Using T2-Capability Profile Modelling to Anticipate Change and Development: Bridging the Industry and Higher Education Views

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Abstract: Organizations depend on the capabilities their members possess to survive and succeed in the highly competitive operating environment. Typically, capability or competence profiles have been created cross-sectionally, serving the current needs of the organization, whilst the Knowledge (KM) and Human Resource Management (HRM) also need to be future-oriented, addressing the emerging needs for new capabilities in an anticipatory manner. The development of capability profiles has moved from I-shaped models stressing the need for deep professional special knowledge to T-shaped models where the emphasis is adding horizontal knowledge capabilities (about business processes and additional knowledge areas) to balance the deep vertical specialization to specific occupational areas. In an ECKM (European Conference on Knowledge Management) conference paper in 2022, a new model called T^2-model was introduced on a conceptual level (Saukkonen & Kreus, 2022). The development step to earlier T-shaped capability models was the addition of a second horizontal layer on top of combinatory capabilities – thus the name of T^2. The lower horizontal layer contains business-specific items (like supply chain management, quality, or project management) where advanced knowledge is needed. The higher horizontal layer contains items of phenomena where a basic level of knowledge is needed (e.g., financial literacy, AI principles, sustainability). In the experimental research design, capability profiles were created for selected professional positions. The capability profiles were created by both business professionals (individuals currently having or managing the profession in question) and higher education professionals (who educate undergraduates and graduates to the industry and function studied). The respondents filled into the visualized T^2-model the skills preselected from earlier literature to relevant and were also able to add the skills they felt were missing in the original list of skills for the profession in question. The results give early proof-of-concept of the viability of T^2-model as a method of bridging both HRM and KM within organizations as well as University-Industry views on the knowledge items and levels needed for the future. Furthermore, the results give a basis for the knowledge anticipation process. The paper elaborates on a new model for anticipation of knowledge and offers a process that organizations can use in designing their HRM and Knowledge Management. Using T^2-model may offer an improved integration to other areas of planning such as technology development and strategic change.

Keywords: Knowledge, Capability, Skills, Career, Competence

1. Introduction

1.1 The Scope and Aim of the Study

The research project aimed at pilot implementation of the T^2-profiling, which had been earlier presented in academia only on the conceptual level. The primary aim was to test and assess the profiling framework in itself but also to shed light on the capabilities demanded for professional success in what comes to areas of Purchasing Management and Digital Marketing Management. The results and conclusions were planned to be usable both for the guidance of lifelong learning and professional development in business as well as for the development of educational approaches in the fields leading students to the two professions under study.

1.2 Research Approach, Method and Sampling

The approach was exploratory and experimental. Via convenience sampling, the following respondent pools were created to do the categorizing of the capabilities.

Professional Title 1: Purchasing Manager

- 2 respondents from HEI (Higher Education Institution) – educators teaching and researching purchasing management
- 3 respondents from industry (2 from the manufacturing industry, 1 from wholesale)

Professional title 2: Digital Marketing Manager

- 2 respondents from HEI – educators teaching and researching digital marketing management
- 3 respondents from industry (2 from the manufacturing industry, 1 from retail)

The three categories of capability ”ranking” were:

EXPERT LEVEL = VERTICAL (DEPTH) LAYER capabilities are rather unique in the organization, crucial for success in the job, and present all the time when performing in the job

ADVANCED LEVEL = FIRST HORIZONTAL LAYER capabilities where someone else in the organization has expert level knowledge, capabilities needed continuously in the job and cooperate with others

BASIC LEVEL = SECOND HORIZONTAL LAYER capabilities not directly included in the job but knowledge of which support the work done in the job and acting in the work community.

The respondents to the study were chosen via purposeful convenience sampling, The respondents contacted were alumni from the HEI (Higher Education Institution) were the researchers work. When constructing the respondent pool, the researchers sought heterogeneity of company types and sizes in what comes to representatives from industry. The respondent pool consisted of professionals from industrial, wholesale and retail organizations. The company sizes varied from 100 people to 2000+ people organizations. The educators invited to the study were educators/researchers responsible for digital marketing and purchasing management courses and research .

