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Rethinking knowledge hierarchies – bridging the gulf between theory and practice: the case of Frankfurt airport's billing department

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Abstract
This paper examines the value of concrete empirical data in enhancing our understanding of knowledge hierarchies (KHs). Theoretical debate has generated different insights and perspectives, but the term (KH) remains a misconstrued principle. In today's age of austerity, managing complex administrative processes in an airport billing environment, while striving for effectiveness and efficiency is challenging. These billing processes are influenced by the existing organisational KH. This study sheds light on the hybrid forms of KH: first, the theoretical impact: through data, information and knowledge as KH; second, the stakeholders' understanding of their role within business processes. The method adopted for this study is influenced by the nature of the problem to be addressed. It uses a qualitative approach, analysing the billing processes and conducting interviews to gauge the stakeholders' perceptions in order to demonstrate that there are significant variations in understanding organisational key roles.
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Introduction

The 21st century is truly a knowledge-driven age. Knowledge has not only enhanced the quality of life, but also improved standards of goods and services. There is extensive literature on the development and implementation of knowledge management (KM) and the role of knowledge hierarchies (KHs), as organisations and institutions are undergoing transformational change and restructuring to alleviate and absorb the pressure of the global recession. There are a number of debates and models in the literature regarding the most effective application. Organisations have come to understand the importance of KM and KH and have applied various techniques and processes to enhance organisations' capabilities to give them a competitive edge, such as organisational KM, process re-engineering and total quality management (TQM). This study acknowledges the need for a rethinking of the core elements of KH, such as data, information and knowledge (DIK) processes and their interaction within the ever-changing work environment to enable agile and proactive decision making. Although there is substantial literature regarding KM, KH and DIK, it can be argued that the pace and magnitude of global economic change has recently increased significantly, therefore this paper's contribution to the debate seems to be all the more

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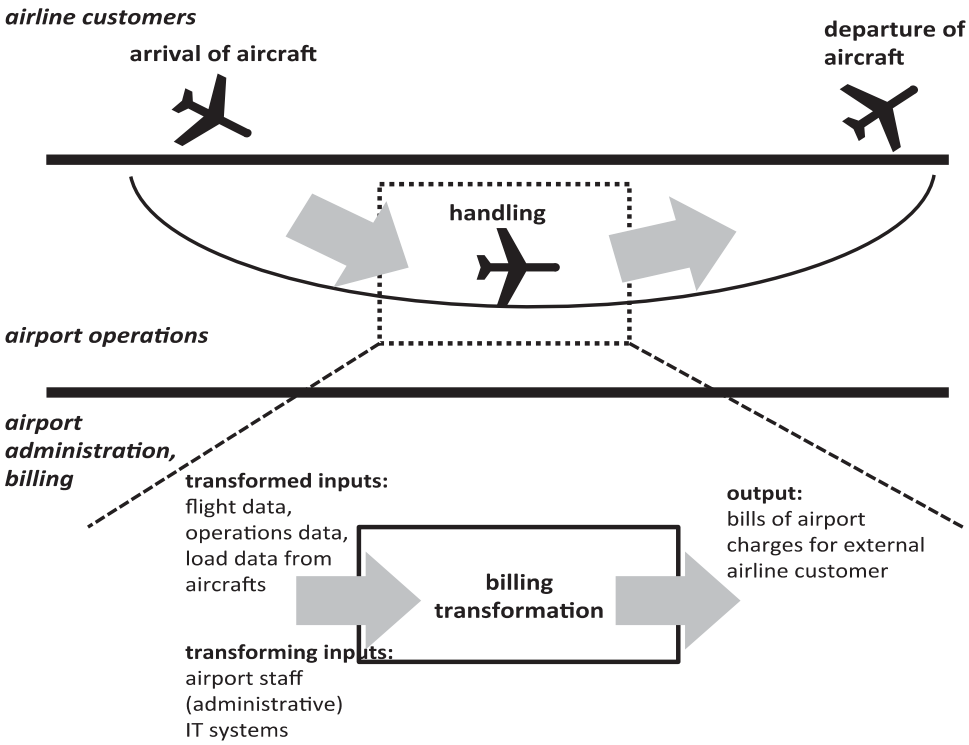


Figure 1 Input–output model at Fraport.
Source: Fraport internal documents, Evers R., REW RP 2010.

