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Organizational learning through issue resolution

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Abstract

Organizations need to be able to adapt and learn in a world that changes constantly in an ever-increasing speed. The purpose was to study how knowledge that exists in an organization can be used as material for organizational learning. The assignor of the thesis was the Customer Support department of Valtra Inc. The study concentrated on knowledge that is formed in the issue resolution process of technical support: how the knowledge is used outside the process and how to lead its use to ensure learning and additional value to customers.

The study was conducted as a qualitative study. Observation was used as the research method and it was conducted in regular meetings of the case organization in the context of issue resolution process as well as on related documents. Before observation study a template was predefined for field notes based on the frame of reference. In analysis phase the field notes were grouped and combined with the help of primary and secondary codes to form results.

The results indicated that knowledge sharing is both formal and informal. Mostly knowledge is explicit but also partially tacit. From organizational learning perspective there were elements from both single-loop and double-loop learning as well as indications on different motivations. Research data also indicated that knowledge use outside the issue resolution process is not included in the process description or instructions.

Conclusion was that the use of issue-specific knowledge outside the actual issue is limited and occasional. Problem solving is mostly based on experience and intuition. This is affected by the gaps in the process description and instructions, gaps in explicit knowledge and lack of motivation to use knowledge. Short-term use of knowledge was identified to be already in place in the case organization. Long-term use of knowledge would require leadership specific to knowledge use and a more systematic approach. Suggestions were presented to enhance the long-term use of knowledge as well as suggestions for further study.

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knowledge management, organizational learning, issue resolution process, technical support, observation study

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Tiivistelmä

Organisaatioiden täytyy pystyä sopeutumaan ja oppimaan maailmassa joka muuttuu jatkuvasti kiihtyvällä nopeudella. Tutkimuksen tarkoituksena oli selvittää miten organisaatiossa olemassa olevaa tietoa voidaan hyödyntää organisaation oppimisessa. Tutkimuksen tilaaja oli Valtra Oy:n asiakaspalveluosasto. Tutkimus keskittyi tietoon, jota muodostuu teknisen tuen ongelmanratkaisuprosessissa: miten tietoa käytetään prosessin ulkopuolella sekä kuinka tiedon käyttöä tulisi johtaa jotta varmistetaan oppiminen sekä lisäarvon tuottaminen asiakkaalle.

Tutkimus toteutettiin laadullisena tutkimuksena. Tutkimusmenetelmänä oli havainnointi ja se kohdistettiin ongelmanratkaisuprosessiin liittyviin säännöllisiin kokouksiin kohdeorganisaatiossa sekä prosessiin liittyviin dokumentteihin. Ennen havainnoinnin aloittamista määriteltiin raportointipohja kenttämuistiinpanoille viitekehykseen perustuen. Analyysivaiheessa kenttämuistiinpanot ryhmiteltiin ja yhdistettiin ensisijaisten ja toissijaisten koodien avulla, jotta voitiin muodostaa tulokset.

Tuloksissa ilmeni että tietoa jaetaan sekä muodollisesti että epämuodollisesti. Enimmäkseen tieto on dokumentoitua mutta osittain myös hiljaista tietoa. Organisaation oppimisen näkökulmasta tutkimusaineisto sisälsi elementtejä sekä yksikehäisestä että kaksikehäisestä oppimisesta ja lisäksi viitteitä erilaisista motivaatioista. Tutkimusaineiston mukaan tiedon hyödyntäminen prosessin ulkopuolella ei sisälly prosessikaavioon tai ohjeisiin.

Johtopäätöksenä oli että yksittäiseen ongelmaan liittyvän tiedon käyttö kyseisen ongelman ratkaisemisen ulkopuolella on rajallista ja satunnaista. Ongelmanratkaisu perustuu enimmäkseen kokemukseen ja intuitioon. Tähän vaikuttavat puutteet prosessikaaviossa ja ohjeissa, puutteet dokumentoidussa tiedossa sekä rajallinen motivaatio hyödyntää tietoa. Tietoa hyödynnetään kohdeorganisaatiossa lyhyellä tähtäimellä, mutta tiedon käyttö pidemmällä tähtäimellä vaatisi erityistä johtamista sekä systemaattisempaa lähestymistapaa. Opinnäytetyössä esitettiin ehdotuksia, miten tiedon käyttöä pitkällä tähtäimellä olisi mahdollista parantaa sekä jatkotutkimuskohteita.

Avainsanat (asiasanat)

tietojohtaminen, organisaation oppiminen, ongelmanratkaisuprosessi, tekninen tuki, havainnointitutkimus

Muut tiedot (salassa pidettävät liitteet)

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1 Introduction

1.1 Background of the study and case organization

For a long time, it has been apparent both in theory and in practice that change is constant and requires adaptability from organizations. Argyris and Schön (1996, xviii – xix) write about the success of an organization being dependent on its ability to change continuously and in a way that engages the whole organization. Nonaka and Takeuchi (1995, 5) state that the purpose is not to seek stability, but ways to live with uncertainty caused by continuous changes in the environment. Senge (2006, 4) uses the term "learningful" in the context of work, referring to the increasing need to learn within complex and dynamic working environments. He also highlights that the organizations that can enhance commitment and learning capacity on all levels of the organization are the ones that will succeed (Senge 2006, 4).

These thoughts are from management literature written years ago, but they are still valid today: organizations need to be able to adapt and learn. Nonaka and Takeuchi (2021, 56) highlight in their recent article that uncertainty and complexity in the world is growing all the time. Change is faster than ever due to rapid technological progress, which sets high requirements also for organizations and their adaptability (Nonaka & Takeuchi 2021, 59). Creating value to customer in an ever-changing and complex environment is not an easy task for any organization.

According to Kaplan and Norton (1996, 96-97), value to customer is created with a chain consisting of the different processes of the business: innovation, operations and after sales service. Operations are often seen as the core, as they contain the actual building and delivering of the product or service. After sales service adds significant value to the product or service by training offering, fast response to problems and additional services. (Kaplan & Norton 1996, 96-97.) The client and case organization for this thesis is the customer support department of Valtra Inc. The department is a part of the after sales organization of the company. Valtra is the leading tractor manufacturer and service provider in Scandinavia. The company is a part of Agco Corporation which operates globally in design, manufacturing and distribution of agricultural solutions. (Valtra. About Valtra, n.d.)

In the case organization after sales services including customer support to the end user are provided by a service network. The machines are sold and serviced by independent dealers who are in direct contact with the customers (Agco Corporation. Find a dealer, n.d.). Dealers are external stakeholders supported by the

internal staff in the customer support department. The department consists of multiple groups that provide the service network with technical documentation, for example operator's manuals and workshop service manuals, diagnostic tools, technical training and warranty management. Field service and technical helpdesk provide guidance when needed and participate in the issue resolution process. Figure 1 shows a simplified view of the technical support process with the different stakeholders.

Figure 1. Technical support process in the case organization

Figure 1 shows that the technical support process includes both internal and external stakeholders. Dealers are external stakeholders who provide support directly to customers and end users in the different markets. The internal stakeholders are service specialists who provide support to dealers as needed. They can be divided into two sub-groups: field service and technical helpdesk. Field service consists of local service specialists in the different markets. Technical helpdesk consists of service specialists within the manufacturing location. More detailed description of the technical support process can be found in the issue resolution chapter of the frame of reference.

1.2 Goals of the study, research problem and research questions

How does adapting and learning take place in this type of organization? Is it enough just to collect and distribute information? In general organizations have IT systems for this purpose and accumulating knowledge to these systems can be very efficient. On the other hand, the use of the accumulated knowledge does not necessarily match with the effort that was used to gather it. There can be a vast amount of information, but not necessarily understanding what exists and how it could be used. As Tidd (2006, 18) points out, an organization does not always know what it knows. Nonaka and Takeuchi (2021, 58) point out that organizations must be both analytical and intuitive to cope with complexity. In other words, it is not only about knowledge, but also about people.

The case organization has a dedicated process for issue resolution. A significant amount of data is collected, created and made available in the process, but the client assumed that the data is not used as well

as it could be. The organization places high value on data and documentation in its operations but the perception was that they sometimes become the end, instead of the means to an end.

It was clear for the client how the data flows in the issue resolution process, but not so clear how it is used outside the process. The process is perceived quite technically, concentrating on the products and the related workflows. The client anticipated development potential and possibility to benefit from improving the use of the data, which is why in this thesis the focus is on using knowledge that already exists. The goal for increased use of knowledge and learning from existing knowledge was the possibility to provide better service to customers. The goal is visualized in Figure 2.

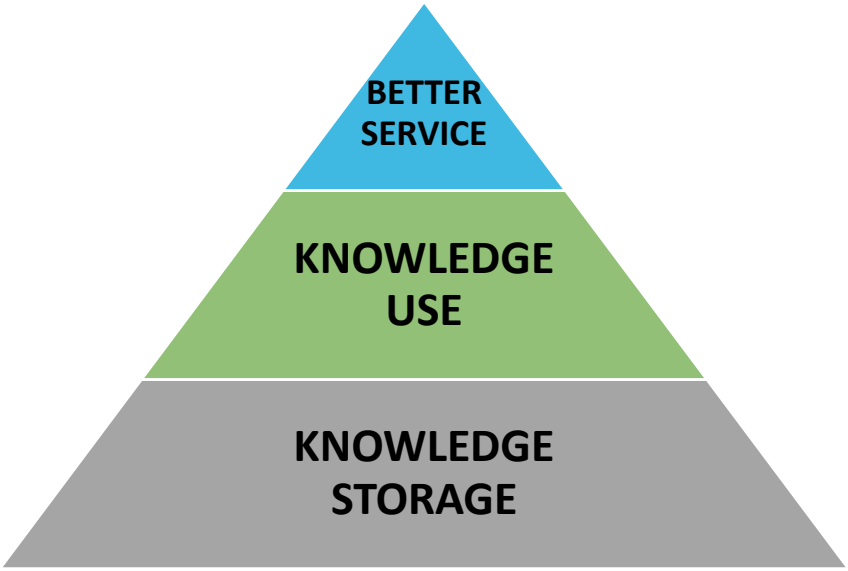

Figure 2. Visualization of the goals of the study

Figure 2 shows knowledge use in the middle, between knowledge storage and better service. Knowledge use will be the focus area of this thesis. As customer support is an important link between R&D, factory and the customers, it is important that the department shares issue resolution knowledge with the other departments of the company. Maula (2006, 179, 185) points out that good examples are commonly used for learning but failures, errors and bad examples not necessarily although they can be equally useful material for learning and they can also aid in forming a more complete picture of the products and related operations. Reese (2020, 10) mentions in his article that is based on interviewing Senge that sharing best practices and good examples does not equal to learning, but learning must include action and reflection.

Failures are typically considered negative, but they can be also positive as they provide a possibility to learn through reflection and response (Reese 2020, 11).

The purpose of this thesis is to concentrate on further use of the existing knowledge and not on the efficiency of the issue resolution process. The subject will be studied from leadership perspective: how the data that exists in the issue resolution process is used and how it could add value to the organization and to the customer.

The research problem is the following:

The data that is formed in the issue resolution process is not used outside the process.

The research questions are:

How is issue-specific data used outside the actual issue?

How to lead the use of the data to enable organizational learning?

1.3 Information seeking for the frame of reference

A pre-study was made in the planning phase of this thesis by searching source material from JAMK library. Based on the pre-study and considering the scope of this thesis, two main concepts were identified: knowledge management and organizational learning.

Knowledge management and organizational learning have been discussed and studied in management for decades, which means that there is a vast amount of literature and scholarly articles available. It is necessary to include theories by well-known scholars in the field, for example Argyris and Schön (1996), Nonaka and Takeuchi (1995) and Senge (2006). Their studies are basic theories of the field even today and frequently cited, although their studies were published about 15 to 25 years ago. Search for eBooks and scholarly articles were limited to the last 5 to 10 years to add a more contemporary view in addition to these theories.

A wide range of source material is available through JAMK library and article databases as well as through other libraries. For example, a search in JAMK library database gave 156 results with keywords “organizational learning” AND “knowledge management”, in English, book as content type, from 2000 to 2022.

The database used for books and eBooks was JAMK Library database (Janet Finna). The search was limited to last 10 years. Finally only eBooks were chosen as source material due to their availability and because they were more recent than printed books. Search was conducted as defined in Appendix 1. The appendix contains the used search terms and filters.

The databases used for articles were Ebsco Business Source Elite, ProQuest ABI/INFORM and Emerald Insight, which are all considered reliable databases within business administration and contain peer reviewed scholarly articles. Amount of source material on the topics is substantial, so thorough filtering was required to limit the number of sources. The search was limited into articles that contained both main concepts as keywords: “knowledge management” AND “organizational learning”.

The search features are different between the databases. ProQuest gave the most results, which is also why it was necessary to filter them quite heavily. On the other hand, the user interface in ProQuest has wide choices for filtering. Information seeking is described with more detail in Appendix 2.

Related to the context of this thesis, a third main concept “issue resolution process” was also identified. The same databases were used to search for articles related to issue resolution and technical support, but results were limited. Search with both main concepts and keyword “technical support” still provided limited results. Due to this, search was done again individually for both main concepts and “technical support”. The search was also extended to abstracts to increase the number of sources. There were some results and the articles were relevant for the context. This part of information seeking is also described with more detail in Appendix 2.

2 Frame of reference

2.1 Knowledge management

2.1.1 What is knowledge and what is knowledge management?

The relationship and difference between knowledge, information and data is a central starting point in knowledge management literature. According to Becerra-Fernandez, Leidner and Leidner (2008, 5), data is easy to capture, store and communicate via IT systems. It is built on facts, observations and perceptions but lacks context, meaning and intent. When these are added to data, it becomes information. Knowledge aids in use of data and information, in creating information from data and in adding value to existing information. (Becerra-Fernandez et al. 2008, 4-5.)

Nonaka and Takeuchi (1995, 58) also highlight context and meaning. They define information as a message flow that either includes or excludes meaning. Without meaning, handling an information flow can be compared to data processing. With meaning, it can be considered knowledge creation. Both information and knowledge are context specific. They also use the definition “justified true belief” for knowledge which forms when belief, commitment and human action are combined with the information flow. (Nonaka & Takeuchi 1995, 58-59.)

O'Dell, Hubert & O'Dell (2011, 2) define knowledge to be information in action, arguing that information turns into knowledge only when it is used. Chouikha (2016, 15) also refers to Nonaka (1994) and highlights that information exists in a message and knowledge in human memory. When knowledge is externalized from memory, it becomes information. When information is internalized, it becomes knowledge. Chouikha (2016, 14) explains data as a set of symbols without meaning. When meaning is added to data via interpretation it becomes information. When an individual uses information it becomes knowledge. (Chouikha 2016, 14-15.)

Knowledge management is “management that promotes an organization’s ability to create value with information, knowledge and expertise” (FINTO TT N.d.). It aims to enhance business processes and competitiveness through knowledge. Related areas are developing new knowledge from data, information and existing knowledge, making the new knowledge valuable and usable for the organization and applying the knowledge within the organization. (Big hopes for big data 2017, 23.)

Knowledge management can be divided into information management, knowledge-based management and organizational memory (FINTO TT N.d.; EBSCo Business Thesaurus N.d.). Information management contains information flows, content and document management and knowledge processes of the organization (FINTO TT N.d.). The difference between information management and knowledge management is their objectives: information management aims to give ready answers and minimum options while knowledge management aims to give more options and increase creativity (Maula 2006, 87). Knowledge-based management aims to facilitate decision-making based on knowledge (FINTO TT, N.d.). Organizational memory contains all knowledge of the organization, both in explicit and tacit form (Chouikha 2016, 23).

Knowledge management is a systematic effort to enable "information and knowledge to grow, flow and create value" (O'Dell et al. 2011, 2). It consists of gathering, storing, sharing and using knowledge as well as creating new knowledge (Becerra-Fernandez et al. 2008, 3; Chouikha 2016, 7). Organizations use substantial time and effort to these tasks (Chouikha 2016, 7). Chouikha (2016, 26-29) divides knowledge management activities as in Table 1.

