IT Management:
How IT Managers Gain IT knowledge

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Abstract—It is not a secret that, IT management has become more and more and integrated part of almost all organizations. IT managers posses an enormous amount of knowledge within both organizational knowledge and general IT knowledge. This article investigates how IT managers keep themselves updated on IT knowledge in general and looks into how much time IT managers spend on weekly basis searching the net for new or problem solving IT knowledge. The theory used in this paper is used to investigate the current role of IT managers and what issues they are facing. Furthermore a research is conducted where 7 IT managers in medium sized and large Danish companies are interviewed to add further focus on the role of the IT manager and to focus on how they keep themselves updated. Beside finding substantial need for more research, IT managers – generalists or specialists – only have limited knowledge resources at hand in updating their own knowledge – leaving much initiative to vendors.

Keywords—CIO, information Technology, Knowledge, Management, Organization

I. INTRODUCTION

IT management and IT managers – represented by CIO's, CTO's and various other titles – are supposed to be updated, aware and knowing when it gets to Information Technology (IT) for use in the enterprise. Plenty have been written on approaching or aligning the IT function and the IT management with the enterprise in general. But beside this important point, the issue arises on how IT managers themselves are kept updated with recent, relevant, pluralistic and balanced IT knowledge. Alternatively the IT manager will be more a general discussion partner for general management securing vendor contracts and some people management. The IT manager as any other specialist manager must always act out of a strong professional insight – unless the generalist approach is agreed.

The IT department in most companies is a department that is often disliked [14][20][16]. Every employee who has a deskjob faces from time to time some problems with their computer, and the first person to blame is the IT manager. The employees believe that the only purpose of the IT manager is to assist in fixing computers when they break down and the employees are irritated when the problem is not solved immediately.

The purpose of this paper is to create awareness around IT management and the manager to ad focus on how the IT manager spend his/her time.

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What is the role of the IT manager and how does the IT manager find solutions to problems where he/she is expected to possess expert knowledge? As IT managers are expected to know everything around IT from the employees how does that connect with the issue that more and more managers need to possess general project management and people skills when managing a IT department. When thinking on the above written it seems like IT managers are "super humans" that possess all skills who on one side possesses general people, planning, project and communication skills and on the other side has to possess extreme specialist IT knowledge. This paper adds focus on these issues and tries to develop an overview of the role of the IT manager. [18][15][21]

This paper is developed for the use on the MSc in technology based business development education. More specifically the paper is used in course "technology management" to create awareness on how the students are able to gain specific IT knowledge in their technology specialization projects.

The IT manager is in this article defined as a person who is the head of the IT department in a company. Moreover the IT department has to consist of more than 3 employees. This means that the IT managers interviewed in this paper have responsibility of three or more employees. The IT managers interviewed for this paper are employed in middle sized or larger Danish companies.

II. THEORY

In the theoretical development we have chosen to divide the section into two sub-sections. The first is concentrated on IT management in general and the second is concentrated on IT knowledge. This is done to provide a better overview of the theory section.

IT management in general – If we take a look at IT projects in general [6] states that there in IT projects hardly is any "winner" an IT project is a project that is expected to make things easier and it is only the IT manager who knows the complexity of the project. Many employees and executives do not have the necessary knowhow to assess the complexity of IT projects. The complexity of many IT projects, and other complex projects as well, is best described as a situation where many random things happen and the IT manager or project manager often cannot do anything to prevent them [6].

In connection to [6] it is also mentioned in [7] that Due to the rapid innovation within IT and the changes IT is facing the impact of IT in the business world is increasing. IT is creating

new services, reaching new markets and integrating new partners into a business model. [3] argues that the issues which a business managers faces are someway the same as the issues of an IT manager. This means that the IT manager is becoming a more and more public figure in the organization, which is a role that many IT managers have not been used to. Future IT managers need to leave their computer (comfort zone) in the future and start networking. [7] The boundaries between IT and business performance are becoming invisible. Workplaces are becoming decentralized, meaning that the world is our playground and changing organization becomes routine in a flexible and dynamic environment. This also means that IT managers have to focus on organizational change as well. In Denmark the salaries for IT engineers are high and Danish companies cannot afford the high salaries and many positions are outsources to Asia.

