Measuring the Maturity of Knowledge-Based Management of Human Resources

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Abstract: In today's volatile and demanding environments, organizations face increasing pressure to balance employee well-being (Kim & Cho, 2024). Given that personnel expenses often constitute the largest share of organizational budgets (Kuntaliitto, 2024), knowledge-based human resource management (KHRM) becomes essential for organizations to survive and remain competitive. The purpose of this research was to investigate the factors influencing the development of knowledge-based management of human resources and to develop an assessment model for evaluating the maturity level of knowledge-based management of human resources. The developed assessment model was tested in Finnish public sector context. The model complements existing maturity frameworks by operationalizing maturity dimensions into measurable statements, enabling organizations to assess not only structural readiness but also perceived satisfaction and cultural alignments. Measuring employee satisfaction as part of determining maturity levels is important, as previous studies have shown that employee satisfaction supports the adoption of new ways of working in organizations. In addition, this model can be used to measure the realization of the benefits achieved with KHRM in the organization. This model has dual focus on objective capability and subjective experience, and it offers a novel contribution to the maturity model literature and supports more holistic HR development strategies.

1 INTRODUCTION

The advancement of technology has increased the amount of information within organizations, thereby making the role of knowledge-based management (KBM) increasingly important (Jääskeläinen et al., 2022). According to Helander et al. (2020) KBM can be defined as a holistic and systematic process that integrates technology and human aspects to enable dialogic management in organizations. Many organizations are heavily investing in the development of KMB by allocating both employee work effort and financial resources (Sen, 2024). It is not uncommon for organizations to utilize separate information systems to manage customer, personnel, and financial data and processes (Chuma, 2020). From the perspective of KBM this presents a significant development challenge, as supporting architectures and data governance must be established for each system. As a result, organizations often must prioritize which internal domains receive focus in terms of KBM.

Many maturity models assess the overall maturity level of KBM (see e.g. Hsieh et al., 2009; Jääskeläinen et al., 2022; Khatibian et al., 2010; Pee & Kankanhalli, 2009). This can lead to uneven development across different organizational domains. According of Finnish Local and Regional Authorities, in Finnish public organizations, personnel expenses often account for approximately 40–50% of the cost structure (Kuntaliitto, 2024). At the same time, the provision of public services relies on a skilled and sufficient workforce. By measuring the maturity of KBM of human resources separately, a more comprehensive picture of its implementation can be obtained, as it is a vital area for the functioning of the organization

The purpose of this research is to investigate the factors influencing the development of knowledge-based management of human resources (KHRM) and

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to develop a maturity model for evaluating the maturity level of KHRM. The research question is: *How the maturity level of KHRM can be measured?*

In developing the model, the process phases for designing maturity models suggested by de Bruin et al. (2005) were followed.

2 THEORETICAL BACKGROUND

2.1 Knowledge-Based Human Resource Management (KHRM)

The core components of human resource management (HRM) are considered the most critical elements in driving organizational effectiveness (Delaney & Huselid, 1996). KHRM is related to every element of HRM. It leverages analytics to transform employee-related data into actionable insights and organizational knowledge. This approach enables decision-makers to uncover patterns and understand the underlying causes and effects of employee-related phenomena based on systematically collected HR data (Kaboor et al., 2012). KHRM seeks to promote decision-making that is efficient, impartial, and grounded in rational analysis (Margherita, 2022).

Ferreira et al. (2022) show in their literature review that KMB processes – such as the creating, sharing and application of knowledge – support the different dimensions of HRM. In particular, the individual and professional development of employees benefits from both creation and sharing of knowledge. The preservation and application of knowledge, on the other hand, strengthen organizational and strategic development, while the acquisition and evaluation of knowledge can support technological and cultural renewal. (Ferreira et al., 2022)

KHRM processes must be designed so that they strengthen the flow of information in the organization. This requires the acquisition, assimilation, transformation and sharing of information. (Donate & de Pablo, 2015). KHRM is most effective, when it is part of the organization's strategy and organizational culture (Le & Ha, 2024). It enables the development of a significant competitive advantage for the organizations by supporting organizational learning and innovations (Al-Qaralleh & Atan, 2022) and it can also contribute to the growth of internal trust, mutual respect, employee dedication and a sense of belonging (Soliman & Spooner, 2000).

