees” showed any greater trustworthiness in the eyes of the lenders. In similar vein, within the technology factor (mean value = 2.40), the only item scoring above the middle of the scale was the “superiority” of present technology over comparable products or technological areas, while items like the possibility of “commercialization”, the likelihood of “imitation” and the dependence on “expertise” were ranked at the bottom of the scale. Confirming this pattern, the view on intellectual properties was somewhat positive only in terms of the mere “number of patents”, while its relation to the “core”, “surrounding patents” or “economic value” of unused patents was deemed to be of very limited value for credit decisions. Summing up, the factors of human resources, technology and intellectual properties were seen as unreliable for credit decisions as were organizational structure and strategy.

In stark contrast to the above findings, the networks factor (mean value = 3.12) stood out as the most important one for lenders’ ability to use soft information for their credit decision. While partly containing low-ranked items like the “coordination” with other firms, the networks-factor generally showed to be the most useful one. The most high-ranked items in the whole questionnaire were “The support system of specialists, such as lawyers, patent agencies and consultant engineers” and “Whether the firm has already captured the target market”. In a broader sense, indications of good network connections with other lenders, equity holders, universities and public (government) research institutes etc. was deemed as useful information for credit decisions.

While the above descriptive analysis of single items and factors may be interesting reading, the results may also raise further questions about the actual message behind the results: do lenders really ignore all but network information and to some extent strategy information, or are there further insights to be gained from the internal correlation between different factors? To answer these questions the material presented in Table 1 was later further investigated by looking at the latent factor behind soft items in the following section.

Table 1 ”Lenders’ usage of soft information”

		Mean Value	Standard Deviation
Corporate Strategy (mean value = 2.84)	Whether the firms make the most of their uniqueness and specialties in technology when outlining their business plan.	3.1671	0.7416
	Whether the firms utilize their intellectual properties strategically.	2.5594	0.7254
	Whether a complete switch of products/services is needed with the adoption of technologies.	2.8696	0.7415
	Clarify and improve corporate revenue by utilizing technologies and intellectual property.	2.5860	0.6950
	Management comprehension of technology.	3.2529	0.7578
		Cronbach Alpha = 0.9007	
Organization Stracture (mean value = 2.56)	Completion of R&D equipment.	2.7778	0.7486
	Brand power or profit margin, based on the high level of technology.	2.8596	0.7834
	Training program for technology department employees.	2.3801	0.6947
	Technology conformity to the market demands.	2.9912	0.7914
	The use of the quality management system (ISO, etc).	2.9329	0.7521
	Systematized, and/or visualized technological know-how (The construction of a database, the spread of an employee training manual, etc).	2.2874	0.7232
	The construction of security systems to prevent technology leaks (The security management, etc).	2.1313	0.7115
	Actual results of the public grant and/or awards.	2.8805	0.7800
	Incentive system for an invention (salary, bonus, and personnel evaluation, etc).	2.1848	0.7619
		Cronbach Alpha = 0.8776	
Human Resource (mean value = 2.52)	The expertise and experience level of senior workers and the rank and file in the engineering and/or strategic planning department.	2.6531	0.7831
	The explicit and implicit knowledge, morale, and motivation of senior and junior workers in the engineering and/or planning department.	2.4797	0.8079
	Qualified employees.	2.5652	0.7209
		Cronbach Alpha =0.9751	

Technilogies and	Undefended technological know-how (business secret).	2.4052	0.8177
	The superiority over other same products and/or technological areas.	3.0554	0.8549
	The level of barriers for new entry.	2.6210	0.8106
	The product life cycle (The period which the product produces the revenues).	2.6181	0.7854
	Innovation of core technologies.	2.6550	0.8720
	The price superiority of core technologies.	2.6696	0.8418
	The functional superiority of the technologies.	2.6862	0.8633
	The possibility of expanding the application of the core technology and business model.	2.5205	0.8343
	Time frame when the product/service (which is based on the technologies) will find its market.	2.5310	0.8148
	The possibility of product/service commercialization which is based on the core technology and business model.	2.4164	0.8382
	Whether the core technology is easily copied or imitated.	2.3695	0.8251
	Whether the core technology is heavily dependent on the specific qualified expertise.	2.3724	0.8184
	The relationship between the core technology and surrounding technologies.	2.5029	0.8001
Intellectual Propeties (mean value = 2.40)	The number of patents.	2.7668	0.8260
	The number of annual applicants and/or legislative patents.	2.3265	0.7636
	The actual results of licensees.	2.3343	0.7608
	The economic value of the patents.	2.3275	0.7529
	The patent portfolio for the product.	2.1559	0.7179
	Whether the patent is core or close to core.	2.0909	0.7158
	Whether the core patent needs application for the surrounding patents.	2.0497	0.7022
	Whether the patent is easily copied or imitated.	2.1199	0.7145
	Whether the patent is heavily dependent on the specific qualifying expertise.	2.1667	0.7133
	The economic value of the unused patents.	2.0175	0.7344
		Cronbach Alpha = 0.9740	