The respondents were introduced (via LinkedIn message or e-mail) the aim of the study and expected workload for them. Once they reacted positively to the invitation to join, they were sent a slide with the T^2- structure and the preselected set of skills. The respondents' task (independently of each other) was to place the preselected capability areas to the T^2-model layers of expert/advanced/base level of capabilities demanded – *currently* -in the job in question. The sources of capability areas were:

- The future of jobs – report by Word Economic Forum (WEF, 2023)
- The final report of FUDIX (Future Digi Expert)-project (JAMK, 2022)
- Purchasing and supply management (PSM) competencies: Current and future requirements. (Bals et al., 2019)
- In addition, the respondents could add the capabilities needed in the profession but not listed by the researchers

The respondents worked by rearranging the capability text boxes on a MS PowerPoint slide that was coded by the sphere (purchasing or marketing & industry or education + the name initials) so that the researchers could have contacted the respondents and asked individualized further questions if needed. Also, the opportunity to act on the responses was kept alive with the informant coding – e.g. the next stage of further research could be the capability needs *for the future,* and looking at that, the ability to backtrack the responses to the person answering was maintained.

In the data analysis of the individual T^2-profiles depicted by the informants, the researchers aimed at pattern recognition (repetition of lines of thought by informants) but also in the issues where no pattern emerged, thus proposing a discrepancy of views that may, in turn, motivate further study and discussion. In the analysis, the researcher triangulation method was used i.e. two researchers performed their analysis independently, and then their findings were merged into a joint view. The approach was a quantitative one the researchers made their conclusions on pattern emergence based on the frequency of capabilities based on specific layers. The areas of interest were: 1) Within one profession: Which skills are typically based on certain layers i.e. what is the agreed core of a capability profile for that profession 2) Which capabilities are lacking a pattern i.e. in which issues the professional community agrees on a capability importance, and 3) Which capabilities form a pattern between the two distinct professions studied: What are the generic, interdisciplinary capabilities.

1.3 Research Gap, Objectives and Questions

The research gap identified links to the lack of practical instantiations of the capability profiles. Multiple studies have addressed the evolution of capability profiles and discussed the alternative models on a conceptual level. Empirical research on the feasibility of the capability profiles has been scarce. The role of business practitioners has been minor in testing the models and developing them further. In addition, higher education's role has been weak in impacting the contents of capability profiles and designing their processes.

The research objectives were:

- to test the practical feasibility of T^2- capability profiling with business and education professionals
- to find if the small samples of the professionals can agree on the capabilities and levels of expertise needed for the 2 professions in focus.

- to see how the educators' view corresponds to those of business professionals.
- to see if there are overlapping/shared capability areas and levels between the two professions (generic capabilities)

From the research objectives, the following research questions (RQs) could be created:

RQ1: What and on what level are the demanded current capabilities for the Purchasing Manager?

RQ2: What and on what level are the demanded capabilities for Digital Marketing Manager?

RQ3: Can some overlapping (=generic) capability areas be identified between the two professions?

RQ4: How well does the T^2-capability profile suit the quest to act as a framework for the improvement of professional capabilities in industries and education?

2. Literature Review

2.1 Skills, Competencies, Abilities, and Capabilities

The literature on capability-related research uses terminology and a range of conceptualizations that overlap. The related terms are often used interchangeably. For example, skill can be defined as the method for outcome connected with knowledge. And knowledge includes creativity, power of practice, communication skills, and technical skills (Takeda, 1999). Skills and competencies are used as the same concept but have distinct differences. Skills are learned abilities while competencies are inherent qualities that combine skills, knowledge, and abilities. Competencies are a set of integrated knowledge, abilities, and attributes that define what is needed to successfully perform a job. Competencies can be specific to a job or vary based on job content, performance situations, and performance criteria. Lee (2022) discusses the definitions and conceptual relationships of ability, competence, and skill. It concludes that "ability" is an individual and independent concept, while "competency" is a set or bundle of factors that includes both ability and non-ability factors.

The paper by Ruitenberg (2019) highlights that skills are specific and transferable capacities that can be perfected through practice, while competencies are broader attributes that involve one or more skills. Ruitenberg emphasizes that many human attributes exceed the concept of skill.

Lastly, capabilities, the focus of study in this paper, can be coined as a combination of knowledge, skills, experience, and competencies that enable individuals or organizations to perform certain activities or achieve desired outcomes (Whitfield et al., 2022). Capability involves the integration of prior knowledge, skills, resources, judgment, and experience to solve problems (Zvradkovic et al., 2014). Capability is seen as a complex, organizationally embedded, and firm-specific knowledge resource that supports competitive advantage (Keeley, 2014). The concept of capability can be used as a baseline for business planning, service specification, and design. It allows organizations to deliver their services in various business contexts with sustainable quality.

