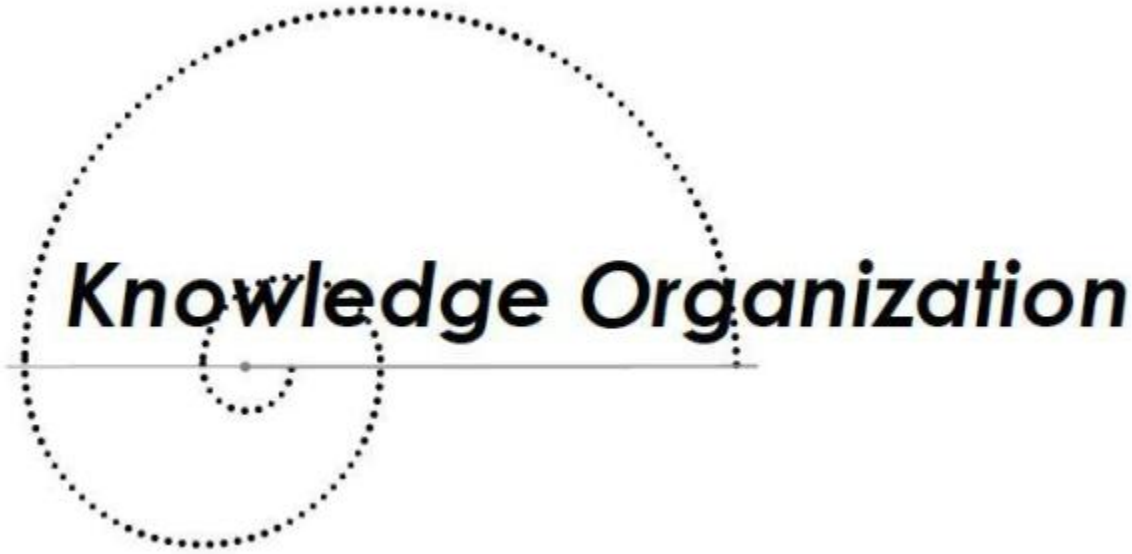

Employee Knowledge Index model with Balanced Scorecard

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Abstract

A corporate index is developed for its employees applying Balanced Scorecard. The aim is to integrate into a single index measured annually a corporation's employees: (1) education (duration), (2) experience (present corporation), and (3) Balanced Scorecard strategic readiness ratio (skill-industry benchmark). The index can be compared within a industry, across industries, and countrywide.
The Employee Knowledge Index (EK_i) can enhance the accuracy and depth of the corporate knowledge asset disclosure to its key stakeholders.
The Ek_i is operationally simple yet a substantially valuable quantitative measure of the corporate knowledge assets aligned for each employee's annual strategy. It is a Key Performance Indicator (KPI) which the corporation can use in its management control system and as an employee development tool.

Keywords: Employee Knowledge Index (EKi); Key Performance Indicator; employee assets

Introduction

Despite increasing sophisticated business intelligence solutions and management control systems (Merchant and Van der Stede, 2008) in leading corporations internationally, a key aggregated employee asset indicator has not been existing which can be compared with industry benchmarks and aligned with the corporations strategy for each employee.
Corporate performance measurement and management can be enhanced by a more flexible and adaptive metric which goes beyond the traditional manufacturing-based productivity measures. The performance measurement can also be used positively for labour incentives on an individual and team-based level (Kennerley and Neely, 2002).
The focus on the importance of the employees as human knowledge assets in the corporation to potentially deliver a competitive advantage in especially knowledge intensive industries have for a substantial period been recognized (Machlup, 1984; Von Krogh, Ichijo, and Nonaka, 2000; Lev and Radhakrishnan, 2005; Voss, 2005).
Despite the intensive focus from human resource management (HRM) and a broad set of affiliated disciplines spanning from operations management, strategic management, organization science, labor studies, business intelligence to information and knowledge management we are still in a need to provide a set of operationally simple yet substantially valuable quantitative measures of the corporate knowledge assets. Furthermore, but not least important, the measure will have most comprehensive, representative, and objective value when being able to be compared within a whole industry (between competitors) and nation-wide. If the measure shall be representative and objective we must assume that each industry can to a substantial degree at a particular time frame agree on a set of benchmarks centred on particular skills and qualifications. Each industry is assumed to be at a fundamentally comparable level. The benchmarks will not be appropriate when comparing an industry in a developed part of the world with an industry in an undeveloped part of the world.

The 1st reason the corporate employee assets are important to valuate for the corporation itself is to improve the efficiency and effectiveness of its human assets. The profit-based corporation will ultimately optimize its market position and competitive ability. The non-profit organizations will also improve the efficiency and effectiveness of its human assets, but the ultimate strategy will for national and local governments be to provide citizen welfare and service. The non-government organizations will have a host of different interests to pursue but they also need to measure ability to obtain strategic goals which can be documented using the Balanced Scorecard methodology.
The 2nd reason the corporate employee assets are important to valuate for their stakeholders are to provide a total and comprehensive coverage of the corporate assets, including the employee assets in the annual report. The annual description and analysis of the corporation must reflect the corporate complexity and provide an accurate picture of the current state of affairs which can be used for its stakeholders, especially investors, to provide a sound basis for evaluation, forecasting, and decision making.

Unfortunately, there are no agreed methodology for how to measure the intangible assets, especially the employee assets, in either the industry itself, government agencies, or in the academic community (Kennerley and Neely, 2002; Neely, 2007). Despite the extensive approaches to variables and measures in the field, the Balanced Scorecard methodology has found a solid base

and is applied throughout a broad range of industries, corporate size, and countries (Balanced Scorecard Collaborative, 2012).