Outsourcing is all about what work gets done inside the IT organization and what gets farmed out. Outsourcing will force IT managers to find better ways to manage and motivate their IT staff, in order to minimize the disruptive effect outsourcing has. Outsourcing will accelerate the tilt toward a more business-focused organization, due to the fact that technical jobs are easiest to outsource [8].

Companies outsources different parts of the organization as a result of the world is becoming smaller and smaller. And as the world is becoming smaller the companies are becoming global and the organizations force management to reconsider how IT can be used for competitive advantage [4]. The rapid changing IT world force IT managers to develop an IT strategy. Unfortunately it is easier to think IT than to implement it. As mentioned the requirement for an IT manager is increasing, [4] has in their article mentioned 5 key issues for global information system management. These are language, culture & geography, systems development & support, legal regulations & enforcement and level of technology, all areas that needs to be considered when making an IT strategy. The choice of the written language is a small but jet a very important strategic task that has to be considered. If you are dealing with non-English speaking cultures, how do you make sure that they understand what you mean? Do you hire local employees to translate, and how do you know that their translation is correct? Another issue that might occur is within the level of technology, many of the areas where salaries are low the technology level is also lower than within western companies, and issues often occur if the level of technology is different.

IT management is facing a huge change regarding to the theory. The IT managers have to become more general and master many levels of management to conquer the challenges that the future holds. It is sometimes hard for IT managers to tell what is going on. In the aim of making rational decisions they need to know what they are talking about and therefore possess huge specialist IT knowledge. Therefore it is suggested [5] that IT managers team up with area experts to interpret the "data" and the IT managers can use commonsense in the decision making. In the empirical section below the interviewed are among other things asked if they see themselves as IT specialists or generalists.

In [12] and [24] it is discussed that IT managers should possess more business and corporate insight than actual technological insight. This track obviously eradicate the justification for IT management, which subsequently is regarded to be based on substantial technological insight. With [23] strong technological skills – and the metaskills of knowledge acquisition - are included to create successful innovations of the firm.

IT knowledge – When it comes to IT knowledge we have just seen that IT managers has to become more general regarding to the theory above. [6] states that IT management is related to security, you always have to prepare the best you can do, but you cannot build a bulletproof application. This is why IT managers always need to be on top of what is happening within IT. The question is then if IT managers are able to both be on top of everything or they can outsource knowledge areas which makes them able to see the larger picture. [6] also states that the best method within IT projects is to stay focused on what works best and choose the products that fits your needs. This also implies that first mover advantage within IT maybe isn't an advantage. The term second mover advantage might fit better for IT project where projects can be benchmarked up against earlier successes and failures. [5] states that IT-managers not always implement the latest IT software, but sometimes use a system that has been proven and a system that they know will work as promised. Further [5] also states that commonsense is an important ability to possess when new a new system is up for discussion. Commonsense should tell the IT managers if a new system is needed or not. They have to think about the bottom line, does the purchase of a new system benefit the company turnover? We believe that the answer to that specific question often is NO, but the purchase is based on trends and motivation for getting hands on the newest technology.

This is though only within projects, if we focus on long term strategy [8][12] points out the necessity of staying online, being aware of what is hot and what is not within IT. And further [8] states that the requirements towards IT managers are increasing as they needs to possess expert knowledge within IT and in the same time manage the department. IT knowledge and management therefore go hand in hand [9] states that every IT technology problem is also a management problem and the reverse. The importance of the connection between IT technology and IT management is enormous managers cannot manage without the technology and without the proper management the IT tool are useless [9]. In our opinion it is impossible to master both specialist and generalist knowledge at the same time. This gives us reason to think that maybe we should look at the IT department as a team where the department manager focuses on the general knowledge and outsources specialist areas to his/her employees. This is investigated further in the empirical research.