In essence, KHRM aligns closely with the evolution of human resource analytics (HRA), which has matured from basic administrative reporting to advanced diagnostic and predictive capabilities. As highlighted by Margherita (2022), HR analytics now encompasses a wide range of enablers, applications, and value drivers that support strategic decision-making. When embedded within organizational processes and supported by digital technologies and artificial intelligence, KHRM can transform HR functions into powerful engines of organizational agility and innovation. This integration not only enhances employee development but also strengthens the organization's ability to adapt and thrive in dynamic environments. (Margherita, 2022.)

2.2 Maturity Models (MM)

According to Kucińska-Landwójtowicz (2019), maturity refers to "the extent to which a specific process is defined, managed, measured, controlled, and effective", and maturity models help organizations to identify their current state and guide their progression toward higher levels. In other words, maturity models refer to structured frameworks for assessing the different development levels of organizational capabilities, processes, or systems. They provide structured description of different stages of maturity. (Kucińska-Landwójtowicz, 2019.) Several maturity models have been developed to measure the maturity level of KBM, but almost none of them are suitable for measuring the maturity level of KHRM (Hsieh et al., 2009; Jääskeläinen et al., 2022; Khatibian et al., 2010; Pee & Kankanhalli, 2009; Serrat, 2023).

In the context of HRM and HRA, these models help organizations evaluate current state, identify gaps, and define pathways for strategic advancements. Traditional maturity models, such as the Capability Maturity Model (CMM), have been adapted to HR contexts to assess areas like strategic alignment, data governance and analytics capabilities. (Marler & Boudreau, 2017; Ulrich & Dulebohn, 2015.) A recent influential framework in the field of HR analytics is the HR Analytics Maturity Model (HRAMM), developed by Rigamonti et al. (2024). This model outlines four key domains – strategy, data, technology, and people – each of which is further divided into specific dimensions that together describe an organization's overall capability to utilize HRA effectively. HRAMM has broader and more integrated perspective than earlier maturity models and it incorporates not only technical and process-related aspects but also highlights the importance of organizational culture, leadership commitment, and employee engagement as essential enablers of maturity.

3 THE PROPOSED MATURITY MODEL FOR KHRM

The development of this maturity model is illustrated in Figure 1, which visualizes the six phases of designing a maturity model following the framework by de Bruin et al (2005). Each phase is described below in the context of developing a maturity model for KHRM. The lighter-coloured phases in the figure- Deploy and Maintain- represent steps that will guide the future refinement and implementation of the model (Figure 1).

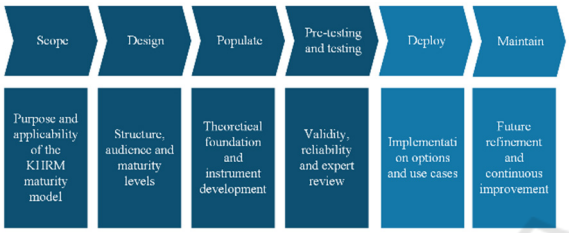

Figure 1: Developing KHRM maturity model (modified from de Bruin et al. 2005).

In the first phase the scope of this model was determined. The purpose of this model is to provide a description of the maturity level of KHRM. This model is not tied only to organizations in a specific industry, but it is suitable only for the measurement of KHRM maturity level. The first phase is followed by design phase, which includes designing the model's architecture and audience, choosing application methods and defining maturity levels (de Bruin et al., 2005). The audience of this model is primarily HR professionals, organizational developers and strategic decision-makers. The suggested model has staged maturity structure, consisting of five cumulative levels. Each level builds upon the capabilities of the previous one. The levels are initial, emerging, defined, advanced and strategic.