2.2 Capability Profiling

Capability profiling is a term used both for human and technology-driven performance evaluations. Capability profiling refers to the process of evaluating the capabilities or qualities of a system, process, or person on specific criteria or variables. The goal of capability profiling is to determine the extent to which a system or process meets customer expectations or specifications. It can be used to identify soft skills requirements in job descriptions, evaluate the process capability of IoT devices within self-organized ecosystems, or assess the process capability of a product or process in quality control applications. (Ajayi et al., 2019; Liu et al. 2018; Charki et al., 2016).

In the sphere of human capability assessments and enhancement, capability profiles are depictions of capability requirements/targets for a successful action in a professional role. Capability profiling contributes to organizational development and performance improvement by identifying and leveraging the various competencies and capabilities of a company. Through capability profiling, organizations can identify the skills and resources needed to implement their business strategies effectively (Liu, 2022). The shape, size, and contents of capability profiles are used in HRM processes from recruitment to training as well as to performance and compensation management. Originally, a wide range of archetypal profiles were established, namely those of specialist, generalist, and Phi-shaped (Macaulay et al. 2010, pp. 728–729). A specialist or in other terms an I-shaped (from the shape of the letter i in the uppercase font) professional profile describes a person who has a very deep understanding of his/her area of expertise but a limited width in other areas of expertise. The

generalist profiles can be described with the symbol "-" or as a hyphen-shaped profile, where there is width in various expertise areas but a limited depth in all of them. This profile might work for the general management or development manager positions within an organization. Phi- (π) shaped profile suggests that two distinctive areas of knowledge go deep, and the width is provided by the capacity to understand their interplay.

2.3 The Models of T- And T2 -Shaped Capability Profiles

The knowledge era in which companies currently operate, calls for new capabilities in both technological and behavioral dimensions and in combining these (Haapasalo and Kess, 2001). Yet, at the same time technological development requires people to gain a deeper and deeper understanding of their own field to provide their employers a true competitive advantage. So, there is the vertical depth required as in the original I-shaped capability profiling. However, combinatory capabilities are needed as the tendency is towards holistic, non-siloed, and interdisciplinary approaches, so also horizontal capabilities are of need. To accommodate these demands, capacity profiling moved towards talk and research on T-shaped capability profiles. As the symbolic letter T proposes, there is a need for a domain- and/or function-specific expertise (the vertical line in the letter) but in addition to that, individuals should possess width in their knowledge. This horizontal width offers the individual and organization flexibility via "empathy, breadth of knowledge, skills, experience, and complex communication abilities" (Demirkan and Spohrer, 2018). T-shaped models have been described to be fundamental for corporate knowledge management (Barile et al., 2012), innovation (Oskam, 2009), project management (Martinez et al., 2016) and service design and delivery (Saviano and Simone, 2015).

Some papers published in 2010s proposed that both vertical and horizontal dimensions should multiply in content. So there would potentially be more than one area of deep expertise but also various layers in the horizontal dimension (e.g. Heikkinen, 2018). To comply with the notions made on the multitude of contents for both the vertical and horizontal dimensions of capability profiles, Saukkonen and Kreus (2022) introduced a T2-model for capabilities based on the analytical assessment of the prior-art models and discussions with and observations of modern organizations (2022). In the T2-model there are altogether 3 layers, 2 of which are horizontal (width) and one vertical (depth).

The T^{2-}capability profile (the basic form of it shown in Figure 1) is built on the following pre-assumptions:

- despite the expressed needs for interchangeability of information and flexibility of the workforce, deep expertise skills possessed by an individual are still a valid demand for competitiveness 10
- the number of skills and competencies with deep expert-level knowledge cannot be many since the time and other resources of an individual and organization are constrained
- the interdependent nature of business functions in a modern organization set demands for the experts to understand the context-dependent (on the industry- and company-level) processes beyond one´s expertise
- in addition to deep expertise and context-dependent capabilities, there is a layer of context-independent competencies, which are needed across domains and industries