pertinent. The importance of 'knowledge management', an umbrella term, as a management resource puts it on the top of the agenda for many companies. Managing organisational and process knowledge across different IT systems in airport billing is becoming a constant challenge. Process specifications, enhancements of a customer-related process design and the internal company needs for effectiveness, cost reduction and increasing process complexity are the main issues that must be addressed. These elements are shown in the following organisational KH. The company related hierarchy consists of two connected streams: first, there is the business process, which deals with routine tasks, IT coding and programmes. This includes the three DIK elements. Second, there is the usage of skills that involves 'knowing how, what and when' in the employees' minds. Within that, the application and definition of DIK supports the business practice. The key question this paper raises is how to deal with these two connected but independent spheres: business processes and DIK elements as virtual sets, and business employees as enablers and implementers of business processes and interpreters of DIK elements. Therefore, the key objective of this paper is to extend the debate regarding DIK elements beyond platitudes by focusing on the links between tacit and explicit knowledge and their relationship and positioning to KH. It argues that a successful implementation of KM requires the application and effective understanding of KH in order to sustain and boost Fraport's (Frankfurt airport's) competitive edge. Fraport's billing department appears to possess diverse KM and KH building blocks. However, it lacks the coordination, awareness and structure to ensure the consistent application, embedment and sustainability to make KH and the DIK elements part of Fraport's way of doing business, in order to deal with the increasing technical complexities and difficult operating challenges. The selected billing department includes typical complex DIK elements as business service activities. Core elements of the business processes are DIK input, transformation and output procedures, as illustrated in Figure 1.

The billing process itself is part of the service and is embedded in operational processes. The coherence between processes and knowledge in firms is extensively discussed and debated in various models in the literature. Throughout business activities, the input–output model for processes provides a vehicle for thinking about processes applied to the creation and transfer of knowledge (Armistead, 1999). This shows the importance given to knowledge and transparency about processes in administrative services.

Literature review and discussion

The scope and depth of theories of organisational knowledge creation (Nonaka, 1994) vary from the focus of creation, based on the perspective and positioning of firms as knowledge creating entities (Nonaka *et al*, 2000), the role of the individual, defining and expressing knowledge as tacit and explicit, to organisational focus and conversions such as information, communication and technology (Hislop, 2009), to descriptions of a fluid mix of

embedded experiences and information in organisational routines and processes (Davenport & Prusak, 2000). In recent debates, the views about knowledge sharing have been described as having a two-faced Janus nature (Cockrell & Stone, 2010) and KM as a fashion (Hislop, 2010). Further interlinked areas examine the elements of KHs (Braganza, 2004), forms of KH (Hicks *et al*, 2006) and critics regarding hierarchies (Frické, 2009). In other publications, the discussion focuses on the perspective of systems, innovation and organisational learning (Liao & Wu, 2010). In addition, the role and focus of KM as a framework for enterprise purposes have also been researched but without shedding any new light on the debate (Gudas, 2009). The discussion regarding the conception, interpretation and implementation of the DIK hierarchy as a data, information, knowledge and wisdom (DIKW) hierarchy is still generating interest but with little practical implication. Similarly, the understanding and shaping of the term-definition DIK still engender conflicting views (Tuomi, 2000; Hicks *et al*, 2006; Rowley, 2007; Zins, 2007; Rowley & Slack, 2009; Aven, 2013).

KM and business processes

As far as the airport industry is concerned, the debate clearly reveals the effects of the current usage of KM within business administrative processes, for example, the impact of complex and high-risk operational activities, connectivity and lack of explicit procedures and role descriptions. In addition, the existing company culture and history (Frankfurt Airport celebrated its 75-year anniversary in 2011) has a direct bearing on the management of knowledge. Furthermore, the aviation sector criteria of organisational processes and employees' behaviours are under constant pressure to reduce costs. In general, the business interest in KM and KH could be summarised in the following statement:

> *… is being conditioned by several driving forces:*
>
> - *Recognition of how difficult it is to deal with complexity in the business environment;*
> - *Interest in core competencies, their communication, leverage and possible transfer;*
> - *Issues concerning the dissemination of company knowledge in world-wide distributed companies;*
> - *Rapid development and adoption of ICT; and*
> - *Company awareness of issues concerning individuals' knowledge and its externalisation and formalisation.* (Kalpic & Bernus, 2006, p. 53)

The above points are relevant to the present Fraport billing department if the management wishes to witness a qualitative transformation, as the complexity, transfer and dissemination across the business constitute obviously influencing factors. The combination of both business processes and acting employees indicates clearly the importance and urgency of managing the current complexity. It illustrates a potential gap between business practice and KM theories. While business practices can be characterised as focusing on action and results, and thus are more short-term oriented, KM theories, in contrast, focus on delivering rigour in models and setting up standards with a long-term perspective. This illustrates parts of the dilemma between business and academia: business and firms require immediate solutions. In contrast, the academic world takes time to adequately develop and test models. Evidence shows that the gap between academia and management grows wider each year, as researchers tend to make theoretical and methodological choices that result in limited practical application. The current short-termism approach in the way businesses are run further complicates matters.