In the third phase the content of the maturity model was defined. The goal was to ensure that the model captures all the essential capabilities and practices required for effective knowledge-based management of human resources, while also enabling meaningful assessment and improvement. To do so, a systematic literature review was made. The results provided a theoretical foundation of the model, and they have been published in Tenhovuori (2024). Based on the results of the review a survey instrument consisting of 55 questions was designed. The questions were divided into five sub-areas: organizational culture and strategy, resources, information needs, information acquisition and storage, HR analytics, HR metrics and information products, and the use and benefits of HR information. All the questions were evaluated on a Likert scale of 1 to 5, where 1 = strongly disagree and 5 = completely agree. In addition, it was possible to answer the statements "I don't know". The survey was designed to be distributed either electronically or through structured interviews.

In the testing phase, the validity, reliability and usability of the HR knowledge maturity model was evaluated. The developed maturity model was first assessed by a steering group of 9 experts in field of knowledge-based human resources management. The pre-testers for the questionnaire were selected based on their work tasks and they worked in several different organisations. The purpose of the pre-testing was to ensure that the content of the maturity model is easy to understand and that there are no contradictions in the separate statements. The pre-testers were also asked whether they thought the model was missing anything essential. Based on the pre-testing phase, the maturity model was redefined by harmonizing the terminology used. In addition, several statements were clarified-particularly to better anchor them in the context of HR management and HR data.

After the pre-testing, the actual testing phase of the maturity model was carried out. Choice of research method has a significant impact on the reliability and validity of the research (Anders, 2012). The data for knowledge-based management maturity measurements are often collected with the help of electronic questionnaires (Becker et al., 2009; Khabatian et al., 2010). However, when using an electronic questionnaire, there is a risk that respondents do not understand the questions and therefore answer "I don't know" or, in the worst case, do not answer at all. Although the maturity models of knowledge management are often surveys; in this study the researcher ended up conducting interviews. The choice of interview method was particularly supported by the desire to ensure that the respondents understood the questions correctly and could give also their development ideas to specific questions.

Interviews can be divided into structured, semi-structured and unstructured (Doody & Noonan, 2013; Rowley, 2012). In a structured interview, all participants are asked the questions in the same order. This reduces the subjectivity of the researcher but does not allow for additional questions (Doody & Noonan, 2013). As the aim was to develop a tool that can be used to determine the maturity level of KHRM, the interviews were conducted in a structured manner and the answers were collected in numerical form.

The data was analysed using quantitative methods using SPSS for MAC. The data is described

using frequencies, percentages, averages, standard deviation, medians and quartiles. Average sum variables were formed from the maturity of knowledge-based management of human resources, its five dimensions and the satisfaction with the knowledge-based management of human resources. The reliability of the sum variables was examined using Cronbach's alpha value. The results of this testing phase analysis are presented in detail in section four.

The main purpose of this maturity model is to provide a structured description of a current state of KHRM within an organization. It enables organizations to identify the maturity level of different KHRM dimensions and to target development actions where they are most needet. Furthermore, the model allows organizations to assess how the benefits of KHRM are realized in practice and to evaluate the impact of development efforts over time. In this paper the model has been tested in a limited setting and these results are opened in next section four. However, further development is required to enhance its generalizability and precision. In the next phase, the model will be tested using an electronic questionnaire to reach a broader group of respondents. This will allow for more robust statistical validation and a more detailed description of maturity test.

The qualitative data collected through transcribed interviews will also be used to refine the model. Special attention will be given to statements that required clarification during interviews. A more granular and validated description of the maturity levels will require a larger sample size. This will support the model's continued evolution and its practical utility in diverse organizational contexts.