As mentioned above [3] states that managers faces the same managerial issues as business managers and if this is true their daily work might also be the same [24]. This means that IT managers need to focus on motivation, strategic planning, budget and so on. This makes us think that IT managers might not need specific IT knowledge, but instead project management knowledge and Human resource knowledge concerning motivation of employees. In relation to [5] the IT

manager does not need to understand specific technical IT issues, but need to know the purpose and the IT specialist/employer will provide him with valid data to base his decision on. If the above statement is correct the IT managers spend less time on gaining knowledge as they do on managing the team/department.

This is also an area that we believe is if huge interest; to figure out how IT managers spend their time at work. [10] states that Maintenance consumes most of the IT departments resources meaning that IT managers need to allocate a lot of resources in non developing areas. This is also an area which we will address much more focus on in the empirical section. When IT project goes wrong a lot of maintenance is required and the time spent on maintenance is time away from developing new solutions that might reduce costs in the long run.

In general if the skillset and the personal profile of the IT manager is not very strongly discussed in the literature, with exceptions of [15][16][21][22], the criticality and impact of high and low performance is paramount to the investments and strategic directions taking by the IT management. The meaningful discussion of low technology and high business knowledge provided by several authors [19][15] give room for non-technologically skilled IT managers who in turn are more susceptible to vendor-centric strategic information – bringing corporate gains at risk [14].

Finally [2] states that role of the IT manager is becoming increasingly important, as IT is adopted in all levels of the value chain and business functions. The IT managers need to be on top with the knowledge that is needed to support the different workforces. Further on [1] mentions three IT related areas where the IT manager needs to have a daily focus. These are system requirement identification, system design & implementation and test and maintenance.

One thing we can learn from the theory is that the role and the work of and IT manager is very blur and we cannot expect them to possess specialist knowledge in every field. In the empirical study we will address these issues in a research of 7 medium and large sized companies to find out how Danish IT managers keep themselves updated on IT knowledge and how they spend their time when not surfing the net.

III. METHOD

The purpose of this method section is to introduce the reader to the structure and the organization of this paper. The method section is divided in three areas: Scientific approach, Data collection and Delimitations.

Scientific approach – This paper is based on qualitative interviews that aim to find a solution on how IT managers keep themselves updated on IT knowledge and how they spend their time at work. The findings in this paper are not considered a final solution but instead a part of an ongoing research that has to be continually updated. [11] describes the scientific approach which we find suitable for this paper. [11]presents a scientific approach called "Interpretivism". The findings in this paper are a part of dynamic research which needs to be evaluated from time to time. Therefore the interpretive approach is the right approach for this paper

because we are interested in what people thinks and how they interpret the situation.

We use qualitative interview because we need to understand in-depth what the interviewed opinions and feelings are on different matters. We have chosen to use in-depth phone interview because of the resources available for this paper. Personal meetings with the respondents might have been preferred.

Data collection – In collecting data for this research we have chosen to focus on Danish medium and large sized companies. Here we have found 7 different companies where we had the opportunity to interview seven IT managers with different amount of responsibility. The seven companies are: Nissens A/S, Jyske Bank, Danske Spil, DdD retail A/S, Vestas, Carlsberg and Dansk Supermaked.

All IT managers were asked the same questions in the same order, but depending on their answers additionally questions were asked. By doing so we were able to ask in-depth into areas were each IT manager had more knowledge than the others.

As mentioned above the questions were divided in two overall categories: Deskribe a typical day as IT manager? And in what mediums do you (IT managers) keep them updated on IT knowledge? The results of the research are described in the following section.

Delimitation – In this paper we have only focused on Danish companies and the IT managers in these companies. Within management of departments it is easy to imagine that culture has a huge importance. The results found in this paper are therefore mainly considered valid in Denmark and other western countries like Denmark.

The resources used in this research vas very limited. It is estimated that the researches has used approximately 250 hours divided equally on empirical research, theoretical review and formulation of paper.