The rationale for the Employee Knowledge index (EK_i) compared with previous business performance measures and corporate disclosure can be summarized in the following attributes:

Single index considering the employee's present corporate working experience (time), total education (time), and present corporate strategic alignment for the employee (decimal). Each component is assigned equal weight, but can be weighted to customize the corporation's needs. An extended index is provided to accommodate the employee's previous working experience in a similar industry ($EX_{ex\ ante}$). The extended index must be used with caution because (1) the employee is assumed to provide truthful data about all previous employment in a similar industry which may not always be possible to verify, (2) the limitations of short term memory may result in not accurately reflect the precise duration of all previous employment and to what extend the employment was full time (part time employment are converted to full time employment when accumulating previous employment).
Cost-effective for the corporation to implement and operate on a continuous basis. The rationale is that the potential enhanced quality of the EK_i as a Key Performance Indicator (KPI) outweighs the cost of calculating the Strategic readiness ratio (BS). The two other factors of the Employee Knowledge Index, Experience and Education is assumed already created in a fundamental state in the corporation's information systems. No new IT investment in hardware or software is assumed necessary although dedicated HRM or Business Intelligence software applications may be beneficially to invest in.
Can be compared objectively industry-wide and nation-wide, assuming the contributing corporations measure consistently and precisely according to standard measurement methods. Applying internationally recognized and widely adopted Balanced Scorecard strategic business performance framework (Kaplan and Norton, 2003, 2008).
Enhance the corporation's annual corporate disclosure (Brennan, 2008) to its key stakeholders by providing an objective and industry-comparable indicator for the corporation's employee knowledge assets aligned with its current strategy. *Ceteris paribus*, higher level of fair, accurate, and comprehensive disclosure of employee assets enable higher documentation levels, hence confidence, for investors when evaluate and decide investment opportunities.

Hypotheses

Ultimately, enhanced corporate measurement of the key intangible asset, the employees, (1) provide a transparent and reasonable fair comparable tool *between* companies in an industry provided that the majority of industry participants contribute with the Employee Knowledge Index, and (2) improves potential economic performance strategically for the individual corporation by an enhanced management control system with a Key Performance Indicator which in one index for each employee, team, or division integrates the relation between the employee's working experience, education and strategic alignment measured continuously on an annual basis.

In a review of the evidence of intangible asset measurement (Ittner, 2008) there is an overreliance on perceptual satisfaction, inadequate controls for contingency factors, simple variables capturing

complex measurement practices, and lack of implementation practice data. Research needs to extend the relationship (correlation) between intangible assets (in the present case, employees) and economic outcomes. That include effects of financial information (a.e. human capital accounting, brand valuation) and non-financial information (a.e. employee satisfaction, customer satisfaction, training/education, brand image). Methodologically, 'only through intimate knowledge of research sites can the full complexity and nuances of performance measurement implementation and use be fully understood and incorporated into the analysis and interpretation of statistical tests of performance implications" (pp. 269-270). The inference from this methodological approach leads to the assumption of the Employee Knowledge Index implementation that it is intended to be complemented by other key indicators and narrative reports of the corporate performance management to have a comprehensive and precise understanding of the present state of the corporation. The exact set of key indicators will depend of the particular corporation, its context, industry, size, current time, and the requirements of its stakeholders.

Methodology

The methodology applies Balanced Scorecard (Kaplan and Norton, 2003, 2008) strategic framework by implementing the employee knowledge asset index aiming to accommodate on the *one side* a solution which can be implemented nation-wide and *industry-wide* on a continuous and consistent basis with an emphasis on a high cost-effective level. On the *other side*, the methodology is aiming to accommodate *internal corporate processes and strategic goals* by eliciting basic information which the majority of corporations across industries, size, and corporate structures already are collecting on a continuous basis. The metric is intended to be simple to comprehend for all kind of corporations and their managers. The metric is applying data collecting design and methods which enables to cover industries comprehensively and be representative on a national level repeated every year at the end of the accounting year. The definitions of the index are in figure 1.
Confidentiality problems are eliminated by no corporate requirements to submit data about revenue, profit, sale, or individual employee identities.

Stakeholders

The corporate disclosure of employee knowledge assets is intended to serve its key stakeholders. The disclosure of employee knowledge assets is in conjunction with other key indicators of the corporation of financial and non-financial nature. The disclosures are either mandatory or voluntary. The employee knowledge asset disclosure is voluntary and falls outside the International Financial Reporting Standard (International Accounting Standards Board, 2011). Apart from mandatory labour statistics and compliance with health and safety, the *voluntary* disclosure status of employee knowledge assets is not assuming a lower importance for the corporation's key stakeholders than the *mandatory* indicators.

The disclosure level of the corporation's knowledge assets requires consideration of confidential business operations and strategies. Individual privacy is related to staff, suppliers, and customers. The disclosure regulations is determined by national regulation, interstate level (European Union,

2007), federal US level (US Securities and Exchange Commission, 2012), and the individual stock exchanges if the corporation is public registered.

The stakeholder's requirements for corporate disclosure are not assumed conflicting in the following cases when considering the primary needs:
The investment perspective is represented by (1) major and minor share holders of a corporation, (2) security exchange for public registered companies, and (3) independent stock market analysts from the investment companies providing advice to their clients or the public. The requirement for the analysts is predominantly for standardized (a.e. international accounting standards) key performance figures and the ability to consistently compare companies in an industry across countries over time (KPMG, 2007). The national security exchanges have a broad set of obligations to ensure the market for securities comply with all national and inter-state (European Union) legal requirements concerning the transactions for the listed companies. The security exchange must monitor, advice, and sanction requirements for mandatory public disclosure of significant decisions and events affecting the valuation and fair trading for the listed companies. Corporate governance legislation and transparency legislation requires comprehensive, consistent, and timely information management for the listed companies.

The strategic and competitive importance of human resources may differ *between* the corporate functions. For example, between HR and the chief executive and financial manager functions about financial performance indicators (Toulson and Dewe, 2004).