4 RESULTS OF TESTING THE MODEL

4.1 Demographics of Respondents

Testing of the model was carried out in a Finnish public sector organisation with a total of 755 employees. The interviewees were selected based on the following admission criteria: work in knowledge management positions, work as a manager or manager, or work in human resources management tasks. A total of 20 employees were interviewed. It was considered more important than the large number of interviewees that the interviewees work in knowledge-based management, management, managerial or human resources management positions. The interviews were conducted remotely using Microsoft Teams, and the interviews were transcribed using the same application. The interviews were recorded and transcribed.

Most of the interviewees worked in managerial positions (n=9) or in leadership positions (n=5) and most of them had worked for the organization for five years or more (n=12). Only a quarter of the interviewees did not work as a supervisor (n=5). Most of the interviewees had a master's degree (n=18). The interviewees were on average 46 years old (MD 45,5, Q1 43, Q3 53.75).

Composite score variables (Cheung et al., 2024) were formed of the organizational culture and strategy, resources and employee capabilities, HR-information needs, HR information products and HR analytics, knowledge usage and benefits achieved and satisfaction with knowledge-based management of human resources. The reliability of the variables was examined using Cronbach's alpha value (Gagnon et al., 2017). Table 1 summarizes the results of statistical evaluation of the model. Cronbach's alphas varied between 0,492 and 0,889. Therefore, composite score variables were not formed among those variables with lowest Cronbach's alphas (availability and collection of HR data, organization and storage of HR data and integration of HR data). Those variables were analysed as independent variables for this measurement.

Table 1: Statistical testing of the survey instrument.

Perspective	N of items	Cronbach's Alpha
Organizational culture and strategy	12	0,753
Resources and employee capabilities	6	0,677
Availability and collection of HR data	3	0,508
Organization and storage of HR data	2	0,492
Integration of HR data	3	0,648
HR information needs	4	0,766
HR analytics	3	0,738
Level of HR-analytics	3	0,741
HR-metrics	4	0,766
Utilisation of HR-data and benefits achieved	10	0,889
Satisfaction with knowledge-based management of human resources	5	0,778

4.2 Organizational Culture and Strategy

Organizational culture and strategy were moderately realised in the organization (Md= 3,4). Of the areas of organisational culture and strategy, the best

realisation was the positive attitude towards the KHRM and the support of executives for the development of KHRM and the assigned roles of KHRM (Table 2).

Table 2: Organizational culture and strategy.

Perspective	Md	Q_1-Q_3
KHRM and strategy	4	2.00-4.00
KHRM and management system	4	2.00-4.00
KHRM objectives	4	2.75-4.00
KHRM roles	5	4.00-5.00
KHRM development plan	4	3.75-4
KHRM and ICT architecture	3	2.00-4.00
Executive commitment	4	4.00-5.00
Supervisors encourage	2	2.00-4.00
Executive support for KHRM development	5	4.00-5.00
Employees participate in KHRM development	4	2.00-4.00
End-user participation in KHRM development	4	4.00-5.00
Attitude towards KHRM	5	4.00-5.00

4.3 Resources

The interviewees estimated the resources of KHRM to be rather inadequate (MD 2,5, Q1 2,33, Q3 3,13). The interviewees estimated that competence related to KHRM is particularly poor. The employees do not understand what knowledge management of human resources means, and the organization does not offer training related to knowledge management of human resources. The interviewees also estimated that the knowledge management tools of human resources are poorly used. Although the organization has a team responsible for the implementation and development of KHRM, the resources were estimated to be sufficient to process data but not to utilize it (Table 3).

Table 3: Resources.

Perspective	Md	Q_1-Q_3
Employees understanding regarding KHRM	2	1.75-2.00
Capability to utilize KHRM tools	2	2.00-3.00
Existence of KHRM training	1	1.00-4.00
Sufficient resources for data processing	4	2.25-4.00
Sufficient resources for data utilization	2	2.00-4.00
KHRM team in organization	5	4.25-5.00

4.4 HR Data

The interviewees estimated that the availability of HR data is quite poor (Md 2, Q_1 1, Q_3 3,5) and the HR data collection processes are not automated (Md 1, Q_1=1, Q_3=2) or efficient (Md 1, Q_1=1, Q_3=2). HR data has not been integrated to the organization's data lake (Md 1, Q_1=1, Q_3=), but common basic data for the most important HR entities is available (Md 4, Q_1=2, Q_3=4).