Table 1. Knowledge management activities (Chouikha 2016, 26-29)

Activity	**Description**
Knowledge acquisition	collecting and gathering knowledge, developing new content or replacing existing content
Knowledge storage	individual (personal memory) or organization (organizational memory) explicit or tacit
Knowledge transfer	between individuals and groups informal or formal personal or impersonal
Knowledge application	application into action integration of knowledge
Creation of new knowledge	innovation changes in relations between individuals and groups

The knowledge management activities listed in Table 1 can benefit an organization. According to Becerra-Fernandez et al. (2008, 4), the purpose of knowledge management is to produce benefits to the organization, whether it is enhancing innovation, helping in decision making or creating competitive advantage. It is especially important in large organizations which are geographically distributed and involved in knowledge-intensive tasks (Becerra-Fernandez et al. 2008, 4). Knowledge management is a tool that provides more information to managers and leaders so that they can be better informed when making decisions, especially in changing environments with many uncertainties (Heisig, Suraj, Kianto, Kemboi, Perez Arrau & Fathi Easa 2016, 1177).

The goal is to ensure that the right people have the right knowledge at the right time. Knowledge management processes help people in their work and through that improve the performance of the organization. Knowledge management should connect people with each other and with knowledge assets. It should enhance learning, decrease repetitive mistakes and aid in retaining organizational knowledge. (O'Dell et al. 2011, 2-3.)

Establishing a knowledge management system is an effort to capture expertise within an organization and share it with all users of the system, but its value can be difficult to measure as it is usually intangible and measured with different criteria depending on the stakeholder (Brown, Massey & Boling 2005, 49). A knowledge management system is an information system built to manage knowledge by enabling different activities. It includes an IT system, but also people as users of the IT system. The people use the knowledge as well as accumulate and create new knowledge. An IT system alone does not guarantee that knowledge management process is working. It can facilitate storage and quick access, but it is upon the people how and when knowledge is used, and for what. The organization and its management must facilitate the use of knowledge for it to become organizational knowledge. (Chouikha 2016, 32, 34.)

To summarize, information is considered more valuable than data because it includes meaning, and knowledge is considered more valuable than information because it includes use and action. Knowledge does not exist without human action and it also does not exist if it is not used. A challenge is the context-specific nature of knowledge as this can limit its usability. Knowledge management is systematic but it is also more than an IT system. Improved value and performance are some of the main benefits for an organization to engage into knowledge management activities. Additional goal is to help people in their work by enabling and facilitating use of knowledge. Therefore, knowledge management is not only about technology solutions, but also about human solutions. Knowledge exists in multiple forms and the next chapters discuss some of these forms.

2.1.2 Explicit and tacit knowledge

Explicit knowledge is coded and visible in words and numbers. It can be defined as knowledge of rationality. Tacit knowledge includes insights, intuition, mental models, perceptions and know-how of an individual. It can be defined as knowledge of experience and it is highly context specific. Explicit knowledge is considered less context specific. (Nonaka & Takeuchi 1995, 8-9, 61-62.)

Knowledge management has focused largely on explicit knowledge, for example on knowledge about processes and procedures or solutions to recurring issues. Bigger challenges are seen in managing tacit knowledge of the individuals. (Becerra-Fernandez et al. 2008, 4.) Knowledge creation based on tacit knowledge is seen as dynamic and active, while processing existing knowledge is seen as a passive process (Nonaka & Takeuchi 1995, 49-50). Existing knowledge can also be recategorized and recontextualized (Nonaka & Takeuchi 1995, 186). This suggests that it is possible to modify codified knowledge later to fit current needs and indicates that processing explicit knowledge can also be an active process. Knowledge transfer can be more difficult when it comes to tacit knowledge, but it is not possible or even desirable to encode all knowledge nor does encoding guarantee that the knowledge is available or used (Chouikha 2016, 7).

Tidd (2006, 42) highlights that explicit knowledge can be distributed more easily than tacit knowledge. He also divides knowledge as consciously codified knowledge and unconsciously codified knowledge. This is to highlight that knowledge codified once will always remain codified, but through learning it can become tacit knowledge. At the same time the value of the codified knowledge for the person in question will decrease. (Tidd 2006, 42-43.) Maula (2006, 99) states that tacit knowledge is subjective and does not automatically become objective when it is converted into explicit form and points out that in the digital age creating and sharing knowledge is so easy that false or misleading information is bound to exist. Also, the context of the knowledge should be noted because not all knowledge is useful in all contexts (Becerra-Fernandez et al. 2008, 32).

Nonaka and Takeuchi (1995, 56) emphasize especially the importance of tacit knowledge. Knowledge is created when tacit and explicit knowledge interact, which requires interaction between people. This interaction they describe with the SECI model that consists of socialization, externalization, combination and internalization modes. (Nonaka & Takeuchi 1995, 56, 61-62). The modes are explained in Table 2.

Table 2. SECI model - the modes of knowledge creation (Nonaka and Takeuchi 1995, 62-70)

Mode	**From - to**	**Interaction**	**Connected to**
Socialization	Tacit - tacit	Share experiences	Organizational culture
Externalization	Tacit - explicit	Explain in explicit form	Knowledge creation
Combination	Explicit - explicit	Data analysis	Information processing
Internalization	Explicit - tacit	Use explicit knowledge	Organizational learning

The different modes defined in Table 2 interact constantly and the order of the modes is significant. The spiral starts with socialization, continues to externalization, combination and internalization, after which the spiral returns to socialization and a new circle begins. The starting point is tacit knowledge of individuals which is converted into explicit form and amplified in the organizational setting through externalization and combination. After this, the knowledge returns to individuals through internalization. (Nonaka & Takeuchi 1995, 70-71.) As this thesis concentrates on the use of existing data, combination and internalization can be considered focus areas as they rely on explicit knowledge as the source.

Combination mode is reconfiguring existing explicit knowledge through data analysis, for example by sorting, adding, combining and categorizing knowledge (Nonaka & Takeuchi 1995, 67). Chouikha (2016, 28) discusses knowledge integration from different sources, highlighting that it can be a complex process. Combination enables further refinement of explicit knowledge to more valuable explicit knowledge, which can enhance organizational learning (Becerra-Fernandez et al. 2008, 28).

In the past, explicit information was processed in a highly structured way. Today information can be made explicit in a less-structured way, for example by using photos, videos or sound files. This type of content does not require transformation from tacit knowledge to explicit as it is digital from the start. Highly structured knowledge can be processed systematically but increasingly also less-structured knowledge can be

used to create new knowledge, for example to identify weak signals. Based on this, Maula (2006, 102) suggests knowledge division into four types: into tacit and explicit and in addition into highly structured and less-structured knowledge. Highly structured and tacit knowledge includes for example education and training. Less structured and tacit knowledge includes the competences of an individual or an organization, for example skills, capabilities, competences and intuition. (Maula 2006, 101-104.)

Highly structured and explicit knowledge includes traditional information systems which are formal, categorized and possible to process in a structured way. They are built on rules, taxonomies and search mechanisms. Less structured and explicit knowledge can include for example photos, videos, sound files, email chains or chats. It is more informal and contains tacit knowledge although it is explicit from the start. This type of information is usually not categorized and therefore more difficult to process. Its' use should be considered within knowledge management strategy of the organization as it can be a great benefit, but requires a different approach compared to using highly structured information. For example, how to follow the less-structured knowledge flows and use them creatively. (Maula 2006, 102, 104.)

In knowledge management literature focus seems to have shifted more on getting value from tacit knowledge, which is seen to contain a lot of potential but also considered more difficult to manage. Nevertheless, the literature also indicates that the use of explicit knowledge is not automatic either. Processes for explicit knowledge might be more passive but making them more active could also bring additional value. The split into highly structured and less structured knowledge is interesting, the latter being digital from the start and very much contemporary.

2.1.3 Individual and organizational knowledge

When people share experiences through dialogue, discussion and observation, it creates new viewpoints and possibly also causes conflict. This interaction between the individuals within the organization refines knowledge into organizational knowledge. Role of the individual is central in creation of organizational knowledge and the role of the organization is to facilitate, support and provide context for knowledge creation. The organization can amplify and crystallize the knowledge created by the individuals but the source is always the individual. (Nonaka & Takeuchi 1995, 13-14, 59.)

Personal knowledge is on the individual's responsibility, to the level an individual is accountable, from information retrieval to application and sharing of knowledge. As individual is the starting point for

knowledge, personal processes to manage, use and share knowledge are needed. The purpose of knowledge management is to connect individual and organizational knowledge, and to ensure that they are in alignment. The organization should create an environment that supports knowledge management both on personal and organizational level. (Cheong & Tsui 2011, 189-190.)

Personal knowledge management is a part of knowledge management that can improve organizational learning. It is a task for individuals, but also requires effort from the organization. Organization must facilitate personal knowledge management: provide needed IT systems, implement it to the performance management system and include it in the individual learning plans to support achieving both personal and organizational goals. (Cheong & Tsui 2011, 219-221.)

Based on the above, individual is the creator and source of knowledge while the organization is facilitator, amplifier and refiner of knowledge. Interaction between the individuals is crucial, as is the interaction between individual and organization. Effort and commitment are needed from both and to both directions to achieve the desired results. What the possible enablers and obstacles are is discussed next.

2.1.4 Efficiency of knowledge management

Heisig et al. (2016, 1169) have conducted a study among knowledge management experts in different countries regarding future research needs within the field. The study highlights that although knowledge management is widely discussed and used, it is not clear how knowledge management contributes to business performance in real life. This is seen as a threat to knowledge management initiatives because the main reason to invest in knowledge management is the expected return on investment. One of the viewpoints raised for future research is to differentiate different aspects of knowledge management strategy: knowledge itself, use of knowledge and related processes and knowledge effect on business performance. (Heisig et al. 2016, 1169-1170, 1175.)

Validating and measuring a knowledge management system is challenging as its value is not fully measurable or it is indirect considering the operations. It is challenging to measure the value of the knowledge to internal and external stakeholders as well as to measure an individual's contribution to knowledge or the individual's use of knowledge. (Maula 2006, 183.) According to Becerra-Fernandez et al. (2008, 7), for knowledge management system to create value people should be committed to contribute to the content – to the knowledge – instead of using the IT system only because it is required. Nonaka and Takeuchi

(1995, 10) highlight also that knowledge creation must be everyone's responsibility in the organization for it to be successful. Sharing tacit knowledge is not easy either as it relies heavily on the motivation of the people (Maula 2006, 185).

Searching, processing and evaluating information for the purpose of refining it is an expert's job. Whoever is doing it must understand the topic in depth and to know what information to look for and where. Cheong and Tsui (2011, 192) highlight understanding the value and usefulness of the information. Chouikha (2016, 26) uses the term knowledge research of the same phenomena. Knowledge systems can easily become too large and too complex for the users (Maula 2006, 185). Organizing and combining data requires IT skills and skills to use analysis tools but making sense of the information is based on human experience (Cheong & Tsui 2011, 192-193). People might not even realize that they are creating knowledge when doing their daily work or the criticality of the knowledge. Sometimes they do not realize that someone else might be interested in the knowledge or someone in need of knowledge does not know where to look. Some people might not want to share their knowledge or there is mistrust towards other knowledge sources than their own. (O'Dell et al. 2011, 29-31.) It is also worth to note that knowledge management adds value only when it focuses on critical knowledge (O'Dell et al. 2011, 23).

Knowledge creation is not a one-off exercise, but a continuous process which changes over time (Nonaka & Takeuchi 1995, 123). In dynamic environment changes occur frequently and in a stable environment knowledge accumulation does not necessarily add that much new (Chouikha 2016, 27). An organization needs a vision of desired knowledge and a concept how the vision is operationalized and implemented in practice. It should set the limits to knowledge creation by defining what knowledge is considered valuable. Certain level of autonomy is required so that the individuals and teams have sufficient flexibility to engage into knowledge creating activities. The organization must be open also to environmental signals, which requires adaptability. When new knowledge is created, not all of it is needed right there and then. This does not make the knowledge unnecessary as it can help the people in understanding the interrelationships between things and events and aid in keeping the overall direction. An organization should possess an information network with easy access to broad variety of information for all individuals that need it. The organizational structure should also support knowledge creation. (Nonaka & Takeuchi 1995, 74-78, 81-84.)

In a classic hierarchical top-down management model, the top creates knowledge. The focus is on explicit knowledge and its' combination and internalization. In a flat, bottom-up type organization autonomous

individuals in the front-line create knowledge. The focus is on tacit knowledge and its' socialization and externalization. Middle-up-down management model presented by Nonaka and Takeuchi (1995, 127) considers both tacit and explicit knowledge and all modes of knowledge conversion. It places the middle managers to the intersection between vertical and horizontal knowledge flows. The individuals in the front-line are experts, but their view on the overall operations can be too narrow and the signals that they receive too ambiguous. The knowledge that they possess is valuable but it is difficult for them to communicate it further. The role of the middle managers is to guide the individuals to create knowledge that makes sense and to build the bridge between the visions of the top management and the reality confronted by the front line. (Nonaka & Takeuchi 1995, 125-129.)

Maula's (2006) study contains several examples of knowledge management implementations from different types of organizations. One of the case organizations has separate systems and processes for divergent and convergent knowledge. Divergent knowledge contains a wide range of different views on a topic, which in the case organization are collected by providing people a community where they can ask questions and share ideas. A knowledge manager follows the discussions and filters topics to be analyzed, refined and added to the convergent system. Convergent knowledge contains a refined outcome which comes together from the different views. When the topic is added to the convergent system, it is a part of organizational knowledge and available for all. In other words, the convergent knowledge process gets its source material from the divergent knowledge process. In another case organization, a part of performance evaluation is based on the individual's contribution to knowledge sharing. Knowledge management is measured by following the contribution to knowledge as well as accessing and reusing knowledge. (Maula 2006, 120-121, 150, 152.)

Cheong and Tsui (2011, 217) suggest personal knowledge management strategy to align the learning goals of the individual and the organization. This provides a framework for individuals to improve their knowledge skills and at the same time highlight the value of knowledge management to the organization. This could also encourage individuals to develop and practice related skills, for example analytics skills, information organizing skills, presentation skills or language skills. (Cheong & Tsui 2011, 217-218.)

Improved performance and added value are the main reasons why organizations invest in knowledge management. This cannot be achieved with IT systems alone, without the commitment and motivation of the people. Existence of a knowledge repository cannot solve all problems as such. People can struggle with finding what they need and being able to use what they find. Easy and quick access to knowledge is of

course an asset but the relevance, usefulness and quality of knowledge are equally important. It is the people who make sense of the knowledge and their understanding and expertise is needed in its creation and refinement. The organization must define what knowledge is valuable and be able to adapt the definitions as the environment changes. It should give sufficient autonomy for the people to maintain flexibility and enable achieving personal goals, but also provide sufficient guidance and leadership for the knowledge management tasks.

2.2 Organizational learning

2.2.1 How does an organization learn?

An organization can be considered to learn whenever it acquires information, knowledge or skills if the relevance or importance of the acquired information is not considered nor the means how the information is acquired. Organizational learning contains more structure: a learning product, a learning process and a learner. Learning is value-neutral, not automatically positive or beneficial. (Argyris & Schön 1996, xxi, 3, 180, 188.)

Organizational learning, as described by Argyris and Schön (1996, xxi), refers to the ways an organization acquires knowledge, understanding, processes or practices. It requires ability to remember past events, analyze different alternatives, do experiments and review results (Argyris & Schön 1996, 194). Organizational learning includes an individual solving a problem on behalf of the organization, which results in a learning product through a learning process. To become organizational, the learning must either be adopted by the individuals in the organization or to be included in the organizational memory, for example in a database, in a process description or in an instruction which serve as guidelines for future actions. (Argyris & Schön 1996, 16.)

According to Argyris and Schön (1996, 3), learning can be considered a product or a process. If learning is a product, it signifies what we have learned. If learning is a process, it signifies how we have learned. Learning as a product can contain acquired information, knowledge or skill. Learning as a process refers to the activity how this information, knowledge or skill is acquired. Learning process can be performed in multiple ways to achieve the learning product. (Argyris & Schön 1996, 3.)

As a summary, an organization can learn when it can remember, analyze, experiment and review results. Learning takes place through individuals who act on behalf of the organization and either use the accumulated learning or adopt it. Learning is not only about the subject of learning but also about how learning occurs.