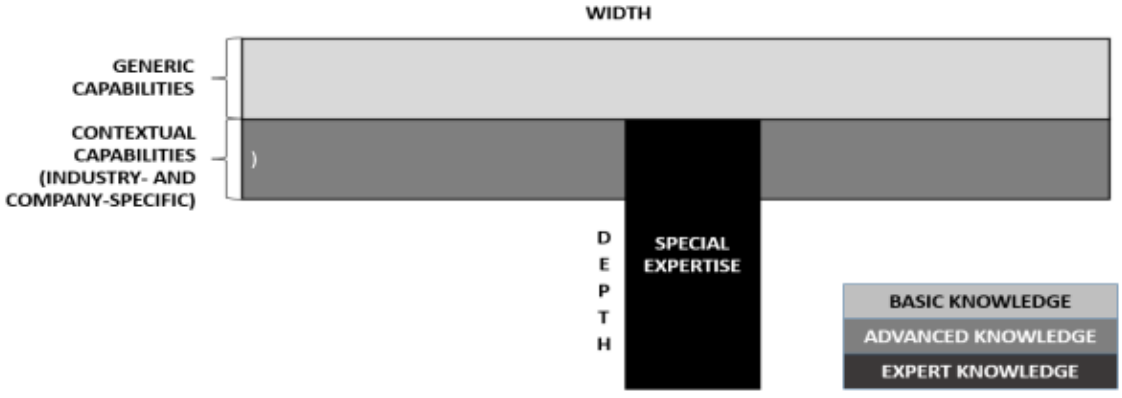

Figure 1: The format of the T^2-capability profile (Saukkonen, 2022)

3. Results

Altogether 10 different capability profiles were obtained from the respondents, to be analyzed based on the frequency of capabilities placed to specific layers, i.e.the data analysis was quantitative in nature. The overall

view was thus created by superimposing the 10 different profiles and looking for patterns that emerge from the data. In Figure 2 an exemplary T^2-profile depiction by a Purchasing Manager practitioner and in Figure 3 the depiction by a Purchasing Management educator is shown.

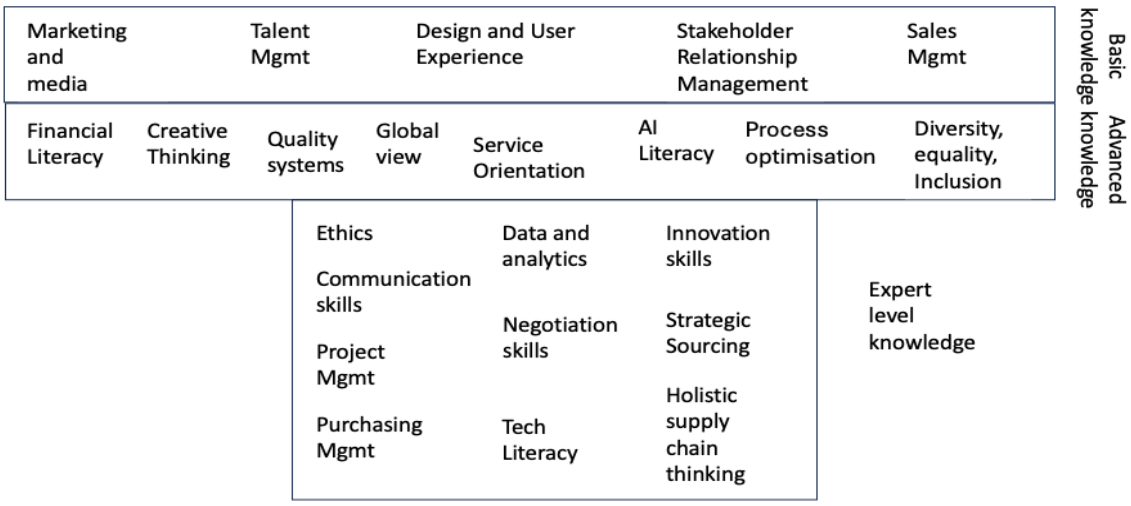

Figure 2: An example of the capability profiling by a Purchasing Management practitioner