Corporate valuation gap

The intangible assets' role whereof the employee knowledge assets are a major part is significant in the corporate valuation gap.
There is wide, and growing, gap between the market valuation of firms and a valuation based on expected future profits. The latter is demonstrably more informative about these firm's tangible investment behaviour. There is no information about investment behaviour contained in stock prices once we control for fundamentals using expected future profits. Persistent deviations of equity values from firm's fundamental valuations are an important feature of US stock markets in the past 17 years, and that this can account for the weak observed relationship between share prices and investment (Bond and Cummins, p. 116).
The under-valuation of the intangible assets is well documented in recent research based on comprehensive US micro and macro-level corporate statistics and surveys covering extended periods in the previous 5-20 years across industries and between industries. The importance of the employee assets is measured indirectly as the residual which are left when comparing corporate book-values (outputs, tangible assets, IT, R&D, and intellectual property rights) with stock-market values for public traded corporations (Abowd et al., 2005; Black and Lynch, 2005; Cummins, 2005; Lev and Radhakrishnan, 2005).

Knowledge assets

The knowledge assets require a definition of an information object which only includes what is explicit. The information object may be tangible, intangible, or a combination. The delivery of the knowledge asset may encompass tacit knowledge in a substantial degree which is typical for customer and supplier relationship management and craftsmanship. The nature of a skilled craftsmanship based on experience and application obtained via a master/apprentice relationship depends on a combination of tacit pragmatic knowledge and explicit contextual knowledge. The craftsman does not always need to explain and document his performance for every product or service element he delivers. The 'learning by doing' is obtained by a combination of the basic theory of the domain, technologies, and mastering skills by practical typical work tasks. The 'rules of thumb', 'intuition', and 'bodily movement' and 'situated knowledge' is often dominated by tacit knowledge (Von Krogh, Ichijo, and Nonaka, 2000). Corporate and society norms and ethics embedded in the daily work practices are often tacit. Norms of a corporation can be explicit in mission statements and procedures but even the most explicit elaborate and precise descriptions of the moral and ethical values of a corporation still require tacit interpretation of each employee in the day to day decisions and actions.
The crucial borderline for what is efficient and effective knowledge management in a given development stage of a society is to determine when crafts based skilled work, customer relationship management, and supply chain management are most efficiently performed:

Apprentice/master system with implicit pragmatic knowledge.
Theory and procedure-based system without implicit pragmatic knowledge.

Governmental and industry regulations require a minimum level of explicit knowledge for educational accreditation, apprentice contracts, health and safety, trading standards, and customer rights.
The 'efficient' measure is defined as the total cost of producing, maintaining, and develop a knowledge management system divided by the total 'fair value' of the knowledge assets annually for all employees.
The 'effectiveness' measure is defined as the measurable impact (facilitators and barriers) the knowledge management system has annually for all employees, partners, and customers. The measures will be a set of qualitative and quantitative measures depending on the particular industry's norms and standards.

Machlup (1984, pp. 251-252) defines the knowledge levels consisting of household, corporation, industry for a group of corporations, market of supply and demand, national economy, and asset portfolio equilibria (stock). The assumption of profit maximizing can be broadly defined as "selection of the action with the optimum distribution of potential outcomes according to the business' outlook and preferences".

Transaction economy models (Voss, 2005) does not explain the importance of knowledge assets in corporations and all attributes of customer and supplier relationships. Simple transaction economy models need to be extended to encompass knowledge assets and corporate learning.

The employee assets (the knowledge asset of the corporation, salary-paid member of the corporation) can be aggregated to knowledge asset classes. The level of detail can support:

Internal functions with a high degree of detail. Utilisation of knowledge assets, product quality systems, and employee skills.
External functions with a high degree of aggregation targeted to investors.

The corporate knowledge assets, including the employee knowledge assets, must be fully integrated in the corporate knowledge management system.

Employee knowledge assets reflected in staff, educational investments, and goodwill fall outside the International Financial Reporting Standards' definition for recognition and identifiability (International Accounting Standards Board, 2011).

Since employee *assets* are not recognized in the mandatory annual disclosed accounts (balance sheet), the value can only be indirectly roughly approximated by accounting disclosures of the employees' and executives' *expenses* (plain salaries, paid out bonuses, pensions, individual social security contracts, individual health insurance contracts, subsidized sport- and leisure facilities, options and warrants, free private use of company car, free private use of company IT equipment, training).
Depending of the country of registration, corporate type, and public/private registration status, the disclosure of employee expenses may be mandatory or voluntary. The disclosure level can in the annual report be represented as foot notes.

In US with voluntary disclosure of human capital (employees expenses), a Compustat sample of 1165 representative corporations in 1999 over a 5 year period controlled for industry sector, size, disclosure status, and industry risk showed "positive influence of human capital information on the firm's market value and performance" measured as corporation's ability to generate above normal returns (Lajili and Zéghal, 2006).

Employee capabilities *not utilized* in the *current corporate strategy* are not accommodated in the Employee Knowledge Index, but the corporation can extent their human resource base on this aspect for internal use. For example, an employee may bring domain specific skills or generic skills from his previous jobs at other corporations which he can not utilize at his current employer under the current corporate strategy for the employer. Some of the employee's previous accomplished skills may deteriorate over time which will change the level of the employee's capabilities not utilized in the current corporate strategy.

The criteria to judge the *effectiveness* of the Employee Knowledge index is the "ability to evoke the desired behaviour" (Merchant and Van der Stede, pp. 33-34) in the corporation which implements the index. The results measures should according to the authors follow four criteria:

Precision (the dispersion among the values placed on a given results by multiple independent measurements must be small). Imprecise measures increase the risk of misevaluating performance.