2.2.2 Individual and organizational learning

The role of the individual in knowledge management was discussed in previous chapters. Individual learning is also the foundation for organizational learning (Chouikha 2016, 34). An organization can be considered a collective of individuals who learn, through whom the organization learns (Argyris & Schön 1996, 4-5). It is the individual who acquires the knowledge, forms an understanding or adopts a process or a practice and at the same time defines how good – or bad – the learning ability of the organization is (Argyris & Schön 1996, xxii). Although individual learning enables organizational learning, it does not guarantee it (Senge 2006, 129).

An organization is often referred to as an entity that does something although it is the individuals doing it. An organization can give responsibility and authority to the individuals within the organization. Due to this, they can think and act on behalf of the organization and at the same time transfer their personal knowledge to the use of the organization. To make the knowledge and the skills available for the organization, it requires that individuals learn for the organization. (Argyris & Schön 1996, 4-8, 191.)

When looking at learning from organizational viewpoint, the structure of the organization defines the role of the individual and what knowledge the individual needs to do the job. The culture of the organization can affect the motivation of the individual to learn and share knowledge. (Cheong & Tsui 2011, 214.) Highly developed IT systems and processes can only provide a platform for learning and knowledge share (Maula 2006, 182; Cheong & Tsui 2011, 214).

Individual is the source for organizational knowledge and an organization cannot learn without the individual. Without motivation, an individual cannot truly learn. A learning organization is “the ideal world” where learning is in focus. This is discussed further in the next chapter.

2.2.3 Features of a learning organization

Learning organization is the structure and enabler for the learning process that consists of individual learners. Organizational learning is the process through which learning occurs. When the individuals learn, the organization learns. (Maula 2006, 13, 21.) Learning organization is a practical view which emphasizes adaptation, flexibility and human potential to learn (Argyris & Schön 1996, 180). It is often described as a flat and autonomous organization which embraces trust and cross-functional cooperation and could also be described as a desirable goal (Argyris & Schön 1996, xx).

A learning organization can change its behavior based on knowledge to develop its operations in the long-term (Chouikha 2016, 24). Maula (2006, 85) refers to Garvin (1993), who has defined learning organization to be good at creation, acquisition and transfer of knowledge and able to change its behavior based on knowledge. A few of the related theories how this can occur are presented next.

Senge (2006, 6) defines learning organization by dividing it into five areas. Personal mastery involves individual learning. Mental models are assumptions and generalizations of individuals. Building shared vision means common goals and commitment to achieve the goals. Team learning consists of the collective learning ability of the team. Systems thinking means seeing the big picture and it is the area that binds everything together. (Senge 2006, 6-12, 69.)

Systems thinking does not mean that all focus should be on wide concepts and big changes. Small actions can operate as leverage if the correct actions are selected but identifying correct or most useful actions can be challenging. Another challenge is that the leverage can be in the relationships between things instead of in the things themselves. If individual things are looked at in isolation from the big picture, there might be no visible leverage. As an example, all results produced by an organization are produced together by the different members of the organization. If people concentrate in operating in the context of their own job and position only, it is more difficult to see the interaction. (Senge 2006, 19, 23, 64-68.)

As an example, in product development it is important to consider multiple aspects: technological potential, how the product can be manufactured, what are the sales arguments, product reliability and serviceability to name a few. Mental models and viewpoints are different depending on from which direction the new product is looked at. The challenge is how to express requirements in explicit form so that the people with different mental models and viewpoints can understand each other. (Nonaka & Takeuchi 1995, 73.)

In addition to emphasizing the big picture, Senge (2006) also highlights focusing on long-term solutions. When a problem occurs, a quick solution might be tempting as it provides a fast and positive response to the symptoms. This can lead into abandoning the search for long-term, fundamental solutions. Short-term solutions are sometimes necessary, but they should only be used as a tool to gain time while the long-term solution is being built. (Senge 2006, 391-392, 399.)

Another approach similar to short-term versus long-term solution is the difference between single-loop and double-loop learning. According to Argyris and Schön (1996, 20), single-loop learning is instrumental learning. A deviation compared to expected outcome is detected by comparing the outcome to previously set values. The result is a correction to the deviation without changing the set values or expectations. An example of single-loop learning is correcting a quality defect based on quality control findings or enhancing marketing to correct decrease in sales. The aim of single-loop learning is to ensure effectiveness and that targets are met. In double-loop learning the result is a change in the set values or expectations. It is a means to evaluate if the set goals are desirable and compatible for the operations. (Argyris & Schön 1996, 20-22, 25.)

If single-loop learning is considered routine problem solving with existing rules, double-loop learning challenges the existing rules when environment changes or new issues surface. Triple-loop learning challenges the background of the existing rules, why and how they were developed, as well as ensures that the routines are consistent with the operations. (Chouikha 2016, 21.)

Single-loop learning might be sufficient in short-term to maintain effectiveness, but to maintain long-term effectiveness double-loop learning is required. Systems thinking theory and single- and double-loop theory both emphasize looking at the overall picture and finding long-term solutions. Most likely organizations do not set goals to have a narrow look or to focus on short-term solutions. Still, a learning organization is not easy to achieve. Factors that can affect that positively or negatively are discussed next.

2.2.4 Efficiency of organizational learning

In previous chapter on knowledge management, it was highlighted that knowledge is valuable only when it is used. The same principle can be applied for learning. Argyris and Schön (1996, xxiii) state that learning new things or acquiring new views become valuable when they become actions. Senge (2006, 132) states that learning is not the same as gathering more information but being able to produce wanted results.

Argyris & Schön (1996, 112) have discovered that there are plenty of examples available from limited learning systems, but practically no good examples of truly functional learning systems. To improve the learning system of an organization can be challenging as it easily raises defensive behavior in people. This is not necessarily intentional as defensive routines can form unknowingly. According to studies made by Argyris and Schön (1996, 76), nearly all individuals in organizations have adopted theories-in-use that prevent double-loop learning. To improve the learning system, theories-in-use should change. It is important to differentiate espoused theories and theories-in-use. In other words, how people describe what they do and what they do in reality. The theories-in-use can be challenging to identify as people are not necessarily aware of this conflict. (Argyris & Schön 1996, 76-77.)

If an organization is not learning effectively, it does not mean that it is not cognitively capable of learning (Argyris & Schön 1996, 248). The first challenge is how to make the defensive patterns, routines and behavior explicit. People should be included in the process and at the same time made aware of their defensive behavior. This is also an opportunity to make them aware of espoused theories and theories-in-use. The validity of any claim should be tested publicly to move from defensive to productive reasoning. (Argyris & Schön 1996, 282-284.)

Self-reinforcing loops can also prevent double-loop learning. Primary inhibitory loops are directly observable in discussions as theories-in-use. Examples of these are vagueness, ambiguity, information withheld and inconsistency. The secondary inhibitory loops are consequences of the primary loops. The primary loops may cause conflicts or reveal sensitive issues. These contradictions can result in secondary loops which can result in further mistrust and tension. Some warning signals of limited learning are modifying negative information into less negative or less important or reacting to early negative signals with delay. (Argyris & Schön 1996, 90-91, 97-99, 207.)

To avoid limited learning, it should be noted that the learning objectives of individuals and organizations are different. An individual pursues personal achievement, for example to meet work requirements or to achieve professional advancement. An organization might pursue better performance, competitive advantage or social responsibility. If the individual and organizational learning goals are in alignment, it encourages the individuals to learn since the environment is favorable also for achieving their personal goals, which will benefit the organization in achieving its goals. (Cheong & Tsui 2011, 199-200, 212-213.)

Another important aspect is communication. Knowledge sharing can be incomplete because there is no personal connection between people or there is a database but with incomplete information or the quality of the shared information is insufficient. This affects negatively to decision making, resulting in inaccurate decisions. In many cases, knowledge sharing barriers are related to people more than technology or processes. (Heisig et al. 2016, 1178.)

Nonaka and Takeuchi (1995, 15) argue that although employees are experts in their work, they often lack the ability to turn what they do into knowledge that can be shared with other people. They might also have a narrow perspective to the topic and therefore they are not able to communicate the importance of the topic to another individual. The knowledge can be shared but it does not make sense or have meaning in another context. (Nonaka & Takeuchi 1995, 15.) A message can be transmitted and received, but not converted or understood. People communicate in their own way and do not necessarily consider that the recipient might have a different perspective. This can be connected to converting tacit knowledge to explicit, but also to sharing explicit knowledge. The transmitter can affect what and how to communicate depending on the desired result.

An individual needs to be conscious of knowledge to be able to learn, also of the knowledge that they do not have. According to Chouikha (2016, 21), people should not feel uncomfortable to reveal their ignorance or their lack of knowledge. An individual can engage in the learning process only when this type of trust exists and when the process is completed the individual should be conscious of the acquired knowledge (Chouikha 2016, 21). This is another example why trust is a crucial factor in organizational learning. Chouikha (2016, 130) concludes in the study that lack of trust towards management did not prevent knowledge sharing among the employees, but they continued to shared knowledge with their coworkers based on their trust in them. Management is the facilitator for knowledge management and organizational learning and trust in management is important, but trust within the teams and between people is even more crucial in knowledge sharing.

To summarize, an organization should ensure that learning is a part of organizational goals and that the goals of the individuals are aligned with the organizational goals. People must have the means and the motivation to communicate and they should be empowered to consider the different motivations of their counterparts. In the end, the level of trust defines the level of learning.

2.2.5 Relationship between organizational learning and knowledge management

Knowledge management is a process, as is organizational learning. Social processes are important in knowledge management while organizational learning relies totally on social interaction. Knowledge management and organizational learning are interconnected in many ways. Chouikha (2016, 26, 30) states that knowledge management requires intentional organizational learning and defines knowledge management to consist of technical infrastructure and human infrastructure. Heisig et al. (2016, 1179) think that knowledge management can be a mechanism to improve organizational learning. Senge (2006, 270) points out that knowledge databases are a vital part of knowledge management but at the same time he states that what matters is their leverage which builds from collaboration. Becerra-Fernandez et al. (2008, 16, 20) argue that organizational learning focuses on knowledge creation, knowledge transfer, people and social aspects, while knowledge management focuses on knowledge capture, knowledge application, use of IT systems and benefits to the organization.

A recent study by Castaneda, Manrique & Cuellar (2018, 299) indicates that knowledge management would conceptually absorb organizational learning. Studies in both fields contain same topics, for example knowledge creation and acquisition are highlighted as core features in both knowledge management and organizational learning. According to the study, which was conducted by analyzing scholarly articles from both fields, during recent years studies related to organizational learning have increasingly included terminology related to knowledge management. Similarly, terminology related to organizational learning is appearing more and more in knowledge management studies. The study highlights also that topics that have started to appear more frequently in both fields include incorporation of technological tools and understanding the role of humans in the processes. (Castaneda et al. 2018, 301, 303, 311-312, 317-318, 321.)

This thesis concentrates on the use and application of explicit knowledge. One could assume that use of explicit knowledge is straightforward if required IT systems and processes are in place. But it is also a matter of motivation. For example, if time to do tasks is limited and the database not so user-friendly, using a knowledge management system might not be on the top of the task list. Chouikha (2016, 8) summarizes obstacles to knowledge management to be lack of commitment from management, insufficient motivation and personal commitment from knowledge users and contributors and lack of trust in general. IT systems are in key role and a necessity to manage knowledge, but still sharing and using knowledge requires personal involvement from the individuals. Technology is needed, but the social side and organizational aspects should not be forgotten. (Chouikha 2016, 8.)

Lee (2020, 192) has conducted a study on management knowledge and how different knowledge types require different learning processes. Management knowledge is described as knowledge that increases understanding in management. It is usually divided into multiple types which are considered to have different levels of value to the organization. Lee (2020, 195) uses the know-what, know-how, know-why, care-why classification, of which know-what is basic knowledge at the lowest level and care-why at the highest level. (Lee 2020, 194-195.)

Lee (2020, 196) argues that understanding the connection between knowledge type and learning process has a positive effect on efficiency in management knowledge. Know-what is descriptive knowledge created by learners through formation of concepts. Know-how is gained when the created knowledge is applied in practice. Know-why and care-why are contextual knowledge types created by learners through observation and reflection requiring active attitude from learners. A complete learning cycle is considered to contain all four knowledge types and learning processes. If the cycle is complete, it brings the most value to learning. This is affected by differences between learners based on their experience, their position in the organization and the learning opportunities enabled by the organization. (Lee 2020, 196-201.)

The study highlights that if knowledge is not applied and learned from, it does not have value. A functional and efficient learning process can add the value of knowledge. Based on the study, work experience has a positive effect on know-how knowledge and work position to know-why knowledge (Lee 2020, 200-201; 210). This indicates that the use of most valuable knowledge, know-why and care-why knowledge, would be a management task. However, Lee (2020, 214) also highlights that people should have a certain level of freedom on the side of standard work processes to use their experience as well as to observe and reflect, to enable the organization to respond to potential and inevitable changes in operating environment. This indicates that all types of knowledge are for employees also, not only for management.

Sasaki (2017, 236) has studied systems intelligence in the context of knowledge management and specifically the SECI model by Nonaka and Takeuchi. Systems intelligence is described as a systemic concept related to human intelligence which is based on systems thinking theory. SECI model is widely recognized in knowledge management, but it is also recognized to be difficult to implement. One possible reason is that when organizations implement knowledge management, they focus on technological aspects like IT systems and forget human aspects, interaction between people and individual motivation. (Sasaki 2017, 236-237.)

Related to this thesis, combination can be the most relevant part of the SECI model and to some extent internalization. Combination means generating new explicit knowledge from existing explicit knowledge and internalization using and sharing this new knowledge in tacit form (Sasaki 2017, 238). Combination phase might fail despite the existence of IT systems and processes and despite the individuals in the organization recognize and accept its importance. The situation can be that people simply do not use or refine the existing knowledge in the IT systems because other people do not use them. If an individual starts to use it, it can drive change and motivate also other people to use and share knowledge. This can be a task for any individual in the organization, not only for managers. (Sasaki 2017, 240-242.) IT systems are especially important in combination phase, which is why it could be assumed that this phase is easy to implement. However, if human aspects and systems thinking are forgotten, implementation might not be successful.

To engage people into knowledge managing activities requires effort from the management of the organization. For example, so-called “teachable moment” is the right time for knowledge or the exact moment when an individual faces an issue or an opportunity to use knowledge. Learning to occur at another time is less likely. Knowledge management should be integrated in the workflows so that it does not require extra effort from the people. (O’Dell et al. 2011, 11.) The same can be applied for organizational learning.

To summarize, knowledge management and organizational learning are connected in many ways. The first might concentrate more on processes and IT systems, but the systems do not add value without the people. The latter might concentrate more on people, but the learning is facilitated by the processes and IT systems. Both recognize the importance of collaboration and motivation. Both also need to be managed and integrated to the daily work to balance effort and results.

2.3 Issue resolution process

2.3.1 Technical support and issue resolution process

Technical support is an important part of overall service connected to a physical product. Other after sales services include product training, spare parts, warranty handling, complaint handling, returns and refunds and dispute resolutions. Technical support specialists respond to questions that customers might have on the product and aid customers if they face issues. The work is usually done in real time when the issue is active. Sometimes physical presence is required, but often the work is done remotely. Remote troubleshooting is efficient and more cost effective than field service, especially if no actual repair is required. In

addition, knowledge possessed by technical support contains important information about product performance and potential improvements. (Gray & Durcikova 2005, 162.)

Customer support knowledge, or technical support knowledge, contains descriptions of issues that customers encounter with the products, as well as expertise and insights of the technical support specialists about the symptoms, causes and solutions to these issues. The specialists can access the knowledge of the whole team within the repository, which equals to organizational memory about the issues. (Gray & Durcikova 2005, 159, 162.) It is a daily task for technical support to help the customers and the service network with the products. It is also important to consider that technical support can provide important knowledge for continuous improvement of the products and processes.

To achieve continuous improvement, an organization must solve the problems that it faces as well as learn from them. Problem-solving must be systematic, which is why organizations often implement a dedicated issue resolution process. Standardized problem-solving processes include steps to describe the context of the issue, to do an analysis of the issue and to propose and evaluate corrective and preventive actions. (Matta, Atifi & Ducellier 2016, 62-64.) Technical support is usually divided in multiple levels of which the first level is in direct contact with customers and if a specialist on a specific level is not able to solve the issue it is escalated to the next level (Gray & Durcikova 2005, 172). A similar structure is used in the case organization of this thesis.