Networks (mean value = 3.12)	The relationship with retailers (retail sellers and wholesalers).	3.6250	0.8128
	Whether the firm has already captured the target market.	3.7594	0.8195
	Small customer base (Whether the firm relies exclusively on a small number customers).	3.3536	0.8227
	Whether the relationship with existing customers is regular or irregular.	3.3942	0.8325
	Coordination with the developers and engineering firms.	2.6481	0.7855
	Coordination with the product/service design firms.	2.6481	0.7742
	Coordination with the manufacturing firms.	2.6158	0.7085
	The relationship with suppliers.	2.7281	0.7990
	Collaboration regarding research within the firms.	2.7843	0.7610
	Collaboration regarding distribution within the firms.	2.7310	0.7644
	Collaboration regarding research with universities and public (government) research institutes.	3.0580	0.7717
	The support system of specialists, such as lawyers, patent agencies, and consultant engineers.	3.8353	0.9035
	The relationship with government and municipal offices.	2.8513	0.9450
	The relationship with other lenders.	3.6676	0.8761
	The relationship with equity holders.	3.6928	0.8481
		Cronbach Alpha = 0.9452	

3.2 Methodologies and factor analysis results

We conducted factor analysis in order to investigate the correlation between the five factors. As the five factors have different numbers of underlying items, we cannot check the correlation between the five factors directly. Instead, we extract latent factors and investigate the correlation between latent factors. The corporate strategy factor has a primary factor whose eigenvalue[6] is 2.41299 and to a 0.8043 proportion[7]. The organizational structure factor has a primary factor whose eigenvalue is 5.04378 to a 0.5604 proportion. The human resource factor has a primary factor whose

[6] Eigenvalue measures the variance between all the variables that are accounted for within a factor.
[7] Proportion shows the degree to which a primary factor variance can explain the variance of all the individual variables.

eigenvalue is 2.41299 to a 0.8043 proportion. The technology factor has a primary factor whose eigenvalue is 9.63748 to a 0.7413 proportion. Lastly, the network factor has a primary factor whose eigenvalue is 8.57670 to a 0.5718 proportion. Hence, the primary corporate strategy factor's variance explains over 80% of all five items' variance.

Table 2 Correlation Matrix

	Corporate Strategy	Organizational Structure	Human Resource	Technology and Intellectual Properties	Networks
Corporate Strategy		0.7764	0.5936	0.7481	0.6269
Organizational Structure	0.7659		0.6412	0.8062	0.5981
Human Resource	0.6001	0.6199		0.6616	0.5504
Technology and Intellectual Properties	0.7446	0.8022	0.6674		0.6590
Networks	0.6175	0.6261	0.5103	0.6655	

The lower left part shows Pearson's coefficients and the upper right part shows Spearman's coefficients.

Internally, within the corporation, the correlation between the organizational structure factor and the human resource factor is 0.6199*** [8] (Pearson's coefficient), the correlation between the organizational structure and the technology factor is 0.8022***, the correlation between the human resources factor and the technology factor is 0.6674***.

Between the corporation and its boundary networks, such as suppliers, customers, R&D co-developers, and government and municipal offices, the correlation between the organizational structure factor and the network factor is 0.6261***. The correlation between the human resource factor and the network factor is 0.5103***, and the correlation between the technology factor and the network factor is 0.6655***. We are able to address that the latent factors within the corporation, especially for SMEs, are highly correlated with the boundary network factor (1% significance level). In other words, in the eyes of the lenders, the trustworthiness of internal corporate information is strongly related to indications of the company's network relations.