KH discussion

The application of KHs constitutes a challenging prerequisite for practical conversion. Different frameworks and models exist because of the different definitions and types of knowledge. From the beginning of KM research, the importance of distinguishing between data, information and knowledge has been addressed (Tuomi, 2000). Similar to other fields of KM, the underlying assumptions and concepts of the KH are widely debated and different insights and interpretations are provided. In particular, the terms data and information spilled over to other fields of academic research: information science, technology, IT, TQM and re-engineering. A further challenge for KM is the need for an interdisciplinary approach. Referring to the business perspective, process data and information systems are often described as consisting of facts and figures. In contrast, knowledge as a term itself can be distinguished in several sub-fields. Thus, the common concept of the KH includes three elements: data, information and knowledge, while a fourth element, 'wisdom' is often added, to create a DIKW hierarchy (Davenport & Prusak, 2000; Tuomi, 2000; Hicks *et al*, 2006; Rowley, 2007; Zins, 2007; Rowley & Slack, 2009; Aven, 2013). The debate highlights the crucial dilemma regarding the concept of hierarchy. If there is no common understanding about the content, or in particular the meanings of the core terms, how can a hierarchy therefore exist? Furthermore, how can the debate contribute to the application within business practice? Since the beginning of the hierarchy development, the discussion focused on the classification, characteristics and the flow within the hierarchy terms. As a result, one criticism of the knowledge pyramid is that information is more extensive than data, and in many instances logically stronger (Frické, 2009). The statement links to the content and the underlying foundation of the billing department aims: process data and information systems.

KH elements

Similar to the discussion regarding the characteristics and descriptions of explicit and tacit knowledge, the DIK and DIKW terms carry different shades of meaning. The discussion varies from short criteria-descriptions, which are

Table 1 The characteristics of DIK

Literature sources and their main perspective	*Data*	*Information*	*Knowledge*
As a metaphor (Zeleny, 1987, p. 60)	Know-nothing	Know-how	Know-what
Theory of organisational knowledge creation (Nonaka, 1994)		*Information* is a flow of messages	*Knowledge* is created and organised by the very flow of information, anchored on the commitment and beliefs of its holder
With focus of DIK measures (Gawron, 2000)	*Data* usually means a set of symbols with little or no meaning to the recipient	*Information* is a set of symbols that does have meaning or significance to the recipient	*Knowledge* is the accumulation and integration of information received and processed by a recipient
Specification from a best practice and customer perspective (Smith *et al*, 2006)	Customer *data* is the recording of transactions or interactions with customers, quantitatively or qualitatively, explicitly or implicitly	Customer *information* is data that has been organised into patterns	Customer *knowledge* is information that has been placed into the context of the relevant situation
Research summary about common understanding regarding DIK definition (Rowley, 2007, pp. 170–172, excerpts)	• *Data* has no meaning or value because they are without context or interpretation • *Data* is discrete, objective facts or observations, which are unorganised and unprocessed, do not convey any specific meaning • *Data* items are an elementary and recorded description of things, events, activities and transactions	• *Information* is formatted data, (and) can be defined as a representation of reality • *Information* is data that adds value to the understanding of a subject • *Information* is data that has been shaped into a form that is meaningful and useful to human beings • *Information* is data that has been organised so that they have meaning and value to the recipient • *Information* is data processed for a purpose	• *Knowledge* is an intrinsically ambiguous and equivocal term • There is still no consensus on the nature of *knowledge*, except that it is based on perception that can still provide a rational justification for it • *Knowledge* is the combination of data and information, to which is added expert opinion, skills and experience, to result in a valuable asset that can be used to aid decision making • *Knowledge* is data and/or information that have been organised and processed to convey understanding, experience, accumulated learning and expertise as they apply to a current problem or activity
View in computational space (Chen *et al*, 2009, p. 13)	Computerised representations of models and attributes of real or simulated entities	*Data* that represents the results of a computational process, such as statistical analysis, for assigning meanings to the data, or the transcripts of some meanings assigned by human beings	*Data* that represents the results of a computer-simulated cognitive process, such as perception, learning, association, and reasoning, or the transcripts of some knowledge acquired by human beings
Specification from a risk perspective (Aven, 2013)	• Observational *data* • Expert judgement	• Estimates, predictions, assumptions that the analysis is based on	• Having a good understanding of the potential hazards/threats, their potential consequences and how professional risk analysts judge their overall risk • Understanding the result of the risk assessments, and what the overall approach is able to do and what its limitations are

Sources: Zeleny, 1987; Nonaka, 1994; Gawron, 2000; Rowley, 2007; Chen *et al*, 2009; Aven, 2013.

more focussed and narrowed (→data = symbols) to specific and detailed classifications (→data = defined as symbols that represent properties of objects, events and their environment. They are the products of observation). This comparison shows the broad range and the different views related to DIK and DIKW.

Table 1 illustrates a collection and comparison of different perspectives and characteristics related to DIK.