IT systems are a vital part of knowledge management. There are multiple types of systems available: knowledge discovery systems for data mining, knowledge capture systems for capturing tacit knowledge of experts, knowledge sharing systems for saving, organizing and distributing knowledge, and knowledge application systems for assisting in problem solving. (Becerra-Fernandez et al. 2008, 6-7.) In technical support a knowledge management system supports the users in issue resolution and in addition it can provide a link to further assistance (Brown et al. 2005, 49).

The case organization has comprehensive IT systems to support issue resolution. IT system called “Tech-Connect” is used by the external stakeholders. It is a combination of multiple system types: knowledge sharing, knowledge application and it also contains an interface to submit a support request if further assistance is needed. For internal stakeholders issue resolution process is integrated in the customer relationship management (CRM) system. It can be considered to include knowledge discovery and knowledge capture in addition to knowledge sharing, knowledge application and issue resolution.

Subramani, Wagle, Ray and Gupta (2021, 1287) differentiate general and procedural knowledge in their study related to how access to codified knowledge affects support requests in technical support environment. General knowledge is basic knowledge that is descriptive. Typically, general knowledge is used to create an understanding about the operation of a system or an equipment. It can be background knowledge but also sufficient to solve low-complexity problems. Procedural knowledge is more specific how-to type of knowledge. It is needed on demand, just in time when a problem occurs, and often needed also in solving high-complexity problems. (Subramani et al. 2021, 1287, 1290.)

In the case organization the IT system for external stakeholders includes general knowledge including workshop manuals that contain descriptions on the operation of the product and instructions how to perform specific tasks. The system contains also procedural knowledge in the form of service bulletins and knowledge objects. Service bulletins complement the workshop manual. They focus on a single topic and are released for example to inform about product changes or to share additional information on a specific topic. Knowledge objects are based on reoccurring issues and contain for example additional suggestions for troubleshooting. In addition, the system contains an onboard diagnostics tool which can be used to read fault codes from a machine that has an active issue.

The purpose is to solve issues on lowest possible level. The customers have basic troubleshooting instructions available in the operator's manual for self-help. If the customers are not able to solve the issues with the help of these instructions, they can contact a local dealer for assistance. The dealers represent level 0 in Figure 3.

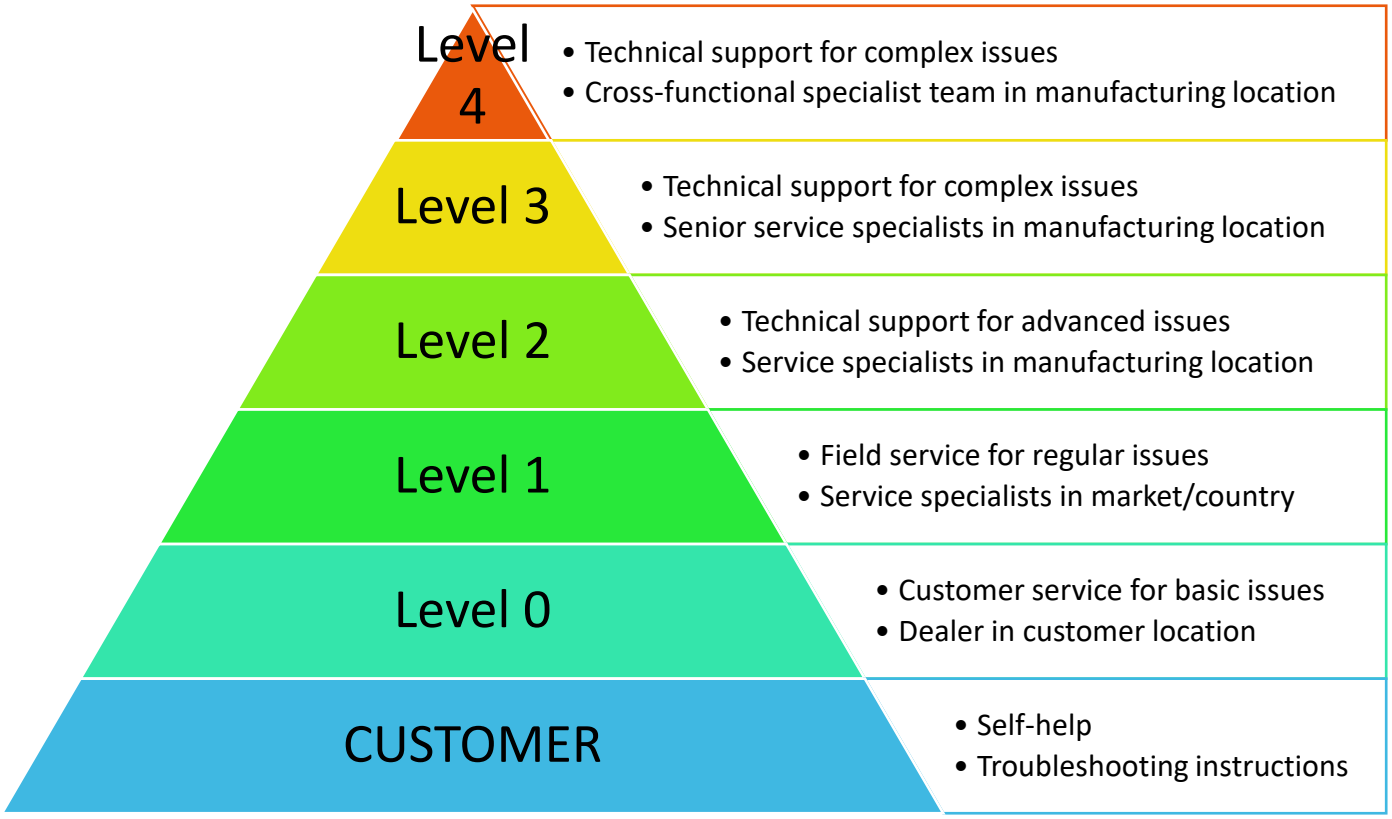

Figure 3. Issue resolution levels in the case organization

The dealers are private service operators. They can submit a support request through the system if they are not able to solve an issue. There is a standard form for the request which includes menus with predefined taxonomy for most fields. For some fields the users are required to add free text. Free text can be submitted in any language as the system includes an integrated translation tool.

Field service consists of service specialists in each market or country. Their task is to assist the dealers in their market with issues that have been escalated to Level 1, which means that a dealer has submitted a support request in the system. At this point the support request moves to the CRM system managed by the internal staff. Relationship between the two IT systems is explained in Figure 4.

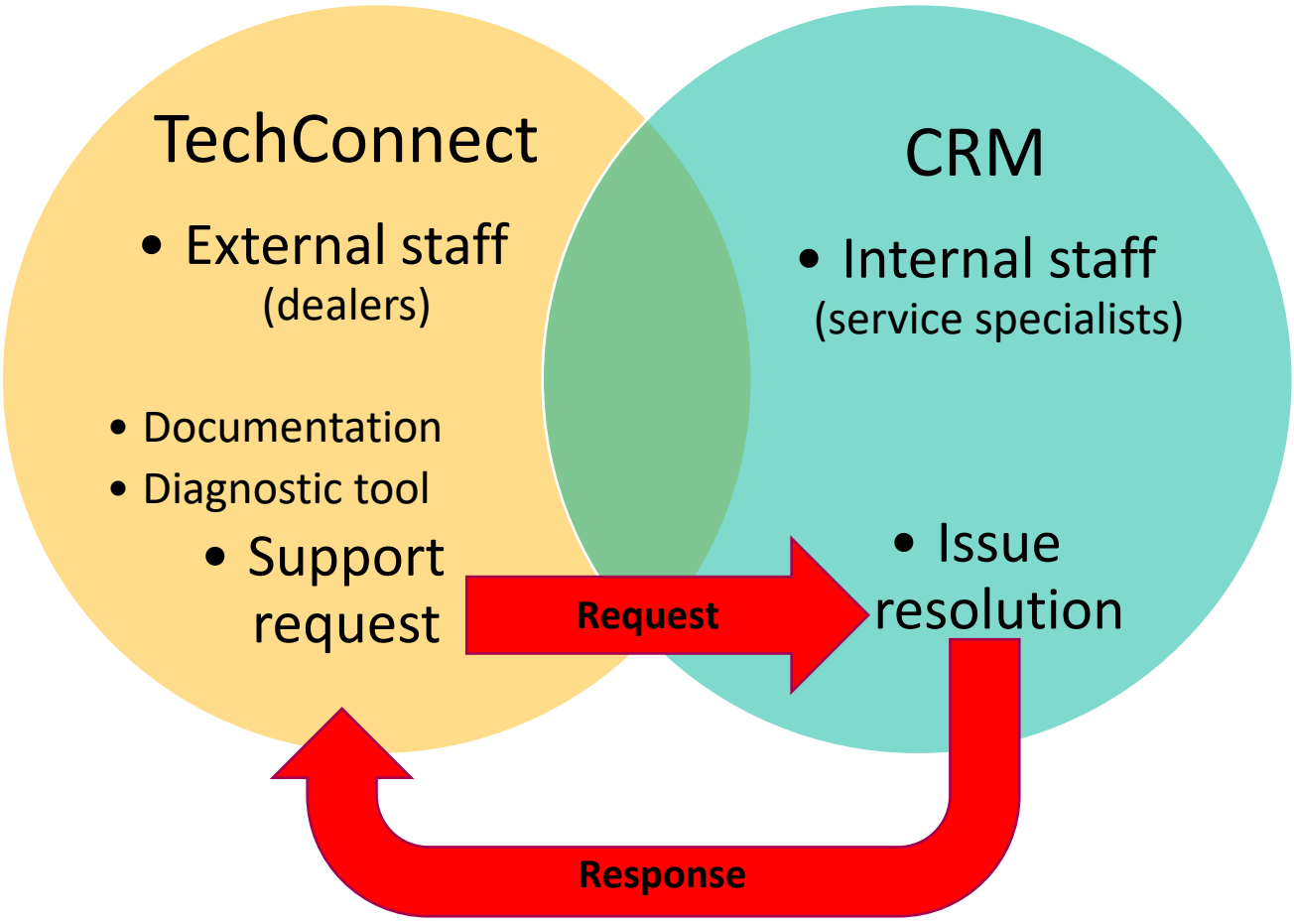

Figure 4. IT systems used in technical support

Figure 4 shows that a support request is created by dealer in TechConnect which is then submitted to the CRM system. When a solution is available, it is submitted back from CRM system to TechConnect for the dealer. All communication within the CRM system is visible for internal staff only and the dealers see only the responses to their own support requests.

A new support request is first in status “New”. When a specialist starts to process the request, the status changes to “In Progress” and remains in this status until there is a solution. When a solution is available, the specialist sends it from the CRM system to the dealer and the status changes to “With dealer”. If the response solves the issue, the dealer changes the status to “Resolved”. After this, the specialist on Level 1 updates the status to either “Monitor” or “Closed”, depending on if the specialist wishes to monitor for some time if the solution was successful before closing it. Figure 5 shows the issue statuses for external users and Figure 6 for internal users.

Figure 5. Issue status in the knowledge sharing system (external users)

Figure 6. Issue status in the CRM system (internal users)

If Level 1 is not able to solve the issue, it is escalated to Level 2 which is a group of service specialists in the manufacturing location. Level 2 has access to a wider knowledge base compared to Level 1. If the issue is complex and requires further study and analysis, it is escalated to Level 3 which consists of senior service specialists in the manufacturing location. If Level 3 is not able to solve the issue, it is escalated to Level 4 which is the highest level of the issue resolution process, consisting of a cross-functional specialist group within the manufacturing location.

Knowledge about an issue is refined in the process if it is escalated to higher levels. Basic issues that are solved on the lower levels do not necessarily add value to knowledge, but the more complex issues can contribute significantly to organizational knowledge.

2.3.2 Knowledge management related to issue resolution

Issue resolution process is a dedicated workflow that organizations implement to solve problems systematically and to pursue continuous improvement and learning. Information and knowledge created in the issue resolution process is usually stored, but not necessarily reused after the resolution of the issue in question. Considering that the solution and the approach used to solve a problem might be valid for other problems as well, some of the created value can be wasted. The information and knowledge produced in the process should be capitalized and reused to solve new issues. Depending on the level of difficulty of

the issue, the resolution process can require collaboration between different stakeholders. (Matta et al. 2016, 62.)

Durcikova, Fadel, Butler and Galletta (2011, 855) state that access to knowledge management system does not guarantee that existing solutions are reused or new solutions developed. Their study has been conducted in the context of technical support, to find out how the climate of the organization and access to knowledge management systems affect how individuals choose between exploiting existing solutions and exploring new solutions when solving problems. (Durcikova et al. 2011, 855-856.)

The results show that access to knowledge management system does not automate solution reuse. Especially in an innovative environment there might be tendency to innovate new solutions rather than reuse existing solutions. Autonomy of the specialists is seen to increase this tendency. They highlight that technical support work is not as much routine as it is often assumed to be, but a complex activity consisting of both routine and creative problem solving in limited time and with limited resources. The role of knowledge management system is to enable both knowledge reuse and innovation. (Durcikova et al. 2011, 862-863.)

People also have different roles in knowledge management. Nonaka and Takeuchi (1995, 151) split knowledge related tasks between practitioner, engineer and officer. Management role is to be the officer and the engineer, to manage and facilitate the process. Knowledge practitioners are further split into operators and specialists. Knowledge operators are in operational role with customer and engaged in practical tasks, for example dealer service technicians. Knowledge specialists use and create explicit knowledge, for example service specialists. (Nonaka & Takeuchi 1995, 151-153.)

As discussed in the knowledge management chapter, the value of a knowledge management system can be difficult to measure, or it is measured with different criteria. Efficiency is targeted to reduce cost, while effectiveness is targeted to improve performance, for example in the form of better service. Measurement depends on what is the point of interest of the stakeholder group doing the evaluation. Due to this, Brown et al. (2005, 51) suggest evaluating merit versus worth. Evaluating merit considers if the system meets expectations and includes for example technical performance, user friendliness and quality of content. Evaluating worth considers the productivity of the system, whether it is sufficient considering its cost to the organization as well as its' impact on customer satisfaction and retention. Based on the findings of the study,

stakeholders involved in everyday operations emphasized merit, while stakeholders in management level emphasized worth. (Brown et al. 2005, 50-51, 54.)

Evaluation should be directed into the whole customer experience because all interaction that a customer has with the organization is a part of that experience, including the use of knowledge management system when solving problems that customers face. Statistics, for example number of support requests, can be used to evaluate worth. Content use statistics can be used to evaluate merit, as well as usage and usability of the system. Surveys and feedback can be used to evaluate both merit and worth. (Brown et al. 2005, 57-58.)

Matta et al. (2016, 67) raise knowledge discovery as a means to extract useful knowledge from data. Knowledge discovery is related to data mining. It uses classifications to refine knowledge instead of reasoning, which is typically used by experts in issue resolution. Repetitive patterns can result in hypotheses, which can be evaluated further to see if they are valuable. (Matta et al. 2016, 67.) Nonaka and Takeuchi (1995, 179) highlight categorization of data from problem solving process, to enhance sharing with for example R&D, manufacturing or marketing. Becerra-Fernandez et al. (2008, 33) state that knowledge discovery through data mining can be useful in finding new relationships which help in predicting and categorizing knowledge and through that in improving business intelligence and creating additional value to the organization.

Context enables the use of previous experiences. Issue from similar context can aid in solving new issues. To achieve this, the issue description must be systematic and simplified. The similarity between previous issues and current issues can be assessed with the help of suitable taxonomy in addition to searching with keywords. Taxonomies, tags and similarity measures are necessary to increase reuse of knowledge. Description of the issue is vital as it enables analysis. In analysis phase, the causes of the issue are identified, resulting into hypotheses which need to be validated or invalidated by experts. Finally, corrective actions are taken to solve the issue and preventive actions taken to avoid reoccurrence of the issue. (Matta et al. 2016, 63-64, 71-72.)

Hellebrandt, Heine and Schmitt (2018, 1074) discuss knowledge management solutions to transfer knowledge from technical complaints to new product development. They state that both technical complaint management and failure management aim at identifying issues, processing related information and eliminating root causes as well as at preventing reoccurrence. Technical complaint management consists of

solving criticized product failures based on internal or external complaints. Failure management aims at identifying issues, processing related information and eliminating the root causes of failures. The aim is also to prevent reoccurrence considering the complete life cycle of the product. To achieve sustainable results, long-term solutions are required to be able to learn from failures. The writers refer to a model by Linder, Anand, Falk and Schmitt (2016) which is presented next. (Hellebrandt et al. 2018, 1074-1076.)