Last, we combined three primary factors: the organizational structure factor, the human resources factor, and the technology factor into one primary internal corporate factor. We found that this comprehensive factor has a 2.40409 eigenvalue to a 0.8014 proportion.

[8] *** denotes 1% significance level for the rejection of the null hypothesis: the organizational structure factor is equal to the human resource factor.

Because of the critical importance of the relation between corporate strategy and corporate resources, we would like to sketch the relationship between the corporate strategy and internal corporate resources in addition to boundary organizations or networks.

The correlation between the corporate strategy and the boundary network factor is 0.6175***, and the correlation between the corporate strategy and the primary internal corporate factor is 0.8123***. The internal corporate and boundary factors are highly correlated with the corporate strategy factor (1% significance level). With this data, we are able to suggest that lending practices definitely notice the relationship between the corporate strategy and the internal corporate and boundary network latent factors.

This tells us that the lenders have difficulties in judging internal resources as well as corporate strategy as isolated data. However, network information is tightly correlated with both internal resources and strategy. This shows us that lenders manage to judge corporate value creation by using network information to put other data into a context in terms of the company's relation to other businesses and the rest of society. In other words, lenders tend to apply a holistic view in their approach to estimate any single company's value creation. This does not mean that the single measures are uninteresting, just that no single measure is revealing the entire or critical insights needed to make a credit judgment.

4. Analysis

Our empirical investigation into lenders perception of the value of soft information about technology based SMEs showed that the context in terms of network relations was decisive for credit judgment. In other words, it was the broad picture of the company's relation with other businesses and the rest of society that provided credibility to the firm and to all other information about its operations and assets. We called this a holistic view on the companies' value creation. One way of expressing the idea of holism is to say that it is the broad picture of all measures, or rather their relation to the companies' network relations and strategy that builds up a credible picture in the eyes of lenders. This means a shift of focus from the much debated ability for reliable measurement of soft items into a focus on the totality of measurements, or – to be more exact – to a focus on the relation between measurements, rather than on the single measurements themselves.

These findings may inspire the notion of integrated thinking by highlighting the move from a systematic view, which puts the classification of single measurements in focus, to a systemic view more emphasizing the interaction between different items and factors involved in a company's value creation. However, the holistic thinking shown by lenders in our case may not only reveal an attitude towards measurements, but might also reflect the material underlying business reality for Japanese technology based SMEs which may be equally important as inspiration for the development of the emerging IR agenda. Hence, integrated thinking should not only reflect the ambitions to integrate reporting into a more comprehensive view of the company, but must ultimately reflect the realities of the very value-creation process itself. In consequence, the move from a systematic focus on classification of resources, liabilities, income and costs to a modeling of the value creation process itself needs to be problematized in terms of the very characteristics of

such value creating realities, which may go beyond shallow notions of production functions and value added analyses. Indeed, we have good reasons to believe that the value creation logic in a knowledge society may be of much more complex and messy nature than often assumed in overgeneralized accounts of strategies and processes of value creation. As our example shows, this more complex notion of systemic thinking – taking into account the typically systemic interactive complexities – may be increasingly relevant even in the most traditional settings of technology based industry.

While the kind of holistic, complex systemic thinking illustrated in our findings may be typical of for a more eastern mindset (Bjurström, 2012), there is also strong reasons to believe that this not only reflects a cultural component, but that it is also founded in a networking business reality that is increasingly also relevant globally.

As Karlsson (2003) showed, prevalent strategies for companies' industrial system design is increasingly taking on a network approach, choosing not to focus on the boundaries of the formal organization, but instead emphasizes the flows and structures relevant from a value creating perspective. Consequently, the most important thing is not whether or not value is added within the own firm or in collaboration with others, but to map and understand what actors, resources and activities that interact within and around the formal organizational entities to achieve valuable solutions for customers and stakeholders. The flexibility of such manufacturing systems increasingly emphasizes mass-customization which in turn erodes neat classifications of market segment while at the same time having important influences on operations management. Globalization and technological development driving automation and information economics are changing the playing field, together with the generation of new distribution systems and business models increasingly challenging established markets, niches and big companies.