Parallel to the discussion shown in Table 1, the school of the 'reversed hierarchy' has been developed. Within that approach, the hierarchy elements and linkage to business processes start with knowledge, then information

Table 2 The characteristics of KID

Literature sources and their main perspective: reversed hierarchy/critique	*Knowledge*	*Information*	*Data*
Tuomi (2000)	*Knowledge* has a close connection to bits stored in computer memory. Indeed, the whole knowledge-based economy can then be reduced to 'information-economy' … (Tuomi, 2000, p. 115)	*Information* can be created only after there is *knowledge* (Tuomi, 2000, p. 115) *Information* can be defined as 'anything that can be digitised' (Tuomi, 2000, p. 115)	*Data* emerges as a by-product of cognitive 'artefacts' that assume the existence of socially shared practice of using artefacts (Tuomi, 2000, p. 115) *Data* emerges last – only after knowledge and information are available (Tuomi, 2000: 107)
Braganza (2004, p. 355)	*Knowledge* is used to achieve higher order organisational strategies and is located in each cross-functional business process	*Information* is used to exploit opportunities and solve problems and is located in one or more work practices	*Data* is fundamental to both, as they are elements derived from information.
Frické (2009, p. 140)	For an account of *knowledge*, as explained above, information science should use a propositional account of knowledge, that is, knowledge-that, and then the use the notion of weak knowledge. This makes knowledge and information synonymous. Knowledge and information collapse into each other.	*Information* is both more extensive than data and many instances of it are logically stronger than data. Information is irreducible to data	All *data* is information. However, there is information that is not data. Almost all of science is information, but, in most contexts, it is not data.

Sources: Tuomi, 2000; Braganza, 2004; Frické, 2009.

and then data (KID). In the following table, the main perspectives of the revised KH (KID) have been collected and compared (Table 2).

KH concepts: DIK vs KID

Although these models are widely accepted, the varying contents and perceptions regarding KHs show some constraints due to the link to the vague hierarchies' definition. Despite the popularity of KH, the flow from data to information to knowledge is not universally accepted (Nold, 2011). The literature has also highlighted inconsistencies and conflicting viewpoints. It seems to have overlooked that KH are influenced by the country, environment and the institution or organisation in which they operate. As an example within the billing processes, the collected flight data will not independently convert themselves into useful billing information and then subsequently and automatically change to customer-transparent and measurable invoice knowledge. It was stated as an argument for KID that the process of the hierarchy should be treated while data emerges (Tuomi, 2000). The above argument suggests that the process depends on crucial factors like the influence of actors. These actors in complex business processes can be people and customised IT systems. In other words, knowledge exists in the minds of individuals and becomes information when articulated and shared and then converted to data (Nold, 2011). The comparison of these arguments with the existing reality in airport billing processes – see Figure 2 – shows the practical dilemma: a mass of data running through systems and directed, changed and led by human beings. Therefore, the application of models in business is faced with people interacting with their individualism and the company as a powerful organisation with an inherent culture. Thus, a harmonious engagement and transparent KH structure involving all the stakeholders is paramount. In further discussions, the classic bottom-up approach of DIK has been changed to a top-down model. The content of this model is the revised character formed by changing the pyramid from bottom to top: everything starts with the knowledge context as a process, followed by the information context and the derived data from information (Braganza, 2004). To summarise the discussion, the three hierarchy models are illustrated in Figure 2.

When contrasting and comparing these models, two ideas can be highlighted. First, the bottom-up approach can be described as rooted in traditional IT methods and begins typically with requirements (Braganza, 2004). This shows a further link and source of KM science as the technical part is based on process and organisational science. Second, the extended top-down approach can be described as a concept, which is reorganised to be top-down, with knowledge leading to information and subsequently determining data (Braganza, 2004). In contrast, the five-tier exchange and extension model shows a more embedded approach. In this case, the model seems to be more enterprise applicable because it involves the global business change, which is more complex than the

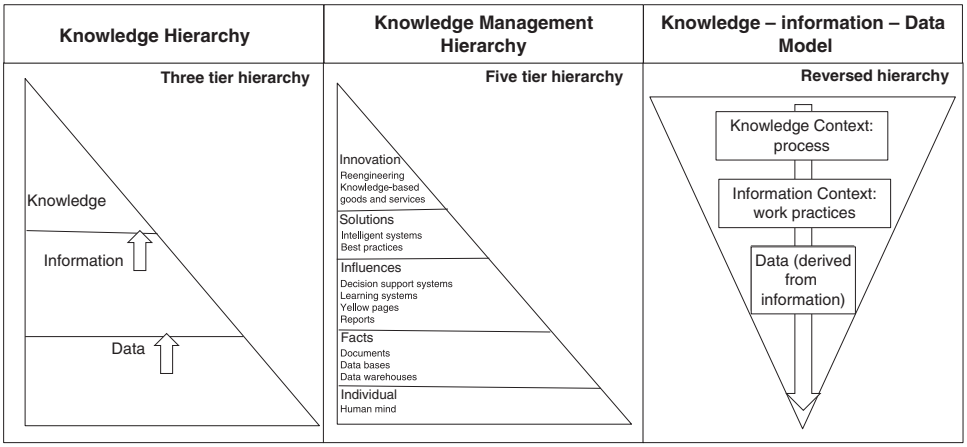


Figure 2 Model of KM hierarchy.
Source: Hicks *et al* (2006, pp. 20, 22): The five tier knowledge management hierarchy; Braganza (2004, p. 349): Rethinking the data-information-knowledge hierarchy.