According to Linder et al. (2016, 99), research of failure management is limited, although they concentrate specifically on technical complaint management. Complaint management is negative feedback from customers. Its' management should be considered a continuous long-term process. Complaint data should be organized so that it is first refined with other internal and external data to understand the underlying cause, then analyzed and evaluated further until the data is completed. They emphasize that this aim is different from short- and medium-term corrections that are normally pursued. Processing normally starts with data organization and moves on to failure identification and correction. The model to support long-term knowledge transfer is described in Figure 7. (Linder et al. 2016, 99-100.)

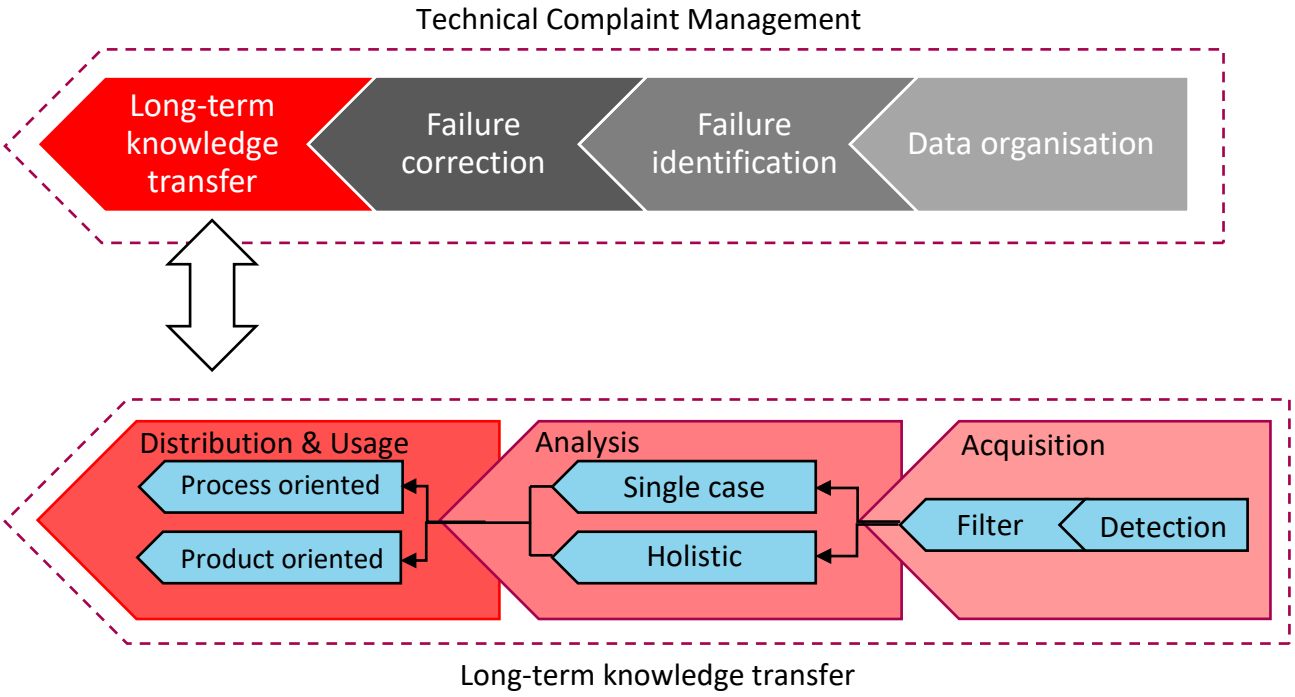

Figure 7. Model to support long-term knowledge transfer (Linder et al. 2016, 100.)

Figure 7 describes that long-term knowledge transfer requires its' own process parallel to failure correction process or an extension that starts after failure correction is in place. It consists of three phases: acquisition, analysis, and distribution and usage.

Acquisition phase consists of detection of complaint information and its filtering, which enables the next phases. The amount of information can be substantial which is why filtering is normally required. Not all information is relevant for future use which should be considered in filtering and prioritization. Only the selected critical information is processed in the next phases. (Linder et al. 2016, 101.)

Analysis phase is divided into single case and holistic analysis. Single case analysis should be conducted on particularly important cases that could correct an error, for example. Holistic analysis is aimed at developing processes in the long term by searching patterns, similarities and abnormalities. (Linder et al. 2016, 101.)

Distribution and usage are divided into product and process-oriented knowledge. The use of information can be instrumental, to support in making individual decisions. If the use is conceptual, information can provide background information and aid in creating general understanding of products or processes. (Linder et al. 2016, 101.)

Failure management and complaint management have the same aims, although they are not the same. Failure management is based on data from the machine or the user of the machine in the failure situation. Complaint is dissatisfaction from the customer. It can be due to machine not working properly due to a failure, but it can also be due to product not meeting expectations. Complaint data and issue resolution data contain same elements and if analysis would be conducted on both, same and different elements would likely appear. The model presented above could be suitable for issue resolution data as well.

The amount of data that organizations possess is growing all the time, as is its potential. The data repositories can be vast and diverse, increasing all the time both in quantity and complexity. The data can be raw and unstructured, and difficult to process. This has created a need to find ways and tools to facilitate knowledge management tasks. Big data is in focus in many organizations, but regular knowledge management tools are not necessarily sufficient to create value from the large, complex and diverse pools of data. Data mining, information retrieval and machine learning are considered techniques to accomplish this. One

suggested technique is big data text analytics. It can be used to extract key information from large amounts of data to form information patterns and trends. The data can be classified and arranged with the help of key words, clustered for further analysis as well as visualized for easier understanding. An example of this is the study conducted by Khan and Vorley (2017). (Big hopes for big data 2017, 24.)

According to Khan and Vorley (2017, 19), big data text analytics brings a lot of potential to discover hidden knowledge and to create new knowledge from structured and unstructured sources. Manual processing of high amounts of data is simply not feasible and new tools for analysis are required. At the same time, the pressure to use knowledge in decision making is increasing and that knowledge is needed fast. In addition to know-what knowledge, know-why knowledge is needed. Big data text analytics has the potential to identify patterns and knowledge that would not be visible otherwise. It can give depth to information that already exists and increase the quality of knowledge, as well as improve the capacity and speed to process and analyze data. Clustering of the key words can improve categorization, identify relationships and increase understanding by visualization of the key words for example in the form of a word cloud. Big data text analytics can aid in dealing with information overload, but it can also enable analysis of all available data without having to pre-select what to analyze. (Khan & Vorley 2017, 20, 22-26, 28.)

Khan and Vorley (2017, 29) also highlight that big data text analytics can be utilized for many types of data, from complaint databases to social media feeds. Considering this, it could be a useful approach for issue resolution data as well. Text analytics could integrate more tacit features into explicit knowledge and that way give depth to the knowledge and deeper understanding of the issues.

Gebhardt, Farrelly and Conduit (2019, 72) have studied sharing marketing knowledge within an organization, also highlighting that the amount of knowledge is increasing constantly but not necessarily the understanding based on the knowledge. By introducing organizationally shared market schemas, market intelligence can be presented in a standard format to aid in distributing, understanding and using knowledge. Existence of dedicated experts to manage and maintain knowledge is seen as an asset. These experts can also facilitate organizational learning by enhancing understanding and use of knowledge. (Gebhardt et al. 2019, 76, 79, 89.) Similar shared schemas could be useful for issue resolution data as well.

As a summary, knowledge related to issues is refined in the issue resolution process. It depends on the used methods how much value it can add. Issue resolution aims to prevent issue reoccurrence but it is also

a part of customer experience. If the knowledge is not used, the refined value can be wasted. Next chapter discusses learning based on the refined knowledge.

2.3.3 Organizational learning related to issue resolution

According to study Subramani et al. (2021, 1287), the amount of support requests to technical support decreased when codified knowledge was available for field service at the right time. The study also highlights that problem-solving requires effort and expertise, which is why it is important to document problems and their solutions properly. If they are documented, a support request might not be needed. Access to knowledge can help in solving low-complexity problems in short term and learning from the knowledge can help in solving high-complexity problems in long-term. The knowledge can provide clues if not a direct solution. Using knowledge not only helps in solving the issue in question but it can also aid in forming models for problem-solving. (Subramani et al. 2021, 1289-1290, 1293-1294.)

Organizations can have procedures and rules for solving problems that are faced repeatedly but it is not possible to have a solution ready for all problems that might appear. Existing solutions and problem definitions are usually simplified models and it is unlikely that they would contain all possible variations. The existing solutions are a sort of learned responses that can be used for similar problems. Problem absorption occurs when an existing procedure or rule is used as a basis when solving a new type of problem instead of searching a totally new solution for the problem. This can reduce the need for organizational learning but on the other hand it can also enhance it as problem absorption occurs due to practical need and in specific context. (Osadchiy, Bogenrieder & Heugens 2013, 185-187.)

Gardiner, Eltigani and Williams (2018, 89) state that especially mature organizations concentrate on social interaction to apply accumulated knowledge in practice while less mature organizations concentrate on simply putting knowledge available for everyone with the help of IT systems. It is a positive finding, that the highly mature organizations have put such a high importance on the social side of knowledge, as these organizations most likely possess highly mature knowledge management systems. Although this thesis concentrates on the use of existing explicit knowledge, social interaction is significant from learning perspective. Nonaka and Takeuchi (1995, 11) argue that all knowledge should be internalized before it is useful for the organization. Within issue resolution knowledge can mostly remain codified and explicit simply because there is too much knowledge to internalize. In other words, it is impossible to have a learned response for all issues, but through problem absorption it should be possible to avoid starting from scratch

with each issue. The target should not be to internalize solutions to issues, but to learn how to use the explicit knowledge in issue resolution and in a wider context.

Gray and Durcikova (2005, 163) discuss that when a technical support specialist faces an issue that is out of the specialist's expertise, it is possible to conduct experiments, transfer the issue to a more experienced colleague or to use external memory: colleagues, manuals or knowledge repository. From organizational perspective knowledge repository would be the recommended way. However, in many cases people lack the motivation to revisit the repository. If an issue has already been solved once, doing it again decreases efficiency as well as the value of knowledge reuse. Efficiency of technical support work is often measured time-based, for example based on call duration or percentage of issues solved right first time. This creates pressure to have simple solutions that can be found easily. (Gray & Durcikova 2005, 159-161, 170.)

According to Gray and Durcikova (2005, 170), consulting colleagues as a source of knowledge can be considered to contain lower risk level compared to the other types as issues can be discussed and clarified during processing. Official documentation, for example manuals or bulletins, can be considered to have higher risk level because they can be outdated, incorrect or insufficient. Knowledge in repositories might have high risk level mainly because issues are usually context specific as are their solutions and therefore not applicable to other issues. Also, the complexity of the knowledge repository and related IT system can limit the motivation to use them. (Gray & Durcikova 2005, 170-171.)

The findings of the study indicated that repositories were not used to improve knowledge or to learn. The main aim of technical support is to solve the issues. Understanding the reason or root cause behind the issue might not be relevant at the level where issue resolution takes place. This can affect the content of the knowledge in the repository if it contains only a fix to a problem and not the background information with sufficient detail. In addition, the pressure to solve the issues as quickly as possible can limit the available time and motivation to write down the solutions. The specialist might rather add "how-to" knowledge which can make knowledge use easier in daily work, but that can also limit further use for analysis and learning. "How-to" knowledge might enhance efficiency, but the lack of "why" knowledge decreases learning in a longer term. Use of knowledge repositories was seen as too time consuming. They are supposed to make issue resolution more efficient but were considered to decrease efficiency. (Gray & Durcikova 2005, 179-183.)

The outcome of the study by Gray and Durcikova (2005, 184) is that efficiency and learning as goals for use of knowledge repositories are in conflict and only one of them should be chosen as the primary goal. If the aim is efficiency, the solutions should be simple and quickly available to improve issue resolution. If the aim is learning, the solutions should be more thorough and provide deeper understanding of the issue, but the cost would be increased time for issue resolution. Proposed technical solution is to add both short "how-to" solution and longer, more detailed "why" solution to the repository. However, this does not solve lack of motivation or the requirement for efficiency. (Gray & Durcikova 2005, 181-185.)

Subramani et al. (2021, 1303) refer to the study by Gray & Durcikova (2005) and state that often the reasoning behind implementing a knowledge repository or a knowledge management system is efficiency, but that does not necessarily rule out learning. Knowledge management can facilitate issue resolution in the short term and in the long-term the benefits through learning can be substantial if the system is adopted by the organization and its members. The payoff comes not only from technology but also from decrease in support cost and increase in human capital. (Subramani et al. 2021, 1303-1304.)

The goal for right first time could also be seen as a controversial indicator on efficiency. Subramani et al. (2021, 1289) refer to Orr (2006), who is known for his research related to technical work. Orr (2006, 1810) highlights that if a previously repaired machine needs to be revisited, it does not necessarily mean incompetence by the technician. Machines wear out and break and failure can be expected during use. The environment and the circumstances where the machines are used can be diverse, as can be its users. Both can influence the behavior of the machine. (Orr 2006, 1810-1811.)

Becerra-Fernandez et al. (2008, 25-27) discuss direction and exchange as processes related to knowledge management. Direction means for example helpdesk giving instructions to a customer, like a solution to a specific situation, without transferring the background knowledge or "the why" (Becerra-Fernandez et al. 2008, 25). This is an interesting point regarding issue resolution: does the solution contain only the main points, is the background data saved and can it be returned to. Exchange means transferring explicit knowledge between individuals in a group including the background knowledge (Becerra-Fernandez et al. 2008, 27). There could be a significant difference between what knowledge exists and what is communicated. Orr (2006, 1808) argues that technicians are not necessarily good writers which can affect the motivation to share knowledge in explicit form. On the other hand, Orr argues that doing a diagnosis is a narrative process (Orr 2006, 1812). This indicates that technicians like to share knowledge in discussions but not necessarily write them down.

Problem-solving, or issue resolution, requires knowledge in all phases of the process: when the issue is defined, when possible solutions are identified and when the most suitable solution is implemented. Required knowledge cannot be directly transferred from managers and leaders to the individuals in the organization, but they can promote awareness and commitment related to problem-solving practices to achieve better outcomes. Participative practices enable interaction and knowledge sharing between people through meetings and discussions. Standardized practices include explicit knowledge in manuals, guidelines and information systems. They improve access to knowledge that contributes to investigating circumstances of the issues and identifying potential solutions as well as detecting deviations and achieving correct diagnosis. However, if the practices are established but not used, they are not adding value which is why leaders should be committed to the practices personally and support people in adopting the practices. (Galeazzo & Furlan 2018, 1018, 1021-1022, 1029-1030.)

It is difficult to predict what is needed in issue resolution. Due to unpredictable problems, most likely there will not be a standard response available for all problems nor a model to solve each type of problem. It is nevertheless important to understand what knowledge exists and how it can aid in issue resolution. Additional value comes through learning and learning requires that the knowledge contains the “why”. In the end, it is due to the motivation of the people how much learning does or does not occur.

3 Implementation of the study

3.1 Research setting and methodology

Methodology defines how the study is conducted, how the cases to study are selected and what methods are used to gather and analyze data. There is no single right choice for either methodology or method, but their usefulness depends on how well they fit with the selected topic and theory. For example, qualitative study is methodology. Methods are research techniques, for example observation. (Silverman 2013, 113.) According to Silverman (2013, 66) the most appropriate method should be selected considering the research problem.

The goal of this thesis is to respond to the following research problem:

The data that is formed in the issue resolution process is not used outside the process.

The research questions are:

How is issue-specific data used outside the actual issue?

How to lead the use of the data to enable organizational learning?

This study is a qualitative study as it is targeted to a specific case and context and the purpose is to achieve deep understanding of the subject (Metsämuuronen 2006, 210-211; Saaranen-Kauppinen & Puusniekka 2006, 5.5). The study could also be called explanatory study with the aim to describe events, to look for new viewpoints as well as to explain them (Hirsjärvi, Remes & Sajavaara 2009, 138). The benefit for the case organization is the opportunity to apply the results in practice.