Objectivity (freedom from bias; measuring done by people independent of the process or measurements verified by independent parties such as auditors).
Timeliness (lag between the employee's performance and the measurement of results). (a) Short term performance pressure employees to perform at their best and (b) short term pressure can stimulate creativity by increasing the likelihood that employees will be stimulated to search for new and better ways of improving results.
Understandability (employees whose behaviour are being controlled must understand what they are being held accountable for). Communication: (a) Training may be necessary for new employees and existing employees if measurement type and focus are changed and (b) employees must understand what they must do to influence the measure.

The present application for corporate internal use of the 4 evaluation criteria to the Employee knowledge Index is met by the following assumptions and means:

The precision of the attributes of the index is met: (a) The tertiary education duration of the employee is registered whatever the type, including apprentice, company education, and mentor arrangements. (b) Experience is the total period of hire at each employer calculated to aggregated full-time employment. The experience type must be as a salary-paid member and may be with different job content and titles. (c) The strategic readiness ratio is calculated as the *employer-stated* performance within *each accounting year* as the relative distance (percent) to the *industry benchmark* of the strategic goal in the market place of the corporation. The employer's motive to 'manage strategic readiness ratio' for its employees similarly to 'manage earnings' is intended to be minimized by relating the performance to the current industry benchmark annually. The regular timely measurement following the accounting year enhance the probability that the strategic readiness ratio is fair (i.e. not biased to please for example the investors and potential new employees). Serious misstatements will be detected in the long run by for example a corporate-level continuous very high average strategic readiness ratio not significantly correlated with employee working satisfaction evaluation, retention ratios relative to industry average, independent corporate reputation rankings (Van Riel and Fombrun, 2007; Cornelissen, 2008) and operational profitability (assuming industry average salaries and average employee demographics).
There is assumed a lower boundary for the strategic readiness ratio on the individual employee level. During an accounting year where (1) the market demand for the corporation's products or service significantly deteriorates, (2) internal organizational restructuring of the division of labour, (3) outsourcing of the employee's job role, (4) significant below normal expected performance of the employee, (5) or a significant changed corporate strategy compared with the previous accounting year will result in the employee's work becomes marginal or obsolete, the strategic readiness ratio will plummet. The corporation can either choose to terminate employment immediately, subject to contractual and legal obligations. Hence, the employee will not figure in the employee knowledge index.
Alternatively, the employee may not be laid off immediately or the corporation wish to wait until the next accounting year to decide if the (1) market demand significant increases for the corporation which will provide sufficient need for continued employment or (2) the corporation may choose to re-train or replace the employee to another job function to recover the significant below normal expected performance of the employee. Under the conditions (1) and (2) the lower

boundary of the individual employee strategic readiness ratio is expected to be reached. The corporation is expected to provide notes in the annual disclosure of the aggregated Employee Knowledge Index about the number of cases in which the conditions (1) or (2) applies to ensure the lower boundary of the strategic readiness ratio is measured precisely. Remember, that in case employees are temporarily laid off (their labour becomes idle) their total Experience in the corporation is still accumulated when rehired in the corporation. Hence, the precision and consistency of the Employee Knowledge Index are not affected.

Objectivity is met by (a) standard measurement of tertiary education across the industry. The corporation can enhance the disclosure of education by providing details of the corporation-provided education period and mentoring because this education type is not industry standard. (b) The experience is objectively measured in time and only includes the present corporation for the Employee Knowledge Index (core version). (c) The strategic readiness ratio's objectivity is enhanced by comparing with the current industry benchmark. The risk of bias is described under the 'precision' criterion.

Timeliness relates primarily the annual registration following the accounting year. When performance is measured annually with the corporation's accounting year end it is possible to complement the Employee Knowledge Index with other company performance key indicators and qualitative descriptions of the corporation's strategies related to the individuals, teams, and divisions' narrative evaluation of the past year's performance. Increasing the frequency of the Employee Knowledge Index reporting is not assumed to provide additional value and precision for either of the 3 elements in the index.

Understanding the meaning and value of the Employee Knowledge Index internally as well as externally is important. It is a composite index which brings three central elements of different types together of the value of the employees related to the current (annual) corporate strategy applied to the Balanced Scorecard framework. The corporation can adopt, measure, and communicate the index aggregated for the whole corporation, division, team, and individual whatever they have a corporate-wide implementation of the Balanced Scorecard methodology. Furthermore, the value and industry importance is enhanced when a critical mass of each industry's participants measure the Employee Knowledge Index. Each employee already knows from the beginning of his tenure at the corporation the duration of his tertiary education and the period he has stayed at the present company. The strategic readiness level for the employee must be discussed individually between the individual employee and his operational manager, typically at formalized and regular periodic employee review. The review can also be at team and divisional level depending on the detail of each corporation's application of the Employee Knowledge Index. The corporation may disclose the aggregated Employee Knowledge Index in their annual report to its stakeholders. The disclosure must indicate the score for each of the three elements in the index. If there are significant changes in the values of index elements in comparison with the previous accounting year, the corporation shall explain the background and reasons. The corporation may also reflect about their current employee knowledge index compared with the industry, i.e. competitors, partners, and market situation. The disclosure must also state near future expectations for the elements of the index. The level of disclosure also depends on the legal ownership status of the corporation (public or private), size, and disclosure regulations in the jurisdiction where the corporation is registered and operates.

Balanced Scorecard

Kaplan and Norton (2003, 2008) have developed Balanced Scorecard methodology especially for intangible assets which for our purpose will be renamed knowledge assets. The Balanced Scorecard model is implemented in a variety of software solutions by different vendors tailored to individual organization or industry wide applications.
The concept 'information' is *not* in a different class from 'human capital'. The Balanced Scorecard framework has inherent categorization disadvantages, since the 'human capital' is *separated* from 'information capital'. Humans *create, reproduce, and communicate* tacit and explicit *knowledge* which is considered *information* when it becomes *explicit*. The 'information capital' in the Balanced Scorecard framework is defined according to be captured and communicated via an information system which is the most central feature of the class 'information capital'. The Balanced Scorecard classification of the objectives 'human capital' and 'information capital' is separated despite the fact that the humans create, distribute, or sell the 'information capital'.