Under such circumstances, many companies not only take on a network perspective as an analytical tool to understand their value creating processes, but also tend to disintegrate their formal structures to increase flexibility and adaptiveness. Indeed, networking arrangements may be seen as a somatic response in the face of uncertainty (c.f. Baumard, 2002). The abandonment of the classical notion of vertical integration into large companies (c.f. Chandler, 1977) is undeniably a characteristic trait of Japanese manufacturing systems (c.f. Womack et al., 1990). However, in the more competitive global environment, companies move from the product level and are increasingly rather selling functions that create customer value, not least by opting at making more complex offerings, focusing on systems integration rather than on lower levels of technology. In consequence, the core competence of systems integrators becomes more horizontal, focusing on product characteristics. As a result, more and more industries are relying on external resources and actors for achieving competitiveness.

This new, and to some extent typically Japanese industrial structure, sheds further light on our empirical findings in the sense that the holistic thinking shown by lenders may not only reflect cultural tendencies of non-atomistic thinking, but rather reflects globally emerging business realities with a long history in the Japanese context. In other words, the rationality behind Japanese lenders skepticism towards single soft information – with network relations as an exception – may lie not only in the thinking but in the very structure of the production system itself: if you are not able to

maintain well functioning network relations, the value of your assets may also be questioned. On the other hand, while the reliability of measurements of soft information may be questionable, the fact of having well functioning network relations may provide the reliability of the company as a whole – including its claims of competence etc – by demonstrating a strong position in the networked production system.

The picture that emerges and is reflected in the lenders perception of soft information is one of dynamism beyond notions of production functions and stability in buffered productions systems through vertical integration in formal hierarchies producing standardized products meeting a stable mass market demand like in the heydays of traditional industrial production (c.f. Womack et al., 1990). Hence, at least in such a business environment, integrated thinking has to go beyond assumptions of stability as a basic feature of the production system reflected in the reporting. Rather, as Weick & Sutcliffe (2007) put it, stability must be seen as a dynamic non-event. Likewise, if stability is obtained even in the most turbulent industries, it must be seen as a dynamic struggle to keep up the varying and ever changing needs of customers and stakeholders in harsh competition with both established actors and new constellations continuously reinventing themselves to transcend the borders between markets and segments. From this perspective, the frame of reference for talking about integrated thinking does not much resemble the typical assumptions of stability and aggregation of information of the company as one integrated and isolated being, typically reflected in economic notion of the production function. Stability is no longer a function of vertically integrating operations into production systems under hierarchical order. Instead, insofar stability is temporally achieved, it is only through the diminishing the pace by which your relations with customers and stakeholders erode (c.f. Williams, 1999).

The consequences for the IR agenda not least concerns the very meaning of integrated thinking. In our view, integrated thinking must take into account not only the integration of different kinds of data in the reporting, but above all account for the very character of the business reality supposed to be reflected in the IR. A move from systematic thinking in terms of mere classifications must be extended not only to systemic thinking in terms of linear models of the business process or value creation, but also take seriously the systemic complexities present in many production systems, even in the most traditional industries as accounted for in this example. The most critical consequence of the interactive, systemic complexity is the unpredictability of interactions in the production process, so typical for knowledge intense work (c.f. Perrow, 1984), but also increasingly present even in traditional technology based manufacturing industry.

Of immediate importance for the notion of integrated thinking is the very point of reference for the logic of value creation. While an aggregated production function would emphasize the mean values of underlying data and ignore variations in the logic, the real life value creation process is increasingly leaving the logic of pretended closed systems and instead value creation instead to an increasing extent stems from the very ability of flexible adaptation to diverse and varying needs. This open systems reality of present day production systems also means an emphasis – rather than an ignorance – on the dimension of temporality, not least through notions of just-in-time production and more contingent and time limited cooperation in projects and joint ventures etc. This also increasingly means an unpredictability of the patterns of interaction. However, while this logic relies more on market solutions than on hierarchical order, successful interactions tend to be

repeated, shaping patterns of interaction ultimately re-creating a structural order in terms of ongoing and potential future interactions in networks. These networks may well show to be rather stable over time, which is often the rule in the Japanese context. However, the strengths of these ties and their following stability do not rely on any contractual or hierarchical arrangements as much as they rely on earlier evidence of successful collaboration shaping efficient routines and expectations for the ability of common future efforts to combine knowledge and capacities to meet varying customer needs. In other words, rather than permanence, ongoing adaptation is what shapes value creating processes and structures over time.