Within issue resolution process, Level 3 was selected as the subject for this study. Level 3 is only one part of the process, but after discussion with the client this level was considered most relevant and the best fit for this study. Using and refining knowledge have a significant role in this level of the issue resolution process to which the more complex issues are escalated. On the other hand, Gray and Durcikova (2005, 172) argue that specialists on higher levels use less knowledge from repositories than specialists on lower levels. Knowledge repositories are considered a way to capture and reuse solutions to common problems, aiming

at improved service quality and increased learning but according to the study by Gray and Durcikova (2005, 159) learning based on these repositories is limited.

In qualitative research, observation can be used to understand a culture or a subculture (Silverman 2013, 124). Organizations are social groups and therefore a suitable ground for observation studies (Silverman 2006, 77). Observation concentrates on understanding routines and what people do, instead of focusing on what people think or feel (Silverman 2006, 69). For example, when the target is to understand behavior observation is an appropriate method, but when target is to understand how people experience the topic interview would be more appropriate (Silverman 2013, 126).

Observation can be used to collect information on how individuals and groups act in different situations and what assumptions they base their actions on, to discover hidden things that individuals do not necessarily recognize (Saaranen-Kauppinen & Puusniekka 2006, 6.4; Toikko & Rantanen 2009, 144). What people consider routine or obvious can be discovered through observing people instead of asking them directly (Silverman 2013, 243). Observing can be useful also if the researcher wants to compare espoused theories to theories in use (Järvinen & Järvinen 2004, 155). Observing is sensing and as a research method it is done thoroughly and consciously, and in context (Vilkka 2006, 6).

In this study, observation was selected as the research method as interest was in what people do and what the knowledge related routines are within Level 3 of the issue resolution process. Interviews could have revealed deep information on the topic, but observation was considered more appropriate for this research setting. Observation was conducted on people in a meeting setup and in addition to related documents.

3.2 Data collection

In an observation study data collection is done based on the researcher's observations guided by the research problem. The subject can be operations or people. The researcher's personality is in a way the instrument to collect data. (Järvinen & Järvinen 2004, 154-155.) Silverman (2013, 132) highlights use of naturally occurring data by observing people in a setting where they regularly do their work, without arranging a specific setting for research to minimize intervention by the researcher.

In this study observation was conducted in Level 3 meetings that are held biweekly. The purpose of these meetings is to follow the issues that have been escalated to this level. Decisions on escalation to Level 4 are also done in these meetings. The meetings were held regularly with regular participants. The duration of each meeting was 1,5 hours.

Observing was done in six meetings during a two-month period in autumn 2021. 7 to 11 participants were present in each meeting, excluding the researcher. On average 40 issues were discussed during each meeting. The issues were in different phases of the process: some were recently escalated, some were under study and some were already resolved but under monitoring. The plan was to observe as many meetings as needed until saturation point would be achieved. Saturation is achieved when new observations do not bring additional information but they start to repeat, which indicates that the amount of research data is sufficient for the study (Eskola & Suoranta 1998 in Saaranen-Kauppinen & Puusniekka 2006, 6.2.2). Saturation started to show quite quickly, after three meetings. Observation was continued in three more meetings to increase the sample and the reliability of the study.

Observation research is considered to include also facial expressions, gestures, postures and movement (Anttila 1996 in Saaranen-Kauppinen & Puusniekka 2006, 6.4). The challenge for this study were the COVID-19 restrictions as majority of the employees were working remotely and meetings were conducted as online meetings and therefore also observation was done online. Microsoft Teams was used as the collaboration application for the meetings. Online meetings are daily tasks for all participants, so the situation was as close to reality as possible. The influence of the researcher to the observation occasion was minimized as the presence of the observer was not as obvious as it would have been in face-to-face meetings. The official language of the case organization is English which is why this thesis was conducted in English to ensure a wider audience. Finnish language was used in the meetings but field notes on the observations were recorded in English to maintain consistency.

Silverman (2013, 26) points out with an example that researchers often audio record the observation situation as well as make handwritten field notes to catch visual data. Afterwards the recording is transcribed into text, enabling analysis of detailed talk, although transcribing a meeting setting can be challenging due to multiple voices. (Silverman 2013, 26.) Audio or video recording enables returning to the moment as often as needed which makes it the preferred option (Silverman 2013, 220, 222). Field notes are in the form as they are written, but it is worth noting that making field notes is also partially analysis at the same time

(Silverman 2013, 220). Audio recording does not guarantee quality on its own but the quality depends also on the transcripts (Silverman 2013, 300).

Regarding data collection for this thesis, agreement was made with the client not to record the meetings that were observed. This was to avoid recording and transcribing discussions that may contain sensitive information related to the operations. Since the study is not about the actual issues or how they are resolved, but about further use of the data that is collected in the process, the assumption was also that audio recording and transcribing what exactly was said would not have added significant value. This also fulfilled the request of the client.

According to Järvinen and Järvinen (2004, 156), obtaining research data from existing documents can include for example letters, memos, agendas, schematics, organization charts, bulletins, presentations, reports or process descriptions as subjects. These are secondary sources as they are not data that is originally written for the study. To understand the meaning and the use of the document can help in evaluating how useful it is for the study. (Järvinen & Järvinen 2004, 156.)

In addition to observing the meetings, process descriptions, instructions and other explicit information on the related processes, information systems and databases were observed. With existing documents, the researcher can provide additional information on the subject through critical review, new viewpoints and making invisible aspects visible (Vilkka 2006, 9). It was considered important to observe the process descriptions and instructions to understand how knowledge management and organizational learning were visible in the documents. The language used in the documents is English. Observing was done on three documents which are used as guidelines in issue resolution. This part of the study was conducted in the middle of the observation period for meetings. Placing it like this was the most suitable alternative as doing it first would have emphasized the process, while doing it last would have meant that there would be no possibility to adapt how the meetings were observed. This phase gave direction for the last meetings as well as for the analysis and conclusions.

The subject should be studied as whole, which is why the observations should be directed not only to the actions of the individuals but also to what kind of products their actions provide (Vilkka 2006, 17). Due to this, also the file in which notes from Level 3 meetings are recorded was chosen as a subject for observation. The file is a workbook in Microsoft Excel format.

According to Silverman (2013, 51), theory that is appropriate for the research question gives direction. In structured observing categories and classifications are defined beforehand. They should be defined in sufficient detail, to make sure that the needed observations can be done. At the same time, they must be consistent and comprehensive so that there is a category available for all observations. (Vilkka 2006, 14.) Categories need to be broad, but items can also be duplicated to be able to assign them into multiple categories to maximize hypotheses based on the data (Silverman 2006, 88).

Provisional coding means defining a list of codes before starting fieldwork. The codes can be based for example on the frame of reference, the research questions, findings from previous studies, previous experience of the researcher or hypotheses. The codes do not need to be fixed but they can be modified, deleted or expanded during the process. This is also to ensure the quality of the research data, that it is not forced into a coding structure that is not suitable for the study. Doing a pilot study to test the provisional coding may be useful to ensure that the coding is suitable. (Saldaña 2021, 216, 218.)

Silverman (2013, 28) also highlights that extensive field notes give the possibility to return to the events. Concepts defined with the help of theory guide the research and can form a baseline to predefined categories. However, it is good to look at the data critically and return to it because predefining can also limit the findings. (Silverman 2006, 92-93.)

In this thesis, field notes were recorded in a pre-defined template based on the main themes in the frame of reference. Field notes were recorded with detail, case by case, and coded after each event. On average 40 topics were discussed during each meeting, which means on average 2 minutes and 15 seconds were used per topic. Due to this, the observation and the field notes had to be completed quickly for each topic, which is also why a predefined template was considered mandatory. The discussion followed a similar pattern on majority of the topics so limited time did not cause issues in recording the notes. Microsoft Excel application was used as the software to record the field notes. In addition, observation diary was integrated to the template, to enable recording both what was discussed and what were the first thoughts of the observer in the situation.

Primary codes were defined based on the frame of reference. Subcodes were added to each primary code to refine coding. The template and coding after each meeting helped in keeping the focus on the research questions throughout the observation period. Since the meetings were recurring, it was possible to do a

pilot and adapt the coding for next events. The data from the pilot meeting is included in the research data.

The observation template is in Appendix 3. Altogether the field notes from meetings contain 347 observations (23 pages). Each observation is one line in the template. The field notes from documents contain 80 observations (4 pages).

3.3 Data analysis

The collected research data does not respond to the research problem directly but it first needs to be analyzed to be able to make interpretations based on it (Vilkka 2006, 75-76). In qualitative analysis research data is studied as a whole and all relevant aspects should be in alignment with the interpretation. The collected data should first be looked from a perspective that is set by related theory and methodology, concentrating only on topics which are relevant considering the research problem and the frame of reference. This reduces the amount of data to be analyzed. The data is reduced further by combining the observations into groups using common denominators. These combined observations must align with all initial observations. Finally, interpretation is made based on the clues that the combined observations provide, but also not forgetting the raw data. (Alasuutari 2011, 31-36.) The purpose of the analysis is also to find connections between the interpretations and the frame of reference (Tuomi & Sarajärvi 2002 in Saaranen-Kauppinen & Puusniekka 2006, 7.3.2). Text or document analysis should be conducted on a limited and clearly defined selection to achieve sufficient level of detail (Silverman 2013, 54). In this study the use of pre-defined observation template reduced the topics already in the data collection phase. The template was based on the frame of reference.

A code is for example a word or a phrase that is used as an attribute for a part of data that is collected for the study in the observation phase (Saldaña 2021, 5). Codifying means arranging data in systematic order with the help of codes to organize findings into categories and to find patterns, themes or concepts (Saldaña 2021, 13, 17-18). It is not necessary to codify all research data but concentrate on the data that is related to the research question or topic of interest (Saldaña 2021, 28). With the help of the pre-defined template, all research data was coded in the field notes already during the data collection phase. This provided a first look into categories already during data collection. As soon as the data collection phase was completed, the coding was evaluated and seen as sufficient to start combining observations.

The observation data from meetings was grouped based on the primary and secondary codes. The observations were first combined per meeting. This decreased the number of observations from 347 to 117 (from 23 pages to 11 pages). Observations from documents decreased from 80 to 32 (from 4 pages to 2 pages).

After this, the combined observations were collected into one table and grouped based on the primary and secondary codes and combined further. This decreased the number of observations from 117 to 45 (from 11 pages to 6 pages). Observations from documents decreased from 32 to 15 (from 2 pages to 1 page). These combined observations were then used to define the results of this study.

4 Results

As explained in chapter 3.2, Level 3 of the issue resolution process was selected as the subject for this study. Results are presented by dividing the findings between the three main concepts in the frame of reference: knowledge management, organizational learning and issue resolution process.

From knowledge management perspective the research data concentrates on knowledge sharing. Communication between groups means communication between the specialists working in Level 3 and other departments of the company or other corporate sites. According to research data this part of the communication is mainly formal as it is largely based on discussions in formal meetings and on sharing explicit knowledge. Examples of formal communication were follow-up meetings with other departments and use of service bulletins released by other corporate sites as a knowledge source. When communication takes place between individuals it is more informal and tacit. According to the research data it is based on emails, phone calls and chat messages which are not necessarily added to the CRM system. Examples of informal communication were emails sent by the specialists to request feedback from an individual in another department.

Based on the research data, communication between the specialists working in Level 3 is mostly informal. Knowledge is often received directly from other specialists. For example, status updates were sometimes searched from emails during the observed meetings. In some cases the specialists communicated also through the CRM system, for example to send an additional request to issue author. In the observed meetings the availability of status reports relied on individual specialists and the updates were based on oral feedback. If the specialist in question was not in the meeting status was usually not updated.

Remembering appeared several times. Phrases like "Can you remember?" and "I can't remember" were used. For example, a specialist said that he does not remember everything that has been discussed about the issue. Another example was a specialist mentioning a solution that should be remembered if any related issues appear. The research data indicates also that the specialists request explicit knowledge if there are unclarities. For example, on one occasion an issue was first considered high priority. As the discussion continued, one of the specialists was able to confirm that there were very few occurrences of the same issue in the CRM system after which priority decreased.

According to the research data, knowledge sharing with external stakeholders in the service network is explicit and formal. Solutions for specific issues are communicated to the author through the CRM system. The knowledge is shared with the whole service network mainly as knowledge objects and service bulletins. Decision on the format of communication was often done during the meetings. For example, decisions were made to release a knowledge object or a service bulletin upon issue closure.

From organizational learning perspective, the research data contains elements from both single-loop and double-loop learning as well as indications on different motivations. Indications of single-loop learning in the research data were related to searching similar previously solved issues in the CRM system. These were used as reference when solving new issues. On some occasions there were also suggestions to create a service bulletin to avoid issue reoccurrence. Related to sharing a solution with an external stakeholder, the challenges with the communication were discussed also in general level: what to communicate and what the expected effect is. Double-loop learning was visible through how the specialists working in Level 3 target to find long-term solutions to communicate to a wider audience and not only to issue author. In many cases the specialists also wanted to wait for feedback on a solution before communicating it more widely or to test the solution in practice before communication.

Although the meetings concentrated on follow-up of open issues, process development was also discussed. For example, focusing on new products and ensuring sufficient follow-up for escalated issues were mentioned. The specialists also considered the backgrounds of the issues, for example if an issue is more a deviation compared to customer expectations. In addition to sharing knowledge with the service network, the specialists would like to share knowledge with the customers.

Related to motivation, there were indications of negative and passive behavior as well as of positive and active behavior. Based on the research data, negative or passive behavior occurs when knowledge sharing

is not bringing desired results. There were also concerns that dealers do not always submit a support request at all because of the same reason. Correct timing to share knowledge was considered, which is why the specialists working in Level 3 sometimes chose to wait before sharing knowledge. Sometimes knowledge was shared only when requested. The biggest concerns were related to time required to resolve an issue and to limited possibilities to do practical testing. From observer's standpoint, the specialists seemed active in sharing knowledge, but they became more passive if they see that the knowledge is not used or if the responsibility related to issue resolution currently lies with another department. Sometimes the specialists seemed to be in waiting mode although topic was seen as important.

There was also positive and active behavior visible. The specialists working in Level 3 value the knowledge that they possess, as well as sharing the knowledge. For example, the specialists perceived that other departments were interested in the knowledge and they also drove solutions proactively. There were indications that although an issue was already escalated to a higher level, the specialists were also proactively involved in planning the actions while waiting for the final decision. From observer's standpoint overall attitude was positive and proactive despite the concerns. Sometimes there were both strongly positive and strongly negative views in the same meeting.

From issue resolution perspective, the research data included observations from both meetings and documents. Process description explains the issue resolution process, how issues are managed in the CRM system. The instructions concentrate in basic use of the system. In addition to instructions that have been received centrally from corporation, there are additional instructions created by the specialists working on Level 3. These have been created mainly by combining screenshots from the CRM system and from instruction videos related to the system. According to the instructions, all communication related to issues is recommended to take place through the CRM system. Use of issue resolution data outside the process is not specifically mentioned in the process description.

Related to possibilities to reuse issue resolution data, according to the instructions it is mandatory to add a description of the resolution when the issue status is set to “Resolved”. For a resolved issue, a button “Nominate for Knowledge Object” is displayed in the CRM system. The instructions indicate that it is possible to link individual issues to each other in the system. Reports and dashboards are available in the CRM system and the system also includes functionality to support escalation. Criteria to escalate from lower to higher level is not specifically defined in the process description. There were also no detailed instructions on how to use the reports and dashboards in the observed documents.

According to the observations during the meetings, escalation to Level 3 or Level 4 was mostly based on experience and intuition. For example, in the follow-up meetings the specialists discussed if there were new issues to be added to follow-up. There was no indication that escalation was based on reports or summaries. Experimentation and testing were mentioned often, especially related to testing potential solutions in practice. Sometimes testing was emphasized to reconfirm the issue. Data to support issue resolution was sometimes searched from the warranty system. On one occasion it was mentioned that data from the machine in question would be needed for further analysis. Data from the machine refers to telemetry data. Telemetry means transmitting readings from instruments to a remote location (FINTO MeSH N.d.). These readings can be used to analyze the operation of the machine.