There are recent representative US evidence of the positive economic impact by adopting the Balanced Scorecard methodology including knowledge assets represented by the three perspectives: Customer, internal process, learning and growth. The impact was measured three years after implementation. The significant improvement compared with non-adopters of Balanced Scorecard have implications for shareholder return, market valuation, and excess returns (Crabtree and DeBusk, 2008). Public listed representative corporations in Germany, Austria, and Switzerland in 2001 showed only 7 % full Balanced Scorecard implementation (Speckbacher, Bischof, and Pfeiffer, 2003). 24 European mainly large multinational corporations in Switzerland, UK, Germany, Austria, France, and the Netherland in 1999 showed that the Balanced Scorecard contributes positively to organizational performance (De Geuser, Mooray, and Oyon, 2009).
The Employee Knowledge Index can be implemented regardless of organizational differences in the corporations and different approaches to the Balanced Scorecard methodology (Hansen and Mouritsen, 2005).

The Balanced Scorecard framework's four perspectives are implemented in the software solution IBM Cognos Business Intelligence (IBM Corporation, 2011).

The workforce scorecard (Becker, Huselid, and Beatty, 2009) has been developed to focus on "productive results of talent" (p. 153). *Strategic impact* is the impact of the workforce on strategy implementation. The most important workforce measures focus on how the workforce influences the key strategy drivers. *Strategic workforce architecture* examines how the workforce policies and practices fit together to deliver the desired workforce success (p. 157). Corporations must focus not just on *levels* of strategic workforce measures but also the *relationships* between workforce measures and the drivers of firm financial performance (p. 159). The last aspect includes causal mapping as already described in Kaplan and Norton's (2003, 2008) Balanced Scorecard framework

Results

The description of the Employee Knowledge Index (EK_i) consists of its core core elements, the extended version incorporating total experience from previous employers, a guideline to sub-

elements of the Strategic Alignment Ratio (BS), and definitions of the Employee Knowledge Index (figure 1).

Employee (EM)
The knowledge asset of the corporation, the Employee, is defined as a salary-paid member of the corporation. He may be either hired on a hourly-paid or monthly-paid basis.

Corporation (CO)
The Corporation may be either profit-based or non-profit based. The unit of the Corporation is the officially registered head office for the business activity. Multinational corporations with central accounts of employees and revenues are only counted once. Establishments-based level of registration is not performed. If the head office does not posses the required data, the corporation is asked to obtain these data from the establishment(s) where the employee is working.

Education (ED)
The tertiary education duration of the employee is registered whatever the type of tertiary education. Apprentice-based education, typically skilled labour, are counted for the entire period of their training, including the apprentice-period at the employer's location. If the tertiary education is taken part-time or scattered over several distant periods, the total period of tertiary education is converted to aggregated full-time period counted in years.
Employer-based training or coaching either in-house or off-site for the employee regardless of purpose is also counted in the total Tertiary Education period. Part-time training is converted to full time activity as percentage of a full time year.
Mentor-agreements and trainee positions for the employee is converted to full time activity as percentage of a full time year when the employee is primarily engaged in being mentored or trained, i.e. not primarily performing routine-based full-load work activities comparable with an experienced, employee in a senior position skilled in the art of the business.

Experience (EX)
The Employee's total period of hire at each employer is calculated to aggregated full-time employment in years. The aggregation is converted for part-time employment and scattered employment over several distant periods at the employer. The Experience type must be as a salary-paid member. The Experience may be with different job content and titles, but are counted with equal status.

Experience ($EX_{ex\ ante}$)
An extended Employee Knowledge Index is provided to accommodate the employee's previous working experience in a similar industry by providing this factor multiplied with the 3 other index factors. The employee's total period of hire at each previous employer is calculated to aggregated full-time employment in years. The aggregation is converted for part-time employment to full-time equivalent period.

Industry Benchmark (IB)
The Industry Benchmark of the accounting year in question is defined by the Employer conducting the registration of his employees' Balanced Scorecard strategic readiness ratios. The Industry Benchmark will for the present methodology be based on a skill level for each employee assigned to a particular Balanced Scorecard strategic goal.
One example could be an Employee may lack the efficient competence compared with the state of the art in the industry for a particular programming tool to master his skills for the strategic goal of the corporation to launch a new version of a software application on the market.

Another example could be an Employee or an employee team in the sales department who needs to improve the customer satisfaction rated good to excellent from 70 % to 90 % within a given segment for the coming year 1. If we assume a benchmark of 90 % customer satisfaction rated good to excellent, the Balanced Scorecard Strategic Readiness ratio for year 1 is 0,80. We expect a total duration of 2 years to obtain the strategic aim of 90 % customer satisfaction from our base level of 70 % customer satisfaction. The total customer improvement increase is expected to be linear, therefore the Balanced Scorecard strategic readiness ratio for year 2 will be 0,90.

Time (T)
The time frame for the Employee Asset Balanced Sheet is annual based on the return of the Employee's annual accounts. If no annual data is directly available, the existing data is converted or approximated to an annual basis for the parameter in question.