The interviewees estimated that the integration of HR data is not systematic or controlled, and that HR data is not consistent between different systems. The interviewees estimated that HR data does not enable real-time reporting (Table 4). Overall, the integration of HR data was estimated to be unavoidable (Md 1.33).

Table 4: Integration of HR Data.

Perspective	Md	Q_1-Q_3
Integration of HR data	2	1.00-2.00
HR data consistency	1	1.00-2.00
Real-time reporting capability	2	1.00-2.00

4.5 HR Information Needs and HR Analytics

According to the interviewees the organization mainly utilizes electronic reports (Md 4, Q_1=4, Q_3=5) and visual analytics (Md 4, Q_1=2, Q_3=4) in HR reporting. The organization's practices enable a good level of granularity when examining HR data (Md 4, Q_1=2, Q_3=4) However, drilling down into the HR data is only moderately well supported (Md 3,5, Q_1=1,75, Q_3=4). There is no dashboard solution that includes HR data in the organization (Md 2, Q_1=1, Q_3=2). Overall, the level of implementation of HR analytics in the organization was quite low (M 2,58, Sd 1,18) (Table 6). The interviewees estimated that all levels of HR analytics are implemented poorly or fairly poorly. However, based on the responses, it can be assumed that the organization uses some descriptive analytics (Md 2,50, Q_1=2, Q_3=4). Overall, the level of HR analytics was relatively low (M 2, Sd 0,84) (Table 5).

Table 5: HR analytics and the level of HR-analytics.

Perspective	Md	Q_1-Q_3
Descriptive HR analytics is utilized	2,50	2,00-4,00
Explanatory HR analytics is utilized	2	1,00-2,00
Viewing HR data at different levels of accuracy	4	2,00-4,00

Drilling down into HR data	3,50	1,75-4,00
The existence of dashboard that contains HR information	2	1,00-2,00

The interviewees assessed that the definition of HR metrics based on strategic objectives was implemented at a moderate level in the organization (Md 3, Q_1=2,00, Q_3=3,00). Similarly, the requirements of different stakeholder groups and management levels were moderately considered in the design of the metrics (Md 3,00, Q_1=2,00, Q_3=4,00). Respondents indicated that the analysis and modelling of relationships between measurable HR aspects were carried out rather weakly (Md 2, Q_1=1,00, Q_3=3,00), and that the examination of HR metrics alongside other indicators, such as those describing customer data, was also implemented rather weakly (Md 3, Q_1=2,00, Q_3=4,00. Overall, the framework describing HR information needs and metrics was realized rather weakly (Md 2,5, Q_1=1,25, Q_3=2,75) (Table 6).

Table 6: HR metrics.

Perspective	Md	Q_1-Q_3
HR metrics and strategic objectives	3	2,00-3,00
HR metrics and requirements of stakeholders and management levels	3	2,00-4,00
Analysis and relationships between HR aspects	2	1,00-3,00
Examination of HR-metrics alongside other indicators	3	2,00-4,00

4.6 Utilization of HR Data and Benefits Achieved

Overall, the benefits and utilization of KHRM were realized to a rather limited extent (M 2,41, Sd 0,88). None of the areas of the utilization of HR data and the benefits achieved were realized even moderately. Of all the areas, the interviewees estimated the improvement in capability management through KHRM to be the weakest (Table 7).

Table 7: Utilization of HR Data and Benefits Achieved.