A Microsoft Excel workbook is used to record notes in the Level 3 meetings. Each issue that is escalated to this level has its own line in the workbook and all open issues are reviewed in each meeting. The workbook is maintained manually, it is not directly connected to the CRM system. The research data indicated that the workbook is not very easy to maintain. For example, there was a comment that the file is difficult to read and update at the same time.

5 Conclusions

The goal of this thesis was to respond to the following research problem:

The data that is formed in the issue resolution process is not used outside the process.

The research questions were:

How is issue-specific data used outside the actual issue?

How to lead the use of the data to enable organizational learning?

The content that accumulates in the CRM system in the issue resolution process can be considered knowledge as it includes context and meaning and it is used in action. Table 3 includes knowledge management activities that were defined in Table 1. Practical activities related to issue resolution process in the case organization have been added to the rightmost column of the table.

Table 3. Knowledge management activities in theory (Chouikha 2016, 26-29) and in practice

Activity	**Description in theory**	**Issue resolution process in case organization**
Knowledge acquisition	collecting and gathering knowledge, developing new content or replacing existing content	knowledge accumulates in the issue resolution process
Knowledge storage	individual (personal memory) or organization (organizational memory) explicit or tacit	organization explicit in CRM system
Knowledge transfer	between individuals and groups informal or formal personal or impersonal	between individuals and groups informal and formal personal and impersonal
Knowledge application	application into action integration of knowledge	actions based on knowledge within CRM, integration of knowledge within CRM and other sources
Creation of new knowledge	innovation changes in relations between individuals and groups	innovation based on knowledge within CRM, improvements regarding products, services or processes

From the activities defined in Table 3, knowledge acquisition and storage were defined beforehand: knowledge accumulates in the issue resolution process to the CRM system. From knowledge management perspective the empirical study was related to knowledge transfer, knowledge application and creation of new knowledge.

Related to knowledge transfer activities defined in Table 3, the results indicate that communication is a mixture of formal and informal communication. Communication is mainly formal and based on explicit knowledge when it takes place with the other departments of the organization. Knowledge sharing between individuals is explicit when communication takes place within the CRM system, but a significant part of the communication takes place also outside the system. Based on the results, the status updates on Level 3 are largely based on tacit knowledge that is received directly from the specialists. At the same time external communication with the service network is explicit and formal and takes place through official channels. This can be considered controversial, but on the other hand there is a clear pattern: within internal network communication is more tacit and informal, but with service network it is more explicit and formal.

Related to knowledge application, solving an individual issue is an example of that. It is also an example of single-loop learning (Argyris & Schön 1996, 20-21). Although the issue resolution process itself is not the subject of this thesis, it is worth noting that based on the results escalation of issues is mostly based on intuition. Experience and experimentation seem to be valued over explicit knowledge. However, when further knowledge is needed it is searched also in other repositories, for example in the warranty system. This can be compared to combination mode of the SECI model (Nonaka & Takeuchi 1995, 67).

The first research question **"How is issue-specific data used outside the actual issue?"** is connected to creation of new knowledge, which is also the final point mentioned in Table 3. Based on the results this is limited and occasional. Knowledge is shared and used as required when solving individual issues within the issue resolution process, but it is not used outside the actual issue for example to identify trends or to track reoccurring issues in a way that would enhance organizational learning. Problem solving is mostly based on experience and highly dependent on specific individuals. These results support the findings of the study by Gray and Durcikova (2005, 159) that learning based on technical support repositories is limited.

Based on the results, these limitations are affected by two things. First, the use of data is not required in the process or in the instructions. The results indicate that the use of issue resolution data outside the process is currently not included in the process description. The CRM system includes features that facilitate further use of knowledge, but use of these features depends on the users. An example is the possibility to nominate an issue for knowledge object, which is an example of a convergent knowledge process (Maula 2006, 120-121). A knowledge object can be refined from reoccurring issues and shared with a wider audience, but the rules when and for which topics a knowledge object should be defined are not explicit.

Second, not all knowledge is available or usable. Since internal communication is partly tacit, not all knowledge is explicit. Tacit knowledge seems to be more natural for the specialists. For example, Orr (2006, 1808, 1812) states that technicians want to share knowledge but often prefer discussions over writing things down. In the CRM system issues are initiated on the lowest level by the dealer technicians. In addition to predefined fields, the users are required to add free text which can affect the quality of the content and its further use. Based on the results, the work is done independently and relies on experience which can also affect motivation to make the knowledge explicit. Also, the Microsoft Excel workbook that is used to record issue status on Level 3 is not necessarily the most convenient or the most comprehensive method to follow progress. It would be worth investigating already in the short term if the follow-up could be conducted in the CRM system as all communication is anyway recommended to take place in the system.

In addition there is a third point to consider: the motivation to use knowledge. As summarized in the knowledge management chapter in the frame of reference, knowledge management is more than an IT system. The value of knowledge to an organization depends on the people who use and create knowledge. Commitment of the people who contribute to knowledge requires that they understand its' value, otherwise it easily becomes mechanical use of an IT system. Understanding is the key to improved value and that depends on the people and their motivation to use the knowledge. The results of this study indicate that experience is valued in the operations, but this is mostly related to experience on the products. The experience related to using knowledge should be valued as well.

Based on the results, there is potential to enhance the use of explicit knowledge as its' use is emphasized in external communications. The use of warranty data in addition to issue resolution data indicates also that a foundation already exists. Considering the right time to share knowledge shows understanding regarding the different viewpoints of other stakeholders. There were also indications of double-loop learning, for example desire to improve how issues are solved and solutions communicated. In many ways the specialists working in Level 3 are both motivated and capable to do more than the process currently requires.

Related to the second research question **"How to lead the use of the data to enable organizational learning?"**, it is important to define what knowledge is valuable and to ensure that management guidance and support exist for knowledge use. As stated in the frame of reference, the service technicians who work with the practical tasks closest to the customers are knowledge operators. Service specialists are

knowledge specialists. Task for the knowledge engineers and officers – for the management - is to facilitate knowledge use.

Operation of a machine can be improved based on issue resolution knowledge, but to improve the operation of an organization based on that knowledge is more challenging (Reese 2020, 12). Issue resolution process is seen perhaps as a “hard” process that focuses on the product but it is also a human process. People are the key as they both accumulate and use the knowledge. As stated by Nonaka and Takeuchi (1995, 13-14, 59), the source of knowledge are the people and the organization can only amplify and crystallize that knowledge. In their recent article they state that even in this age of rapid technological progress social connections are in key role (Nonaka & Takeuchi 2021, 61). The leverage of knowledge builds from collaboration and from people working together (Senge 2006, 270). Even experienced specialists need support and direction. To engage the less-experienced specialists and to ensure consistency it is important that the organization guides and supports the use of knowledge.

Processes and systems are needed to connect the individual and the organization. To ensure that knowledge is used guidelines should be clear: what knowledge is valuable and what are the goals for its use. This should be defined in the process descriptions and instructions, otherwise it cannot be expected that knowledge is used in a way that it should be. The process descriptions and instructions should be dynamic and revisited from time to time so that the organization is able to adapt to changes.

Based on the results, the specialists working on Level 3 understand the importance of the knowledge that they possess and are motivated to share it. The question is what is stopping them since the view of the client was that knowledge is not used sufficiently which was also the main driver for this study. The results show that sometimes the group loses faith towards knowledge sharing. There are both strongly positive and strongly negative views and it could be worthwhile to evaluate the roles if there could be ambassadors or role models that could enhance the use of knowledge. As Reese (2020, 13) highlights based on his interview with Senge, not everyone in the organization will ever be aligned with change but there must be “a critical mass” to enable it.

The data from problem solving process can be useful to multiple different user groups like R&D, manufacturing or marketing after it is first analyzed (Nonaka & Takeuchi 1995, 179). The refined knowledge must also make sense to whoever is using it, otherwise it does not have value. Communication is the key and it cannot be built with communication tools alone. If the message is not correctly transmitted, it might never

be received or understood. Even if the message is correctly transmitted, different motivations might prevent understanding. From systems thinking perspective, if people concentrate in operating in the context of their own tasks and positions only, it is more difficult to see the interaction between different topics (Senge 2006, 19). As stated by Lee (2020, 214), know-why and care-why knowledge can benefit all levels of the organization, not only management.

Use of knowledge is not only knowledge management, but also organizational learning that involves remembering, analyzing, experimenting and reviewing results (Argyris & Schön 1996, 194). As mentioned in the frame of reference, processing existing knowledge can also be an active and dynamic process and a source for innovations. Internalization is visible through experience but not everything can or should be remembered. The direction should be towards learning how to use the explicit knowledge to create value, not so much to internalize it. To improve a learning system, a map of current learning system, a map of the targeted learning system and a map how to get from current to target system are needed. It should also be noted that the target state is not the final state, as the purpose of double-loop learning is to evaluate the current state continuously. (Argyris & Schön 1996, 111-112.) The target state can be “the ideal world” of a learning organization, but any improvement towards that can be considered a step forward.

As a summary based on the results, short-term use of knowledge is already part of the daily work in the case organization, but long-term use would require more guidance, more structure and a more systematic approach. Short-term improvements can be looked at also from long-term perspective, with sufficient time for reflection as results are not always instantly visible (Reese 2020, 10, 12). A suggestion how the long-term use of knowledge could be enhanced in two phases is presented in Figure 8. The suggestion is based on the model to support long-term knowledge transfer in complaint management by Linder et al. (2016, 100). The model was presented in chapter 2.3.2 of the frame of reference.

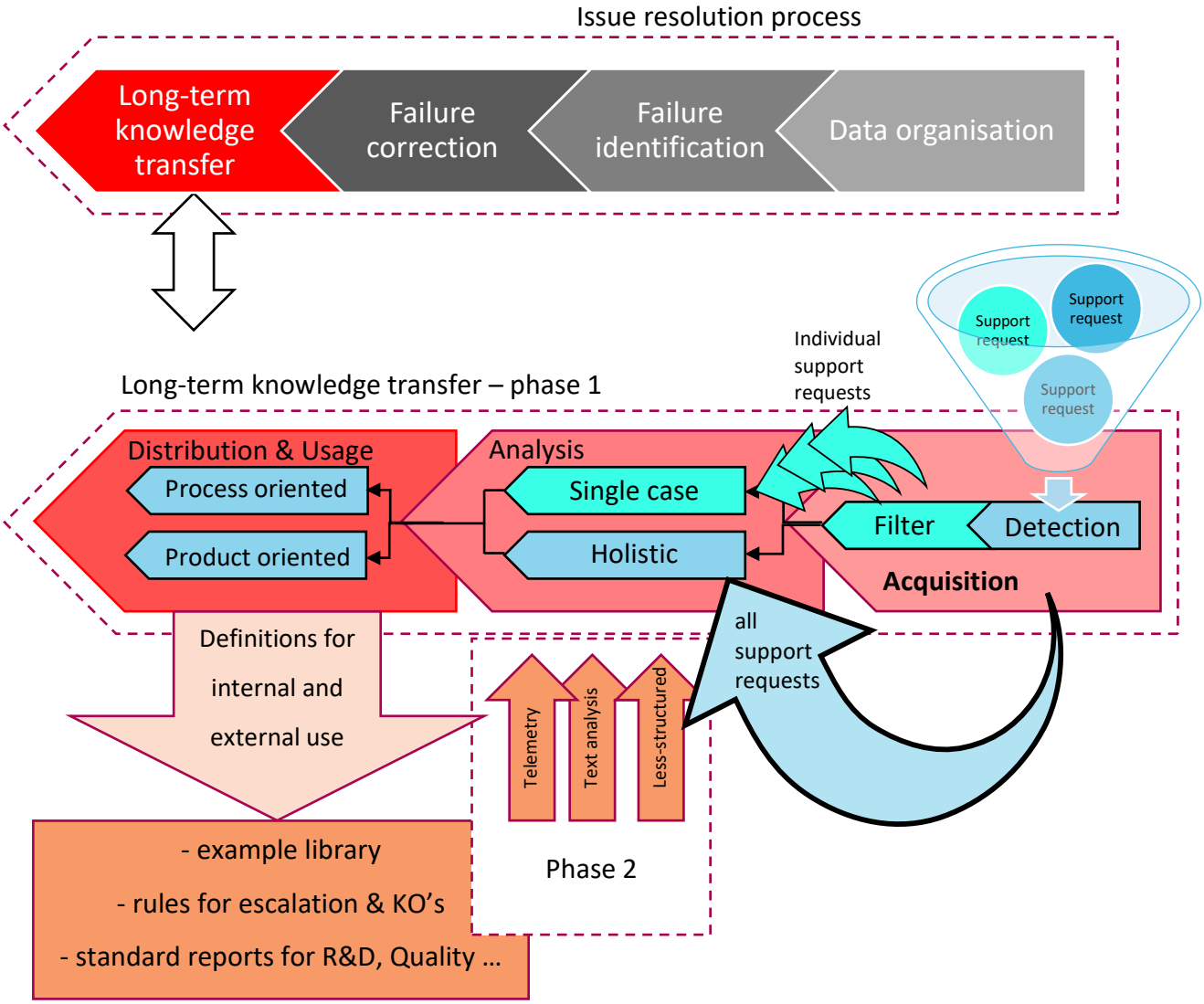

Figure 8. Suggestion for issue resolution knowledge transfer

In Figure 8, the model by Linder et al. (2016, 100) was modified for transfer of issue resolution knowledge. The plan can be divided into two phases. The first phase concentrates on the overall process to transfer knowledge.

In knowledge acquisition, detection can be considered to include all support requests that have been submitted into the system. The task for the case organization would be to define the criteria what is relevant and what is valuable. For single case analysis, the filters and priorities could be based for example on escalation level, issue severity or reoccurrence. For holistic analysis the criteria can be different as holistic analysis is more conceptual and aimed at searching patterns, deviations and trends related to processes and

products. Single case analysis and holistic analysis should not be looked at in isolation from each other, but how they could complement each other. This should be considered in the criteria so that valuable knowledge is not left out, although Linder et al. (2016, 101) emphasize processing only filtered critical information in analysis phase.

The target should be to analyze issue resolution data systematically and to use the analysis results to gain a wider picture. The purpose is not to ignore experience and intuition but strengthen the issue resolution process by providing background knowledge and additional leverage with the help of the analysis results. Analysis does not bring value on its own which is why distribution and usage should be part of the improvement plan as shown in Figure 8. Process-oriented results would be mainly for internal use. An example of knowledge use within the department could be the use of selected examples from resolved issues to create a library of typical cases. This would benefit especially new employees, but also the more experienced employees. Another example could be creating clear rules for escalation and knowledge object creation. Product-oriented results could be directed more towards knowledge sharing with other departments. For example, there could be standard reports defined for R&D department and Quality department needs.

In the second phase, the overall process would stay the same but the knowledge would be refined by combining knowledge from other sources with issue resolution knowledge, for example from machine telemetry data. Different analysis methods could also be implemented, for example text analysis methods to analyze free text in the support requests (Khan and Vorley 2017, 29). Also, the use of less-structured knowledge like photos, videos, audio files, emails and chats should be evaluated since they require different type of processing compared to regular text fields (Maula 2006, 102, 104).

6 Discussion

6.1 Reliability, validity and ethics of the study

Every study has its limits as it is not possible to see or hear all aspects of work. Something important might not simply come up. Data is always partial and "the whole picture" not even possible to draw. Nevertheless, the data can be detailed. (Silverman 2013, 50-51.) Validity of a study decreases if only a few examples are reported, if criteria for selection is not provided and if the original form of material is unavailable (Silverman 2013, 301). Ethics related to research process include relevance of the study, how the research data has been obtained, how the data has been analyzed and results reported (Saaranen-Kauppinen & Puusniekka 2006, 3.1.2).

The relevance of the study was explained in the introduction chapter as well as in the conclusions chapter. The reasons for selecting qualitative study as the methodology, observation study as the method and Level 3 as the subject were explained with detail in chapter 3. Data collection phase was also described in chapter 3. Data collection proved to be successful as there were plenty of field notes available for analysis. The reoccurring nature of the meetings where the observation research took place and extending the observation research to the related documents can be considered to increase the reliability and validity of this study.