Balanced Scorecard Strategic Readiness (BS)
The Balanced Scorecard methodology (Kaplan and Norton, 2003, 2008) measures the strategic readiness of the employee, team, division, or entire corporation within a given time frame as the current state of the corporate unit for the strategic goal compared with the final goal. The strategic readiness ratio is calculated as the employer-stated performance within each accounting year as the relative distance (percent) to the Industry Benchmark of the strategic goal in the market place of the corporation. For example, in the present employee asset Balance Sheet the ration 0.90 in year 2006 means that the Employee is lacking 10 % for skill x compared with the current industry benchmark for year 2006 to obtain the Employee's strategic goal of the corporation.
In case an Employee is assigned several different Balanced Scorecard goals within one accounting year, the average is calculated of all the Employee's Balanced Scorecard strategic readiness ratios.
Equal Employee's Balanced Scorecard strategic readiness ratios can be assigned to all employees belonging to a team, department, or division regardless of each individual employee's particular current skill level if the Employer has only stated one common Balanced Scorecard strategic readiness ratio for the particular group or division in question.
The type of the Employee's skill may be either domain and trade specific or generic skills, for example team-building skills or project-management skills.
The Balanced Scorecard Strategic Readiness ratio Skill-Industry Benchmark for the present research is aimed to be compared externally with a representative sample of companies. The ratio is defined as objective and standardized as possible for all employees within a corporation and intended to be implemented systematically as an ongoing activity. The ratio in its basic form is primarily for external functions, i.e. management research, industry survey, and for investors. For internal functions, the ratio can be developed for more sophisticated application. For example, different work functions of the corporation can be assigned different weights in the Employee equation to reflect differences of strategically critical Employee functions in the corporation. Another example is the Experience variable in the equation. Depending of the level of knowledge and skill intensiveness in the industry, the emphasis may be different on how important the staff retention is for the corporation. A high emphasis on staff retention may assign a high weight on the Experience component of the equation. The reasons for emphasis on staff retention can be high cost to train new employees to become fully efficient in the job, corporate culture, and difficulties finding suitable highly-skilled new employees to substitute the departing employees joining competing corporations.
The depreciation rate and level of the employee's skills is build in the Balanced Scorecard Strategic Readiness ratio. In each annual statement of the employee's strategic readiness the employee's required skill for the corporation's strategic goal is assessed for the current degree of depreciation and the need for updating.
There may be significant different levels for depreciation rates depending on the industry development pace and sophistication. Furthermore, the type of skills have different type of depreciation: Generic skills which are not highly depending on fast changing knowledge and a heavy load of current short term memory may

have a low depreciation level. For example, this is the case for basic training in team work, basic negotiation techniques, and project management methods.

Figure 1. Definitions of the Employee Knowledge Index.

The most subjective aspect the corporations are asked to submit is the annual status of each employee's Balanced Scorecard and its relation to the industry's benchmark for the particular strategic goal which the employee has been assigned. The strategic readiness ratio is calculated as the employer-stated performance within each accounting year as the relative distance (percent) to the industry benchmark of the strategic goal in the market of the corporation.
If the corporation surveyed has no previous application of the Balanced Scorecard or does not measure their employee's performance systematically against individually assigned strategic goals, the default value is 1,00 strategic readiness ratio.
The corporations may have a diverse set of tools and way of assessment practices to determine the annual strategic alignment of each employee, teams, and divisions. An optional guideline with a typology of qualifications and personal traits, labelled 'efficacy' (Bandura, 2006) are provided to systematize the process of analyzing qualifications and personal attributes in relation to the corporation's annual strategy. Each of the sub-element in the guideline may be assigned different weights depending on the particular relevance, viewpoint, and size of the corporation. If different weights are applied, the total of weights must equal 1 (proportionality) to avoid distortion in the metric. In the guideline the most subjective and difficult aspect of the formula 'efficacy' is placed separately (outside brackets) to differentiate this factor from the more tangible qualification factors.
The extend a skill set for an employee is employer-transferable to a similar corporation in the same industry depends on a broad set of factors, not only if the employee is highly educated specialist worker, skilled-labour (apprentice-based), or unskilled worker. We also have to consider interdisciplinary developments on the labour market, globalization of labour force, and the division of labour at a given time in the society which are measured. As part of the dynamic and rapid development in the division of labour and the general world-wide increase of education level the traditional boundaries between 'blue colour' and 'white colour' workers become blurred.
The analysis needs to consider the current national skill system (Crouch, 2009, pp. 111-112) in which the Employee Knowledge Index is implemented. The national system's composition is important in the way it prioritizes the (1) fundamental public educational system (scientific and professional levels), (2) specialist vocational training (private and public), and (3) apprenticeship system (private and public). The degree of synchronized alignment between the industry skill *demand* (market) and the public educational system's standardized curriculum *supply* is important when determining (1) who shall provide the training and the expenses for the employee and (2) the extend the skill is a recognized industry-wide transferable skill (qualification). This aspect is the element labelled 'Q-TRANSFER-INDUSTRY' in the guideline to sub-elements of the Strategic Alignment Ratio (BS) described in the following section.

Careful consideration should be carried out to avoid the lower bounds of the decimal scale ($> 0 \leq 1$) for each element since just one extreme low value element will be detrimental for the total Strategic Alignment Ratio (BS) because all the sub-element values are multiplied with each other.

Guideline to sub-elements of the Strategic Alignment Ratio (BS)

Elements

Q-TRANSFER-INDUSTRY
Qualification, industry standard certification (employer transferable skills). The qualification covers the span from a whole vocational-oriented educational program to single specific certifications in a practical tool or framework.

Q-TRANSFER-GENERIC
Qualification, non-industry standard generic certification (employer transferable skills). The qualification typically covers basic training programs corporate-wide as a pre-requisite to be employed and carry out normal duties of the job. This type of qualifications is a combination of (1) government-regulated compliance training and (2) company-policy regulated training.
Examples: Health and safety, basic IT systems portfolio, information security policy, statutory employment rights and obligations, ergonomics, and work-place conditions. Although a part of these training programs are company-specific, the majority of the qualifications in this category are relatively transferable to other employers.