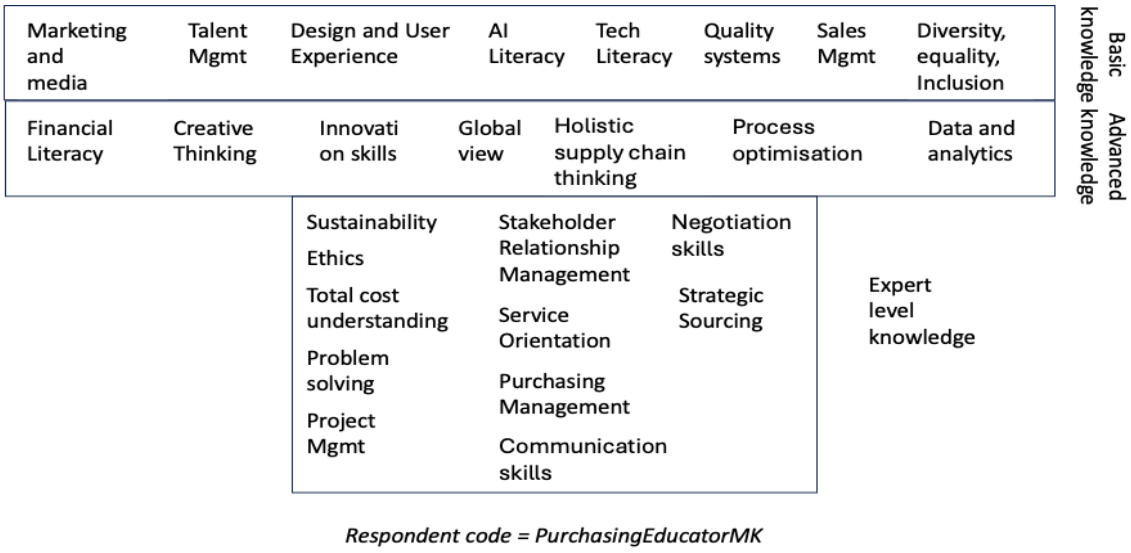

Figure 3: An example of the capability profiling by a Purchasing Management educator

When superimposing (placing on top of each other) the T^2-profiles depicted by the informants, the following patterns were identified.

- In the T2 model for a purchasing manager (PM) a greater agreement was reached than in what comes to the Digital Marketing Manager DMM case– especially on the depth dimension (Expert-level skills) may be partly due to some skills/competencies offered were taken from a sector-specific source=> conclusion: a sector-specific tailoring of competence listings needed when applying T2
- In the Digital Marketing Manager -case the informants added various and very specific skills to the expert level => conclusions: 1) the lack of sector-specific "vocabulary" (see above) may be the reason to that, and 2) the question of the difference between competence/capability and skills that prevails in academic literature is present also on the practitioner level. Educators used more broad concepts both when selecting from the given list and in adding new competencies.

- Soft skills of communication and negotiation were most often placed to expert level in PM sphere, whereas in DMM the opinion on that differed. Is DMM action currently more tech-laden than PM so transactions and communications happen online thus leading to a lower level of skill needs?
- Data and analytics are crucial for success in both professions – whereas the wider concepts of Tech and AI literacies were placed in the layers with a lot of variation.
- Financial literacy was placed clearly on the layer of advanced capabilities as well as project management was either expert or advanced competence required – across both cases.
- Ethical considerations are more present and capability-demanding in PM than DMM case
- Overall, the advanced level (first horizontal layer of combinatory capabilities) was very "crowded," giving a hint that modern business requires capabilities across organizational silos and functions.
- in the DMM -case the informants mentioned "customer journey"(expert level) and "customer relationship management"(basic level) in the category "other. The customer-related competencies were not in the pre-selected capability list and should be included in future work on the issue.

4. Conclusions

Based on the results displayed in Chapter 3, the following answers to the RQs can be presented.

RQ1: What and on what level are the current capabilities demanded of a Purchasing Manager?

The core capabilities of strategic sourcing, purchasing management, communication, and negotiation skills as well as stakeholder relationship management were commonly agreed upon by the informants and were placed on the expert level. Data and Analytics were also highly ranked among purchasing management informants - either expert or advanced knowledge level. The remaining capability areas based on the literature were placed on advanced or basic levels. Creative thinking and sales-related capabilities were ignored by some purchasing management informants.

RQ2: What and on what level are the capabilities demanded of a Digital Marketing Manager?