previous three-tier model. However, the three-tier model appeal is because of its simplicity. The reverse concept focuses more on the main content of knowledge due to the top-down approach. The comparison of these models shows the development of the hierarchy models and the fundamental distinctions in the starting point of analysis and therefore the appliance of KHs in general. The bottom-up is more applicable for collecting within process design steps. In contrast, top-down is often in use for target setting and clarification in general. Therefore, a 'whether' or 'not' approach is not adaptable. A further argument against the reversed model is that it does not solve the main problem of clarification regarding the distinct meanings. From a business perspective, the usage depends on specific process needs. The weaknesses of both theories (different meanings, application within the model context) can be reduced by mixed application. In addition, the application of business routines and group interactions is also important within the hierarchy context (Lazaric & Raybaut, 2005). An opposite view to the illustrated KHs has been developed with the aim of 'abandoning' the concept of DIKW (Frické, 2009). It has been argued that the concept of data relies on the two features, truth and certainty (Frické, 2009). In the light of this argument, the basic concept about 'truth within data' has been challenged. Therefore, it has been argued that data is not known for being true, is fallible and includes mistaken, incorrect and invalid data (Frické, 2009). From a business perspective, all these arguments are true in relation to the possibility of invalid and incorrect data. From a billing process perspective, if the number of transfer passengers and origin passengers is incorrect, the bill is incorrect. The knowledge and information about the process elements of distinct numbers of passengers can be described as true and worthy to know in general within a knowledge and business process perspective. Therefore, to abandon KHs because of so-called weak knowledge (Frické, 2009) is not sufficient from a business process perspective. From the discussion above regarding the business processes, it could be concluded (for KHs and the SECI model) that the interdependencies between the hierarchy elements (data, information, knowledge) depend on employees' understanding of their role as business process performers and knowledge owners of the embedded practices and routines in billing. The influence of business information systems and procedures is shown in the extension of the DIKW (Rowley, 2007). Similar to the five-tier hierarchy development (Hicks *et al*, 2006), the mapping system developed (Rowley, 2007) tries to include the main driver 'IT' and influencing element 'Complexity' from business practice. In summary, the broad discussion over more than 10 years within that specific field shows the need for bridging the gulf between theory and business practice.

Research methodology and methods

Research methodology

The rationale for adopting an interpretivist/qualitative approach stems from the nature of the problem that this study aims to address and is in line with the study objective that is to investigate the influence of the department merger and subsequent business process changes within the KH. As the case is dealing with non-measurable issues that are not generalisable, assessing billing processes and perceptions and opinions of stakeholders of an individual company, and in order to analyse the KH in depth, a qualitative approach is deemed appropriate. The research strategy applies the method of the exploratory single case study. The centralisation of the three departments has been managed in a project that covers the development of a process inventory to fulfil the completeness requirements (accounting standards). The case study investigates the project activities from the KM point of view by analysing the outcome of process meetings by carrying out interviews with the participants (Table 3).

Table 3 Methodology of the research

Methodology	*Research approach*	*Research design*	*Content*	*Interviewees/stakeholder groups*	*Process-structured departments*
Interpretivist	Qualitative and inductive research	Case study	Study of KM impact on change and process development over the time	Billing experts: 5 Product process supervisors (PPS): 5 Management: 4	AC – Airport charges GH – Ground handling OS – Other services

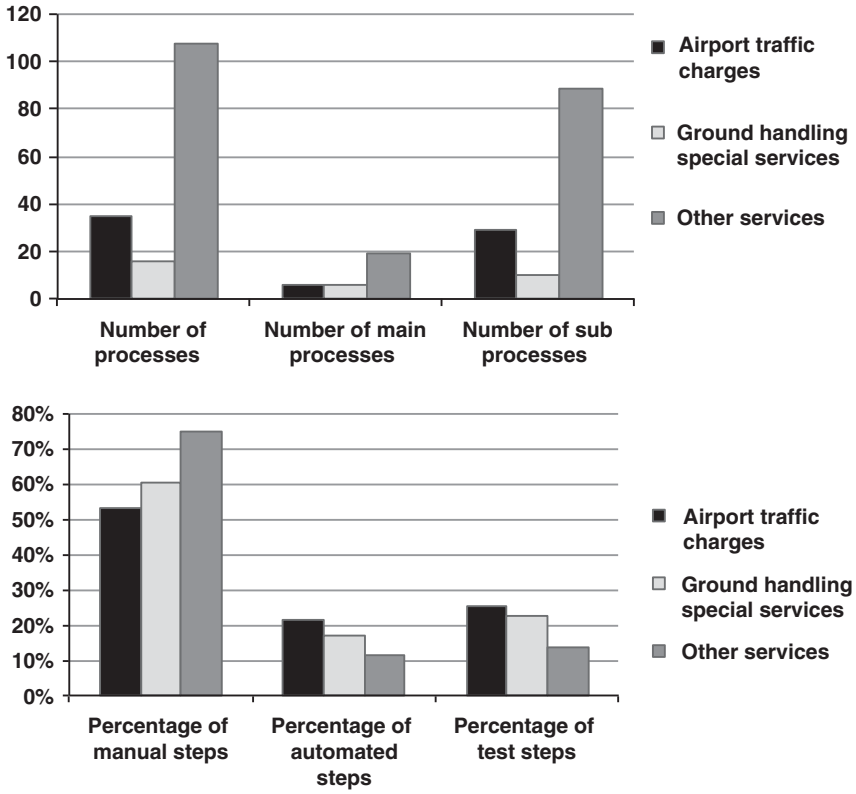


Figure 3 Process statistics.