Q-NONTRANSFER-INDUSTRY-CORPORATION SPECIFIC
Qualification, non-industry standard (employer non-transferable skills). The qualifications covers formal and informal education and experience which predominantly are corporate-specific and are not efficiently and profitable transferable to other employers in the same industry because of (1) peculiarities in the nature of the work or (2) non-disclosure employment contractual clauses to ensure corporate confidentiality of intellectual property rights and avoiding illegal commercial exploitation.

Q-NONTRANSFER-GENERIC-CORPORATION SPECIFIC
Qualification, non-industry generic (employer non-transferable skills). the qualification typically covers tacit knowledge of the informal and formal corporate-specific organizational structure, processes, working methods, culture, and ethics. The 'spirit' of the corporation is assumed to be idiosyncratic, hence non-transferable to other corporations. Although role-model corporations can function as inspiration for the remaining members of an industry, we assume for simplicity that the employee are not able to individually transfer his qualifications of this type to another employer directly.

Q-EFFICACY
Definition
The concept encompasses the impact on cognitive, motivational, affective, and decisional processes. "Efficacy beliefs affect whether individuals think optimistically or pessimistically, in self-enhancing or self-debilitating ways. Such beliefs affect people’s goals and aspirations, how well they motivate themselves, and their perseverance in the face of difficulties and adversity. Efficacy beliefs also shape people's outcome expectations - whether they expect their efforts to produce favourable outcomes or adverse ones. In addition, efficacy beliefs determine how opportunities and impediments are viewed. People of low efficacy are easily convinced of the futility of effort in

the face of difficulties. They quickly give up trying. those of high efficacy view impediments as surmountable by improvement of self-regulatory skills and perseverant effort. They stay the course in the face of difficulties and remain resilient to adversity. Moreover, efficacy beliefs affect the quality of emotional life and vulnerability to stress and depression. Last, but not least, efficacy beliefs determine the choices people make at important decisional points" (Bandura, 2006, pp. 170-171).
When the corporation evaluates the employee individually and in teams for efficacy, the factors outlined in the definition are important for the corporate performance accomplishment (Stajkovic, Lee, and Nyberg, 2009), and the individual employee and selecting the annual index value for the efficacy factor. Since different employees have different thresholds for the efficacy factors outlined, the operational manager for the employees in question may accordingly assign different expectations to each employee based on the responsible operating managers history of the employee. For example, the stress limit for the employees may vary based on individual traits of the employees, inter-personal and group relationships in the everyday working environment, and family status (employees with small dependent obligations may be more vulnerable to excessive and abnormal complicated work load).

Formula guide for Strategic Alignment Ratio (BS)

Q-TRANSFER-INDUSTRY, Q-TRANSFER-GENERIC, Q-NONTRANSFER-INDUSTRY-CORPORATION SPECIFIC, Q-NONTRANSFER-GENERIC-CORPORATION SPECIFIC, Q-EFFICACY where value < 0 ≤ 1

$\sum \vec{n} = 1$

[Q-TRANSFER-INDUSTRY $\vec{a}$ * Q-TRANSFER-GENERIC $\vec{b}$ * Q-NONTRANSFER-INDUSTRY-CORPORATION SPECIFIC $\vec{c}$ * Q-NONTRANSFER-GENERIC-CORPORATION SPECIFIC $\vec{d}$] * Q-EFFICACY $\vec{e}$

Example for an employee in a corporation (employer-rated)

1. Weights of qualification types

TRANSFER-INDUSTRY: 0,10
TRANSFER-GENERIC: 0,10
NONTRANSFER-INDUSTRY: 0,40
NONTRANSFER-GENERIC-CORPORATION SPECIFIC: 0,10
EFFICACY: 0,30
Total weights: 1,00
Number of weights: 5
Average weight: $\frac{1,00}{5}$ = 0,20

2. Un-weighted values for employee's Balanced Scorecard Strategic Ratio (BS)

TRANSFER-INDUSTRY: 1,00
TRANSFER-GENERIC: 1,00
NONTRANSFER-INDUSTRY: 0,90
NONTRANSFER-GENERIC-CORPORATION SPECIFIC: 1,00
EFFICACY: 0,95

3. Weighted values for employee's Balanced Scorecard Strategic Ratio (BS)

TRANSFER-INDUSTRY 0,10
TRANSFER-GENERIC: 0,10
NONTRANSFER-INDUSTRY: 0,40
NONTRANSFER-GENERIC-CORPORATION SPECIFIC: 0,10
EFFICACY: 0,30

4. Final values for employee's Balanced Scorecard Strategic Ratio (BS)

TRANSFER-INDUSTRY 1,00 * 0,10/0,20 = 0,5
TRANSFER-GENERIC: 1,00 * 0,10/0,20 = 0,5
NONTRANSFER-INDUSTRY: 0,90 * 0,40/0,20 = 1,8
NONTRANSFER-GENERIC-CORPORATION SPECIFIC: 1,00 * 0,10/0,20 = 0,5
EFFICACY: 0,95 * 0,30/0,20 = 1,43

Total: $\frac{0,50 + 0,50 + 1,80 + 0,50 + 1,43}{5} = 0,95$

Reasons for prioritation of weights

The corporation's strategy is to be a leader in a high-technology and knowledge-intensive industry where the corporate-specific qualifications are mission-critical (NONTRANSFER-INDUSTRY). The personal profile (EFFICACY) highly critical for corporate success is an ability to resolve complex work problems and deliver efficient results despite competitive challenges (hostile, fast innovative competitors) and handle an uncertain dynamic environment.
The standard industry qualifications are assumed to be easily available to a moderate market cost (salaries) and are not considered mission-critical in itself for the corporation in question. Therefore, these aspects are rated low (TRANSFER-INDUSTRY and TRANSFER-GENERIC). The corporate-specific generic qualifications are considered to be fairly easily and well leaned by any type of employee in the corporation and are basic understanding for all employees but not mission-critical for the corporation (NONTRANSFER-GENERIC-CORPORATION SPECIFIC).
Please note, that there may be different prioritation of weights within the same corporation depending on the work function, industry, and department.