The core capabilities that most informants agreed upon to be demanded at the expert or advanced level were Marketing and Media, Data & Analytics, Financial Literacy, Negotiation skills, Creative Thinking, and Project Management. In what comes to the remaining 22 capability areas surged from the literature the opinions on the level of capability demanded varied between basic/advanced level skills. For example, the role of Ethics, the understanding of Purchasing management, and AI literacy varied a lot between informants. Interestingly, Data and Analytics were on average ranked higher than Creative thinking in what comes to managing digital marketing.

RQ3: Can some overlapping (=generic) capability areas be identified between the two professions?

Capability areas that were shared between the two professional communities were Data&Analytics, Negotiation skills, and Financial literacy. These areas can be seen to reflect the development tendencies of technological and organizational development across industries. Of the capability areas not shortlisted by the researchers, the additions by the informants were mostly related to Sustainability (PM case) and Search engine optimization (SEO) capabilities (DMM case).

RQ4: How well does the T^2-capability profile suit the quest to function as a framework for the improvement of professional capabilities in industries and in education?

The informants described the approach and "exercise" built on it as interesting and no negative reports were made on the usability of the T^2-tool. On average, informants placed 7 capabilities in the category of deep expertise level (8 in the PM case and 6 in the DMM case), 8 capabilities in the layer of advanced skills (9 in the PM case and 7 in the DMM case) and 6 capabilities to the level of basic skills (in both PM and DMM case). This finding highlights the complexity of the current world of work and the need for cross-disciplinary learning and practice. One informant commented that the size of the organization - how many people share the responsibilities in e.g. purchasing department – affects individual capability profiles.

For future purposes, a mode context/sector-specific "capability library" would add to the specificity of the findings and better guide the usage of the model in educational and learning purposes in both academic as well as in professional environments. The dilemma of whether the capabilities offered are too generic vs. too specific was prevalent. In addition, in a large corporation, the studies could be done on a company level with their specific structure and more focused set of organizational capabilities in mind.

As the study results propose, there are contrasting views on the importance (level required) of competencies within the professional (practitioners and educators together) communities in purchasing and digital marketing spheres. Those discrepancies may result from 1) the destructive features of emerging technologies reshaping professions, or 2) the contextual differences (like company size, the field of business, and geographical/cultural operating environment.) The study by Liu et al. (2018) shows that the capabilities requirements change as employees transition from one position to the other. Also, the capability requirements change as organizations transform from one focus area to another. The idea of dynamic capabilities, i.e., proactivity and reactivity to changes in the operating environment by the transformation of capabilities (Helfat et al., 2007) is likely to prevail as a core tool for competitive advantage, survival, and success of organizations.

5. Discussion

The results and the study's process highlighted the potential opportunities but also challenges in applying capability profile models into practice. The small sample of the respondents does not suffice for statistical proof of which capabilities belong to which layer of skills. However, the results indicate that the method chosen was actionable and understood by the respondents who represented experts on the areas studied. The sourcing of the skills from just three previous publications can cause bias. Even though respondents were encouraged to leave out of their T^{2-}model the proposed skills that they did not find relevant and /or add skills that were missing from the proposed list, the pre-selection of skills strongly directed the choices made by the informants. Furthermore, the skills were not described to respondents beyond the name of the skill, and that may have led to differing understandings of the content/meaning of the skills. Multiple roads ahead for academic advancement, as well as practical development of the T^2-model, can be identified: Firstly, via quantitative study the claims of the contents for the more tightly connected to a particular context a joint view can be reached for professions with statistical proofs. A quantitative study would also shed light on the effect of context to the views. SME (Small and Midsize Enterprise) companies were missing from the sample, and there the perceived capability demands might be different as delegation of tasks to a wider purchasing or marketing team is not a viable option. Secondly, via qualitative study the true meaning and contents of somewhat vague names of capabilities like “Tech literacy” (sourced from the World Economic Forum –publication “Future of jobs”) can be studied. Thirdly, by shifting the focus to capability profiling into *future* demands for professions, the tension between the current vs. future view (“as is” vs. “to be”) can be identified. That tension can then act as a guideline to educational institutions in designing and delivering learning paths for future professionals as well as upskilling the current employees in the profession. Finally, the intrusion of Artificial Intelligence and Machine Learning into human capital management will enable the creation of capability profiles with the means of technology (Weichselbraun et al., 2024), using job advertisements, job descriptions and performance assessments as datasets needed.

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