Perspective	Md	Q_1-Q_3
Decisions are guided by KHRM	2	1.00-2.00
Information can reveal operational issues	2,50	2,00-4,00
HR metrics are used to monitor resource utilization	2	1,50-4,00
Resource allocation is justified with data	2,50	2,00-4,00
KHRM supports the quality of decision-making	2	1,75-3,00
KHRM increases employee well-being	2	2,00-4,00
KHRM improves resource allocation	2	2,00-4,00
KHRM improves capability management	1	1,00-2,00
KHRM improves performance management	2	1,00-4,00
KHRM enhances employee retention and attractiveness	2	1,00-4,00

4.7 Satisfaction with Knowledge-Based Management of Human Resources

Overall, the interviewees were quite dissatisfied with the current level of HR knowledge management in the organization (M 2,46, Sd 0,80). The interviewees estimated that they were most satisfied with the organisation and resources of KHRM (Md 4, Q_1=2,25, Q_3=4,00). Satisfaction with how HR data is used to support decision-making, and management was the weakest (Md 2, Q_1=2,00, Q_3=2,80) (Table 8).

Table 8: Satisfaction with KHRM.

Perspective	Md	Q_1-Q_3
Satisfaction with KHRM strategy and organizational culture	2	2,00-4,00
Satisfaction with KHRM resources	4	2,25-4,00
Satisfaction with HR data	2	2.00-3.00
Satisfaction with HR analytics and HR metrics	2	2.00-4.00
Satisfaction with utilization of HR data	2	2,00-2,80

5 DISCUSSION AND CONCLUSIONS

This study contributes to the field of KHRM by developing and testing a maturity model tailored to the needs of public sector organizations. The model provides a structured framework for assessing the maturity level of KHRM across five dimensions: organizational culture and strategy, resources, HR data, HR analytics and the utilization and benefits of HR knowledge. The results indicate that while strategic alignment and executive support for KHRM are relatively well established, significant gaps remain in data integration, analytics capabilities and employee competence.

Although various KM maturity models have been presented in literature, only a few of those are suitable

for measuring the maturity level of KHRM (Hsieh et al., 2009; Jääskeläinen et al., 2022; Khatibian et al., 2010; Pee & Kankanhalli, 2009; Serrat, 2023). The aim of the new model is to create a tool that allows public sector organisations to measure the maturity level of KHRM in a practical way while assessing the realisation of the benefits achieved by KHRM in the organisation. Based on previous literature, employee satisfaction strengthens the rooting of new operating models in organizations (Vieira et al., 2023; Voordt & Jensen, 2023). With the help of this maturity model, it is possible for organizations to examine the level of maturity of the KHRM, but also the satisfaction experienced by the employees. Thanks to this feature, organizations can, in addition to developing HR systems, for example, identify areas where organizational culture needs to be supported and developed.

In this study, a practical self-assessment model was tailored primarily in the context of the Finnish public sector. However, based on the comments received during the preliminary testing, the model can also be used in organizations operating in other sectors, and this is one interesting idea for further development. The model complements existing frameworks by operationalizing maturity dimensions into measurable statements, enabling organizations to assess not only structural readiness but also perceived satisfaction and cultural alignments. Measuring employee satisfaction as part of determining maturity levels is important, as previous studies have shown that employee satisfaction supports the adoption of new ways of working in organizations (Vieira et al., 2023; Voordt & Jensen, 2023). In addition, this model can be used to measure the realization of the benefits achieved with KHRM in the organization. This model has dual focus on objective capability and subjective experience, and it offers a novel contribution to the maturity model literature and supports more holistic HR development strategies.

Despite its contributions, this study has limitations. The maturity model developed in this study needs further development, especially in those areas where Cronbach's alpha does not reach the target value of 0.7. The qualitative data collected in the interviews will be utilised in the development of these areas. Due the rather small sample of interviewees further testing with larger sample should also be done in the future. It is also relevant to test how the model works when the data is collected using an electronic questionnaire instead of interviews. Additionally, longitudinal studies could explore how maturity levels evolve over time and how they correlate with organizational performance indicators.

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