Research process

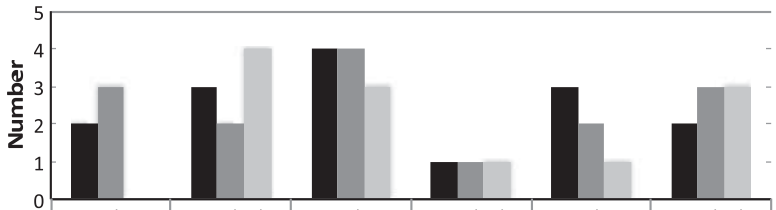
Sources of evidence for the data collection are interviews, documentations and archival records. Closed and open questions of semi-structured interviews have been analysed by descriptive statistics and content analysis. The triangulation with results of recent studies increases the reliability of the outcomes. Employees who were involved (billing experts, PPS and management) have company experience ranging from 3 to 35 years. The researcher himself is part of the company as the department leader. The data collection method used interviews as the main data source. The interviews were conducted over the period of February–June 2012 and involved a total of 14 participants. The interviews consisted of a structured list of mainly closed questions, which were in line with the nature of the problem and the research objectives. In cases where the participants were asked about their perceptions, experiences and opinions, a 7-point scale has been applied. While 1 represents the response 'I totally agree', 7 represents 'I totally disagree'. The data analysis uses boxes at the top ('I totally agree' and 'I partially agree') and at the bottom ('I totally disagree' and 'I slightly disagree'), which indicates a definite agreement or definite disagreement. For the specific question of this paper, the qualitative outcomes of the interviews have been contrasted with the theoretical debate by using tag clouds and word analysis.

Findings and conclusion

Complexity of billing processes in the airport industry

One result of the study includes a complete set of the billing department processes. This covers the processes of all three areas and the extracts of shared tacit knowledge from a group-based experience. The outcome is highlighted in Figure 3.

The high and varying numbers of processes, sub-processes (25–110) and steps demonstrate the high level of



	AC - low resp.	AC - high resp.	GH - low resp.	GH - high resp.	OS - low resp.	OS - high resp.
Billing expert	2	3	4	1	3	2
PPS	3	2	4	1	2	3
Management	0	4	3	1	1	3

Figure 4 Process responsibility.

Table 4 Individual definitions of KH content

Group	*Data*	*Information*	*Knowledge*
Billing expert	Master points and news to create an invoice in combination with information and knowledge	Information is something someone asks for to get an answer for the customer from the customer service centre	Knowledge is to know how the billing system works and the things everyone has in mind
	Data is the basis or the input needed	Information is a combination of data and the missing input to create an invoice or to execute the billing process	Knowledge is to know what to do with the combination of data and is what we need to get a good output out of billing and services
	Data is the input that comes from the GH department	Information is learning	Knowledge is to know the components that influence each other; therefore knowledge is experience
PPS	Master data of the billing process like aircraft types or pricing per airlines	Categories of customers like airlines, government and others	Quality within the billing process Low number of claims Automation of process steps
	System-related electronic information Transfer into ERP system by interface or manually	All kind of relevant and needed data (verbally or on paper) to fulfil the given task correctly and efficiently	Combination of data, information, personal and professional experience of the employee
	Countable, measurable data like aircraft types, slots, prices for specific services	Additional necessary information to execute the process ('on top' of relevant data)	Notices that enable the handling of several process steps How to use data/information in the preparation of an invoice
Management	Data is all necessary inputs for flights	Information is the way of bringing data together	Process of billing
	Certain details that are relevant for the billing process	Information is a set of data	Knowledge is data, information and to know how to process
	Raw data and all requested figures without subjective influence	Information is part of the data box	Knowledge is to know how to combine the data with the information, the result is the doing Knowledge are elements of experiences to manage the billing process

complexity. An unexpected outcome was the broad difference in process numbers and the percentage of steps. This shows fundamental distinctions between the three centralised billing areas (airport charges (AC), ground handling (GH) and other services (OS)).

Billing process knowledge by stakeholders

For the analysis of the stakeholders' perceptions regarding the different billing processes, it is important to clarify their knowledge about these processes. The explicit knowledge has not been directly identified. It can be derived from the responsibilities of the involved stakeholders, which they have mentioned during the interviews. Figure 4 illustrates the statistical outcomes regarding the responsibility of the stakeholders concerning the three billing process types (AC, GH and OS).