Summing up, we may ask whether the IR agenda does not miss the point of prevalent trends towards increasing complexity in business life by reducing integrated thinking to a notion of production function representing value creation. In a more dynamic world, looking at network connections would tell more about a firm's ability to adapt and keep itself sustainably relevant over time, than only looking at the internal and pretended closed production system of traditional manufacturing industry. With reference to our study, where lenders tended to emphasize the broad picture in a holistic way rather than focusing on details of singular measurements, we may ask whether the discussion about too much or too little information i.e. the level of aggregation, does not breed the notion of linear, non-complex structures where information problems can solved by reductionism rather than a holistic thinking more compatible with the systemic complexities and uncertainties characteristic of real world production systems. Furthermore, following a systemic view, a network perspective would be more likely to reveal how real world value creation processes work over both internal and external organizational borders. Consequently, integrated thinking must be extended to incorporate holistic notions of systems of interactive complexity, uncertainty and networked value creation processes over formal organizational borders.

5. Discussion

In this article, we set out to understand and interpret the meaning of Japanese lenders perspective on soft information of technology based SMEs to inspire conclusions relevant for developing the emergent IR agenda. The outcomes emphasizing the role of network relations for assessing the trustworthiness of all other information led us to conclude that the holistic thinking among lenders was the main finding of the study. We further conceptually generalized how this preference towards holism and emphasis on network relations also for the trustworthiness of other factors may reflect the material logic of a more distributed production system, with larger companies increasingly disintegrating in order to focus on horizontal technologies and establishing network relations with smaller firms. This led us to draw the conclusion that while being a typical trait of eastern mindsets, the focus on holism and network relations may not only be valid in the Japanese cultural context, but could also reflect the ongoing global trend towards outsourcing and establishment of more flexible network structures. Consequently, we speculate that the view of Japanese lenders might be generally useful for developing and specifying the notion of integrated thinking, as to take into account the prevalent complexity and unpredictability as well as flexibility as a key factor in value creation.

One of the most fundamental consequences for this view is that the point of reference for value

creation changes with the networked logics of production. A common debate about IR as well as other suggestions for reporting is what should be the relevant level of information provided: either it seems to be seen as too little or too much information. We suggest that a more specific question would be what kind of information that should be disclosed is more a matter of the logics of the production system. In our view, this would be the very essence of *integrated thinking*. Hence, rather than assuming that a linear and simple logic of value creation, sometimes expressed through the notion of a production function, is generally valid, the first and most important question for IR should be what kind of logic that dominated that business to be accounted and how it should be represented to contribute to an understanding of the *character* of the relationships between different actors, resources and activities. In traditionally stable production systems with a buffered and seemingly closed production system in a vertically integrated and hierarchically controlled company, the linearity of the production process provided simplicity and predictability allowing for reductionism in its representation. However, the uncertainties would rather emerge at the end of the line, where products and services have to meet customer needs. A networked dynamic production system rather turns this logic around. While its interactive systemic complexity generates uncertainties and unpredictability in the logic of production, its relevance and value is instead continuously demonstrated through persistent network relations with other companies and with the society at large.

In our view, the suggestion of integrated thinking as an expression of interactive, systemic complexity also has consequences for the very aim of the IR agenda. If IR is going to mean something more than connectivity of information in terms of a change in the structure of presentation and go beyond the surface of representation it also has to create understanding of the underlying relationships in the value creating process. This is a claim that most proponents of IR can agree upon. However, our main claim is that if IR is going to live up to its ambition to create and understanding of relevant relationships, it fist has to create an understanding of the very *character* of those relationships. While our Japanese case study may reflect a cultural element of emphasizing interactive complexity, leading to a holistic thinking, the sample chosen for our study at the same time reflects one of the most traditional branches i.e. technology based manufacturing. If such conservative production systems already demonstrate that kind of interactive complexity, uncertainty and network logic, it is plausible that our conclusions will be even more relevant for service industries and knowledge intense work, both of which are growing in size and importance. Therefore, the integrated thinking able to make IR an efficient tool for lenders must emphasize the interactive systemic complexity inherent in prevalent value creating processes. And if nothing else, adding multiple perspectives and systems of meaning of relevant stakeholders will make sure that notions of complexity will rather seem like understatements.

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