Field notes for qualitative research conducted with observation method are rarely available for readers, and readers have no choice but to rely on the researcher's interpretation (Silverman 2013, 298). The field notes of this study are not available for the audience but this can be considered a standard procedure in qualitative research. The anonymity of the people attending the observed meetings was secured to ensure research ethics. There are no recordings or transcriptions available due to client request to prevent any harm to the operations and to the employees. The absence of recording to back up data collection could be considered a risk for the reliability of this study. The risk was minimized by selecting observation events which were held regularly, with regular agenda and with regular participants. This enabled conducting observation repeatedly in the same setting. It would also have been possible to continue observation longer to ensure that saturation point would be reached.

Observing is subjective and in everyday life it can lead to false assumptions or misinterpretations because observations are formed based on what is previously known or experienced about the subject. As a research method, reliability of observing is increased by doing it systematically, consistently and by using classifications and categories. Observations should be done selectively based on the frame of reference, to make sure that the focus is on relevant topics and analyzed critically against the frame of reference to further increase the reliability. (Vilkka 2006, 8-9, 11.)

Reliability was increased by pre-defining a template to record field notes prior to the observation study. This ensured that focus stayed on specific topics that were highlighted in the frame of reference and considered the most relevant for this thesis. The predefined template enabled recording the field notes consistently also when the meetings were proceeding fast from topic to next topic as well as faster categorization and analysis of the field notes. The field notes were written with detail and included an observation diary in the same template. Examples of observations are included in the results chapter to explain the findings and to show the validity of the results.

The research data includes plenty of examples from knowledge sharing, organizational learning and the issue resolution process. What it does not include are examples from knowledge application or creation, which also supports the view that further use of the knowledge that accumulates in the process is limited. At the very least it was not directly visible in the discussions between the members of the group. Another possibility is that observation is not the most suitable method to study these topics. Interviewing the participants would have increased the knowledge but that was not possible in the scope of this study with the available resources. This study is also an example of what can be achieved with an observation study. If interviews were added, it would have reduced the benefit from this perspective.

Other topics that were not visible in the research data were quality of knowledge and management role in the issue resolution process. For these topics interviews could have increased the knowledge but due to limited resources this was not included in this study. The absence of data related to quality of knowledge could also indicate that the quality is sufficient.

A researcher rarely goes to field without experience or initial ideas (Silverman 2013, 29). The experience and understanding of the researcher affect what is observed as the researcher sees the subject through personal understanding (Järvinen & Järvinen 2004, 155). The researcher was a member of the organization and therefore had the required background knowledge regarding the operations. On the other hand, the

researcher was not directly involved in the issue resolution process through normal working role but more a customer for the knowledge. The researcher had no prior in depth understanding of the process nor too deep involvement in it, so it was possible to maintain an objective view. It would have been more difficult for a researcher from outside the organization to do as thorough observation in this setting with the available resources.

It is not possible to know beforehand what will happen during observation period and if all relevant topics are visible. The observer can be passive or active. Even passive participation can create negative feelings in participants, especially if the participants are not informed beforehand. Informing the participants can also change their behavior. (Järvinen & Järvinen 2004, 155; Saaranen-Kauppinen & Puusniekka 2006, 6.4).

In this case passive role as an observer was more suitable, to minimize the influence of the researcher to the study from research ethics perspective. The observation events took place in a closed setting through audio and video conferencing tool. In an online meeting the presence of the researcher can have a smaller effect than if the researcher would be in the same room. The observer maintained a passive role and did not take part in the discussions. Due to these facts, the presence of the observer in the meetings had minimum effect on the observation events. Observation is often done in a face-to-face setting, but due to COVID19 restrictions this was not possible. Online meetings can be considered a normal working situation for the participants and therefore the effect on this study was minimal.

Openness with the participants required by research ethics was considered by informing the meeting participants in the first meeting about this study. A short reminder was done in the next meetings as participants were regular. Observations were recorded in the field notes as anonymous and they are not identifiable to a certain individual. The field notes do not contain personal information on the participants that could be used to identify an individual so the study does not cause harm to participants. The observation events were group events and the roles of the participants were not highlighted in the field notes which also ensured the anonymity of the individuals. The purpose was in any case to observe the processes and find improvement points that could benefit the case organization.

A typical issue with case-specific study is that although it can expand understanding about a specific phenomenon, the results can be difficult to generalize to different contexts (Metsämuuronen 2006, 211-212; Saaranen-Kauppinen & Puusniekka 2006, 5.5). This typical issue applies for this case study as well. The re-

sults could possibly be generalized to issue resolution process in other manufacturing sites of the corporation. For other departments of the organization the benefit of this study is an increased understanding on how observation study conducted by a member of the organization can bring value to the operations. More typical approach is to do a questionnaire or to arrange a workshop when there is a desire to develop and improve operations. Observation study is a different approach as it is more indirect.

It is challenging to observe behavior of others, not to mention your own. An organization might be interested in conducting their own studies related to organizational behavior if they see improvement potential in the operations. However, interpretations can be limited and biased. The results can reflect the attitudes of the individual conducting the study if the individual is a member of the organization. On the other hand, an outsider as a researcher needs more time to familiarize with the topic and still the background knowledge about the subject will be limited. Based on this experience, it was a benefit that the researcher knew the organization. At the same time, it was a benefit that the researcher was not too deeply involved in the actions under observation.

The main benefit of this study is a new target state and development plan for the case organization, supported by systematic research results and theoretical framework. It should also be noted that saturation can have a positive effect on the possibility to generalize results: if the research data starts to repeat itself, conclusions can possibly be generalized even from a relatively small sample (Saaranen-Kauppinen & Puusniekka 2006, 6.2.2). In this case saturation point was achieved quite early in the research process, which indicates that the results could be valuable also within other similar organizations in the same industry or within organizations that operate in a similar service network. Amount of source material related to knowledge management and organizational learning was high in general but related to issue resolution process in technical support environment quite limited. The thesis could provide useful viewpoints on knowledge management and organizational learning from issue resolution perspective.

What was not visible in the results, but still important to note, was the availability of data that is stored in the CRM system. If access is restricted, it highlights the unique value of the knowledge that the customer support department possesses. At the same time, it also is a big responsibility for the department. This should be considered by management, to ensure that the knowledge is used and that the people are motivated to use it.

The existence of a knowledge management system does not pass on the experiences of the people automatically. Even if the goal would be to make all knowledge explicit, that is not possible in real life. Even if data is analyzed, it is the people who make the decisions based on the analysis. A learning organization can be considered to mean more flexibility and less bureaucracy but it does not mean that structures and processes are not needed at all. Knowledge management and organizational learning support each other and it should be more about finding the right balance between the IT systems, processes and people.

6.2 Recommendations for further study

The purpose of this study was to evaluate how the use of the issue resolution data outside the issue resolution process and organizational learning are considered in the operations and what would be the potential improvement points. Some gaps were mentioned in the previous chapter, related to knowledge application and creation as well as to quality of knowledge and management role in the issue resolution process. A questionnaire or interviews could be conducted to increase understanding on these topics.

Related to the quality of knowledge, it could also be studied on dealer level in what type of situations a dealer submits a support request. Also, how the level of information added on Level 0 affects use of knowledge in the next levels. Assumption is that a large part of the knowledge on Level 0 is based on tacit knowledge of the technicians working at workshops. The issue descriptions typically include quantitative and qualitative data as well as both systematic and non-systematic descriptions. It might be worthwhile to ensure that the categories and classifications are clear and that users are familiar with them. The challenge is especially with the qualitative data as it is based on the experience of the individuals. The quality of the data in support requests should be ensured but at the same time it should be considered that too much control can have a negative effect on making issues explicit.

It is also worth noting that the external stakeholders on Level 0 are not interconnected with each other and they see solutions only to their own support requests unless there is a service bulletin or knowledge object added to the knowledge sharing system. Internal stakeholders on Level 1 and upwards see all issues and their solutions and it is also possible for them to interact between each other. The results of this study do not describe how that takes place in practice.

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Appendices

Appendix 1. Information seeking report, books & ebooks

Database	Search terms	Filters (inclusion criteria)	Results total	Results after filtering	Additional filters (inclusion criteria)	Results used
JAMK Library (Janet)	"knowledge management" AND "organizational learning"	Language: English Book material: eBook Publish date: 2011-2021	14	8	guidebooks and study books excluded	7
JAMK Library (Janet)	"knowledge management" AND "organizational learning"	Language: English Book material: Book Publish date: 2011-2021	3	1	guidebooks and study books excluded	1[1]

[1] previous edition available as ebook

Appendix 2. Information seeking report, articles

Database	**Search terms**	**Filters (inclusion criteria)**	**Results total**	**Results potential (after pre-filtering)**	**Additional filters (inclusion criteria)**	**Results used (final)**
EBSco Business Source Elite	"knowledge management" AND "organizational learning" (subject term)	Full text (availability); Peer reviewed (reliability, quality); Publish date: 1.1.2016 - 30.4.2021 (novelty)	21	6	both subject terms as keywords, relevant topic, relevant context, high-quality publisher	3 + 1[2]

[2] "+1"means that search results included a briefing about an article and the actual article was also selected as source material

Database	**Search terms**	**Filters (inclusion criteria)**	**Results total**	**Results potential (after pre-filtering)**	**Additional filters (inclusion criteria)**	**Results used (final)**
ProQuest ABI/ INFORM	"knowledge management" AND "organizational learning" (mainsubject)	Full text Language: EN (availability) Peer reviewed Source type: Scholarly Journals Document type: Article (reliability) Publish date: 1.1.2016 - 10.4.2021 (novelty) Publisher: Emerald	66 The Learning Organization: 38 pcs; Journal of Knowledge Management: 21 pcs; Development and Learning in organi-zations: 7 pcs	13	both search terms as keywords (main subject), relevant topic, relevant context, high-quality publisher	4 + 1[3]

[3] "+1" means that search results include a briefing about an article and the actual article was also selected as source material

Database	**Search terms**	**Filters (inclusion criteria)**	**Results total**	**Results potential (after pre-filtering)**	**Additional filters (inclusion criteria)**	**Results used (final)**
Emerald Insight	"knowledge management" AND "organizational learning" (in abstract; no possibility to filter by keyword or main subject)	Content type: article (reliability) Only content I have access to (availability) Publish date: 2016-2021 (novelty)	43[4]	3	both search terms in abstract, relevant topic, relevant context, high-quality publisher	1

[4] 12 pcs duplicate with ProQuest

Database	**Search terms**	**Used filters (inclusion criteria)**	**Results total**	**Results potential**	**Additional filters (inclusion criteria)**	**Results used (final)**
EBSco - Business Source Elite	"issue resolution" AND "technical support" (as subject terms or in abstract)	Full text (availability) Peer reviewed (reliability, quality)	0	0	-	0
ProQuest ABI/INFORM	"issue resolution" AND "technical support" (as "mainsubject")	Full text Language: English (availability) Peer reviewed Source type: Scholarly Journals Document type: Article (reliability)	0	0	-	0
Emerald Insight	"issue resolution" AND "technical support" (in abstract)	Content type: article (reliability) Only content I have access to (availability)	0	0	-	0

Database	**Search terms**	**Used filters (inclusion criteria)**	**Results total**	**Results potential**	**Additional filters (inclusion criteria)**	**Results used (final)**
EBSco - Business Source Elite	"knowledge management" AND "organizational learning" AND "technical support" (as subject terms)	Full text (availability) Peer reviewed (reliability, quality)	1	1	all search terms as subject terms, relevant topic, relevant context, high-quality publisher	1
ProQuest ABI/INFORM	"knowledge management" AND "organizational learning" AND "technical support" (as "mainsubject")	Full text Language: English (availability) Peer reviewed Source type: Scholarly Journals Document type: Article (reliability)	0	0	-	0
Emerald Insight	"knowledge management" AND "organizational learning" AND "technical support" (in abstract)	Content type: article (reliability) Only content I have access to (availability)	1	0	both search terms in abstract, relevant topic, relevant context, high-quality publisher	0

Database	Search terms	Used filters (inclusion criteria)	Results total	Results potential	Additional filters (inclusion criteria)	Results used (final)
EBSco - Business Source Elite	"knowledge management" AND "technical support" (as subject terms)	Full text (availability) Peer reviewed (reliability, quality)	5	2	both search terms as keywords, relevant topic, relevant context, high-quality publisher, publication year	2
EBSco - Business Source Elite	"knowledge management" AND "technical support" (in abstract)	Full text (availability) Peer reviewed (reliability, quality)	5	3	both search terms in abstract, relevant topic, relevant context, high-quality publisher, publication year	2
EBSco - Business Source Elite	"organizational learning" AND "technical support" (as subject terms)	Full text (availability) Peer reviewed (reliability, quality)	2	1	both search terms as subject terms, relevant topic, relevant context, high-quality publisher, publication year	1

Database	Search terms	Used filters (inclusion criteria)	Results total	Results potential	Additional filters (inclusion criteria)	Results used (final)
EBSco - Business Source Elite	"organizational learning" AND "technical support" (in abstract)	Full text (availability) Peer reviewed (reliability, quality)	0	0	-	0
ProQuest ABI/INFORM	"knowledge management" AND "technical support" (as "mainsubject")	Full text Language: EN (availability) Peer reviewed, Source type: Scholarly Journals, Document type: Article (reliability)	4	1	both search terms as keywords, relevant topic, relevant context, high-quality publisher, publication year	1
ProQuest ABI/INFORM	"knowledge management" AND "technical support" (in abstract)	Full text Language: EN (availability) Peer reviewed Source type: Scholarly Journals Document type: Article (reliability)	4	1	both search terms in abstract, relevant topic, relevant context, high-quality publisher, publication year	1

Database	**Search terms**	**Used filters (inclusion criteria)**	**Results total**	**Results potential**	**Additional filters (inclusion criteria)**	**Results used (final)**
ProQuest ABI/INFORM	"organizational learning" AND "technical support" (as "mainsubject")	Full text Language: EN (availability) Peer reviewed Source type: Scholarly Journals Document type: Article (reliability)	0	0	-	0
ProQuest ABI/INFORM	"organizational learning" AND "technical support" (in abstract)	Full text Language: English (availability) Peer reviewed Source type: Scholarly Journals Document type: Article (reliability)	1	0	both search terms in abstract, relevant topic, relevant context, high-quality publisher, publication year	0

Database	**Search terms**	**Used filters (inclusion criteria)**	**Results total**	**Results potential**	**Additional filters (inclusion criteria)**	**Results used (final)**
Emerald Insight	"knowledge management" AND "technical support" (in abstract, no possibility to filter by keyword or main subject)	Content type: article (reliability) Only content I have access to (availability)	3	1	both search terms in abstract relevant topic, relevant context, high-quality publisher, publication year	0
Emerald Insight	"organizational learning" AND "technical support" (in abstract, no possibility to filter by keyword or main subject)	Content type: article (reliability) Only content I have access to (availability)	1	0	both search terms in abstract, relevant topic, relevant context, high-quality publisher, publication year	0

Appendix 3. Observation template

	A	B	C	D	E
1		Date	XX.XX.2021		
2		Observation event	Meeting - Level 3		
3		# observation event	1		
4		Time & place	Teams 09:30-11:00 AM		
5		# participants	X		
6		# cases discussed	XX		
7					
8					
9	**Topic #**	**Observation / Free text**	**Main concept**	**Subtheme / Code 1**	**Subtheme / Code 2**
10					
11					
12					
13					
14					
15					
16					

Codes for main concepts and subthemes

Main	**KM**	**OL**	**IR**	**Management**
KM	Share	Motivation	Experience	Role visible/strong
OL	Apply	Type	Experiment	Invisible/weak
IR	Create		Colleague	
Management	Quality		Manual	
Observer			Repository	
	Share	**Motivation**		
	between individuals (informal/tacit)	Positive/open/proactive		
	between individuals (formal/explicit)	Negative/defensive/passive		
	between individual & group (informal/tacit)			
	between individual & group (formal/explicit)	**Type**		
	between groups (informal/tacit)	Single-loop/short term		
	between groups (formal/explicit)	Double-loop/long-term		
	with service network (informal/tacit)			
	with service network (formal/explicit)			

	Apply			
	No			
	Yes, use as is			
	Yes, sort			
	Yes, categorize			
	Yes, recategorize			
	Create			
	Combine, unofficial			
	Combine, official			
	Modify existing, unofficial			
	Modify existing, official			
	Data analysis, unofficial			
	Data analysis, official			
	Quality			
	Sufficient, highly structured			
	Sufficient, less-structured			
	Insufficient			