Employee Knowledge Index model

The three aspects of the Employee Knowledge Index are based on the definitions described in figure 1. The index equation is with averages for all employees within each corporation measured at head office level.

$$EK_i \sum_{n,\,t} = ED_{\text{period (year)}}\ EX_{\text{corporation (year), t}}\ BS_{\text{skill, t /industry}}$$

ED: Education (duration)
EX: Experience (present company)
BS: Balanced Scorecard strategic readiness ratio (skill-industry benchmark, year)

An example with three employees are entered and averaged (table 1). For convenience the measurement of education and experience are displayed in full months and years. In the index calculation they are converted to decimals.

Employee knowledge Index report											
Corporate ID				Registration number							
Submitting corporate HR manager				Name							
ID	**Birth date**	**Region**	**Division**	**Team ID**	**Job role**	**Education (ED)**		**Experience (EX)**		**Strategic readiness (BS)**	**Index (ED * EX * BS)**
184	02/10/1960	Country A	Management	2	Line manager	Y 2	M 0	Y 1	M 6	0,90	2,70
515	25/03/1976	Country B	Sales	5	sales representative	Y 4	M 6	Y 2	M 3	0,95	9,62
454	11/09/1956	Country C	Operations	35	Production engineer	Y 3	M 0	Y 5	M 6	0,80	13,20
Total average						3,17		3,08		0,88	8,51

Table 1. Employee Knowledge Index report.

Extension of the Employee Knowledge Index model

The extended version of the Employee Knowledge Index incorporates previous total employment in a similar industry for the employee. The present company experience is now called $EX_{ex\ post}$ to differentiate the factor from previous experience $EX_{ex\ ante}$

$$EK_i \text{ extension (1) } \sum_{n,\,t} = ED_{period\ (year)}\ EX_{(year),\,t}\ EX_{ex\ post\ (year),\,t}\ BS_{skill,\,t\ /industry}$$

As stated in the definition of the Employee Knowledge Index in figure 1 under results, different work functions of the corporation can be assigned different weights in the Employee equation to reflect differences of strategically critical Employee functions in the corporation. To accommodate individual corporation's need to differentiate in the EK_i index that certain skills are more critical or significant in relating to the corporation's strategy, we provide the option to have one additional extention of the Employee Knowledge Index model which is intended to be calculated in *parallel* with the standard version to ensure there is a consistent and continous standard metrix regardless of changes of the corporation's choice and prioritation of 'critical' skills.

$$EK_i \text{ extension (2) } \sum_{n,\,t} = ED_{period\ (year)}\ EX_{corporation\ (year),\,t}\ CS_t\ BS_{t\ /industry}$$

To avoid excessive distortion of the 2nd EK_i extension's metrics, it is recommended *not* to place any value for the weighted factor for Crititial Skill (CS) higher than 1,5 which will otherwise risk outbalancing this factor compared with the other factors since the factors are multiplied with each other.

The calculation implementation is performed by setting the default Crititial Skill (CS) for the employees in the corporation to 1,0 (i.e. neutral) and the highest valued Crititial Skill (CS) up to a factor maximum 1.5 on an annual assessment basis. This calculation assumption implies that the total EK_i extension version with weighted critical skills can *only* increase or stay neutral for employees compared with the standard EK_i model which is intended to continue in parallel with extended model(s).

Please note that the critical skill assessment can both be determined by (1) the corporation's strategic goals as well as (2) macro-economic disequlibrium of demand/supply of the critical skills (CS) in question.

A corporation may circumvent or seek relief from difficulties to resolve the problems with critical skills (CS) employment by either (1) *outsource* the particular work function (asset) to the market participants (business partners) who most efficient can resolve this deficiency to the corporation's strategic resolution or (2) *insource* the particular work function by merger or acquisition.

Conclusion

The hypotheses were to (1) provide a transparent and reasonable fair comparable tool between companies in an industry provided that the majority of industry participants contribute with the Employee Knowledge Index, and (2) improves potential economic performance strategically for the individual corporation by an enhanced management control system with a Key Performance Indicator which in one index for each employee, team, or division integrates the relation between the employee's working experience, education and strategic alignment measured continuously on an annual basis.

The results confirm the hypotheses but empirical validation on a substantial scale will be needed to support the theoretical feasibility.

The novel model is developed for the Employee Knowledge index (EK_i) with the Balanced Scorecard strategic framework: A single index considering the employee's present corporate working experience (time), total education (time) and present corporate strategic alignment for the employee (decimal). Each component is assigned equal weight, but can be weighted to customize the corporation's needs.

The model claims to have developed a methodology to accommodate a solution which can be implemented nation-wide and industry-wide on a continuous and consistent basis with an emphasis on a high cost-effective level.

The metric is applying data collecting design and methods which enables to cover industries comprehensively and be representative on a national level, repeated every year at the end of the accounting year.

The Eki is operationally simple yet substantially valuable quantitative measure of the corporate knowledge assets aligned for each employee's annual strategy. It is a Key Performance Indicator (KPI) which the corporation can use in its management control system and as an employee development tool.

The methodology aims to accommodate the internal corporate processes and strategic goals by eliciting basic information which the majority of corporations across industries, sizes, and corporate structures already are collecting on a continuous basis. The metric is intended to be simple to comprehend for all kind of corporations and their managers.

Enhance the corporation's annual corporate disclosure to its key stakeholders by providing an objective and industry-comparable indicator for the corporation's employee knowledge assets aligned with its current strategy. Ceteris paribus, higher level of fair, accurate, and comprehensive disclosure of employee assets enable higher documentation levels, hence confidence, for investors when evaluate and decide investment opportunities.

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