Application of the KHs to billing processes

To examine the different descriptions and perceptions regarding the KHs, the participants were asked to give their definitions of the hierarchy terms – DIK – in the context of the developed processes. First, they described in their own

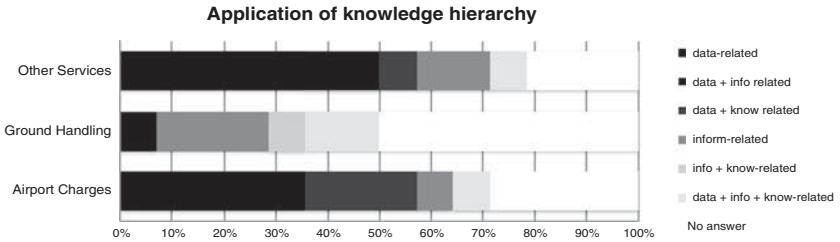


Figure 5 Application of KHs to billing processes.

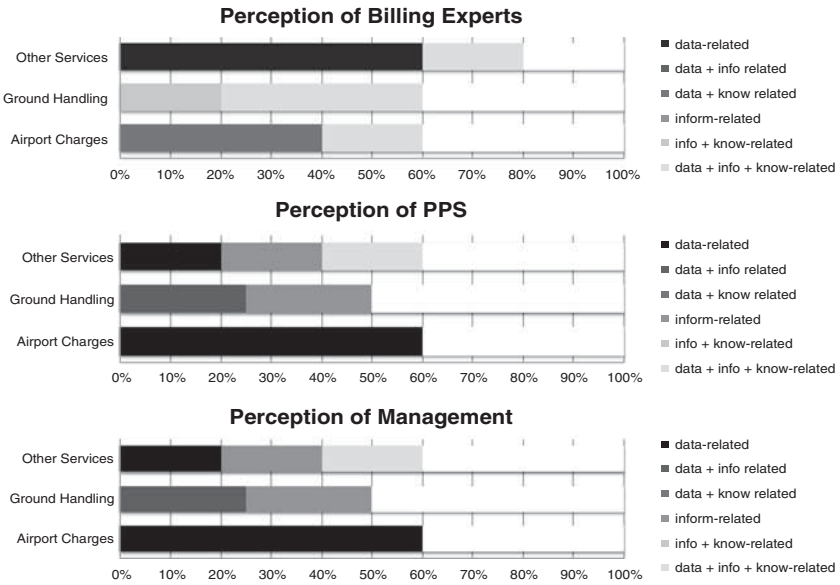


Figure 6 Variation of KHs to billing processes.

words the definitions (audio record). Afterwards, they had to summarise the main content (written statement). Some written results from each group are illustrated in the following table (Table 4).

The different descriptions regarding the terms DIK showed some interesting insights. First, the data description is mainly focused on the master data and systems. Second, the information definition is based on data and covers the need to fulfil the given process task. Third, the knowledge description summarises the quality, combination and usage of data and information. A further outcome is the fact that the order of DIK as the three-tier hierarchy is logical. Therefore, it could be concluded on the basis of the above evidence that the revised hierarchy model and the five-tier model seem difficult to put in practice. In other words, from the perspective of the interviewees, the definition is strongly related to the business processes. Therefore 'data' consists of billing master data, 'information' consists of relevant and needed data (so far, enriched data) and 'knowledge' describes the how-to-use (the column description in the process inventory includes the first transfer to codified explicit knowledge). Furthermore, the participants were asked to explain all sub-processes in general and in detail, if the process is more data-related, information-related, knowledge-related or a combination (Figure 5).

The findings suggest, as highlighted earlier, that the knowledge about the GH services is not adequate enough to evaluate these processes. More than 50% of the participants gave the response 'no answer'. AC and OS billing processes depend mainly on the database provided. The combination of data with information and knowledge determines the billing processes in the perception of the majority of the participants (60%). There is no billing process in general that depends solely on knowledge. The importance of information is higher than the knowledge for the billing of AC and OS. The results for the billing processes of GH are quite different. They are more information-related and depend on the combination of information and knowledge.

Variations of KHs by organisational groups

In the next step, the perceptions regarding the KHs have been analysed by the organisational levels. There is clear evidence that the perceptions of the billing experts differ from the view of the management and the product process supervisors. In particular, AC seems to be more 'mixed' in relation to DIK from billing experts' views. This shows a significant change in perception depending on the organisational role within the company (Figure 6).

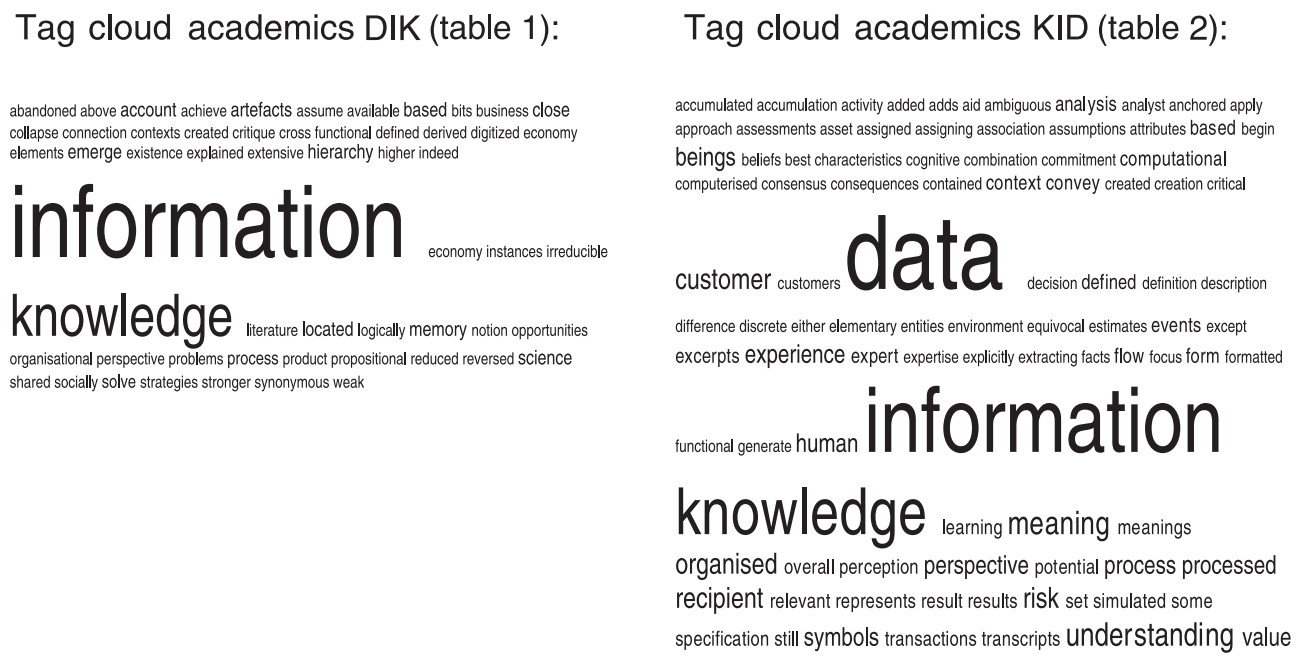


Figure 7 Tag cloud DIK *vs* KID.

Figure 8 Tag cloud interviewees.

Comparison of KHs by tag clouds

To illustrate the different perceptions in regards to KH, the main statements from academics' and interviewees' perspectives were transferred into tag clouds (usage of NVIVO). First, a tag cloud to compare the theoretical discussion between DIK and KID was developed (Figure 7).

As illustrated in the tag cloud, the main difference between the DIK (left) and KID (right) is mainly in the consideration of the term 'data'. Similarities are within the positioning of 'information', which in both concepts is clearly the main driver. A second tag cloud covers the statements of the interviewees. The content is the written statements from the 14 interviewees (Figure 8).

The comparison of the tag clouds extracted from the interviewees shows two effects: first, KH similarities to the KID model, referring to the balance of 'data' and 'information'; second, for practitioners the term 'knowledge' itself seems to have a lesser importance. In addition, the terms

'data' and 'information' are the most frequently used. Therefore, it could be stated that these two characteristics are the most important from a business perspective.

Limitations

It is generally accepted that any research is by its nature limited. This limitation applies to this research, because the chosen organisation with its billing department determines the outcome. Therefore, the generalisation of this study is limited to those companies with a comparable environmental situation. Another concern is the lack of rigour, because there are no systematic common procedures setting out how a case study should be conducted. This research took an overall approach to the theme KM for one company. By combining the outcome with academic studies undertaken in this field, a comparison with other research outcomes can be made. A general limitation for this research has been the time constraints regarding the number of conducted interviews. The organisation and execution of 14 interviews of about 1 h each has been challenging. Although the number of interview partners has been discussed and defined during the non-random sampling with the department leader, the review of the interview results raised suspicion that the selected participants and their knowledge limited the outcome.

Conclusion

This paper has an academic value as it expands the KM- and KH-related literature. A contribution to knowledge has been achieved by enriching the research area through providing fresh insights regarding the correlation between KH definitions and the organisational level. Despite the broad range of perceptions regarding DIK/KID, some interesting similarities between theory and practice occur: first, the term 'information' has an extremely important role. This evidence was shown in the interview statements when information was described as 'is a set of data' and 'something someone asks to get an answer', as well as the tag clouds. Furthermore, the argument that knowledge and information collapse into each other (Frické, 2009) has been verified by statements like 'combination of data, information, personal and professional experience of the employee'. The results concerning the importance of information in practice are also similar to the findings of Rowley (2007) and Chen *et al* (2009). The current academic discussion could be extended by including the views of the managerial level of employees. This leads to additional practical implications involving developing and setting up a framework for the knowledge sharing process at Fraport, which will consider the different understandings of the processes regarding the data-related, information-related and knowledge-related perceptions of billing processes.

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