It has not been possible to find other scientific littereture that is concentrated on how IT managers gather information on IT. Therefore the empirical study is the main data source in the development of this paper.

IV. EMPIRICAL RESEARCH

As mentioned above the empirical research is divided in two main sections. The first section is concerning the daily work of an IT manager and the second is concentrated on which mediums IT managers use to keep them updated on the resent knowledge around IT.

The size of the companies that participated in this research varied from 50 employees in DdD retail A/S to 44000 employees in Dansk Supermarked. Also the IT departments varied a lot which we believe have provided the research with a versatile profile. The IT departments varied from 8 employees in DdD retail A/S to 700 employees at Vestas. Furthermore Danske Spil who has 230 employees has a IT department on 75 employees which is a huge percentage of the overall employee number. This means that we both have huge difference in the size of the company and a huge difference in the type of company. This has all contributed to a research that

in our opinion covers a broad segment of the Danish medium and large sized companies. The interviewed IT managers are:

1) Helle Midtgaard, Head of IT at Nissens A/S
2) Jens Nielsen, IT director at Jydske Bank
3) Jørgen Falsvig, IT director at Danske Spil
4) Morten Gade, Head of development at DdD retatil A/S
5) Rasmus Kejsager, CIO office and process exelence at Vestas
6) Anders Odgaard, IT process director at Carlsberg
7) Kim Nissen, IT&S system development manager at Dansk Supermarked

The daily work of an IT manager – The first very interesting finding in this research was that all IT managers said that they did not spend much time on updating their knowledge on IT. When it came to the usually daily work they did not have time to spend numerous ours online searching for new technologies or new interesting knowledge.

It was a general answer that most of the respondents spend a lot of time on answering mails and on daily prescheduled meetings. These meetings vary over many different activities but mainly it is planning and follow-up on earlier projects. Furthermore motivation of employees is also on the agenda at some of these meetings. Rasmus, Anders and Jørgen, who are some of the respondents with most employees' responsibility, also mention that they use much of their time on leadership. This is though not surprising that the more employee responsibility thus more time spend on management and leadership of the department.

As mentioned the IT managers did not use much time keeping themselves updates. Morten mentioned that he does not have time during work hours to keep himself updated this is done in his spare time. Furthermore he though believe that it is important to be on top of what is new but with constantly new important ad hoc task it is hard to find the time. Rasmus has outsources the knowledge updating part and has a department dedicated to keep him updated on the latest news. The department then brief Rasmus with the most important news. The rest of the respondents answered that they spend from 5% to 25% on searching for new technologies.

When the respondents were asked if they were IT specialist or IT generalist the answers were both much alike but also very different. Many started out with a specialist background but have over the years turned into generalists. Helle is the only one that stated that she still was a specialist. The other respondents were generalist by nature or have developed generalist skills over the years, and in connection with the more employee responsibility there is a need for generalist abilities. Kim believes that he could work as both specialist and generalist but also concludes that compared to many of his employees he is a generalist. There is no time for being immersed in his work.

If we look more into IT managers in general the answers were also very different some believed that IT managers in general where more specialist than generalist and some believed the reverse. We believe that Morten and Rasmus puts it well as they stated that in many small and medium sized companies it is the IT specialist who gets promoted as IT manager. These managers are then in charge of the project portfolio but can still contribute in the specific projects. In larger companies there is a bigger need for motivation, management and leadership and the abilities needed are more of the generalist. Some of the respondents also think that at current time there are more specialist IT managers but they believe this will change in the future so more and more IT managers become generalist.

Mediums IT managers use to keep them updated – Even though the IT managers stated that they did not spend much time on keeping their knowledge updated they did not have any problems when they had to say where they kept their knowledge updated. The list beneath show the different mediums the respondents mentioned.

1) Specialist Journals
2) Internet
3) Network
4) Analysis Companies

The main places where the IT managers kept their knowledge updated was at conferences, newsletters, computerworld and Gartner. Anders suggested an alternative way which he used. By looking at different jobsites you are able to see what the general focus are in the industry. Each area is described more in-depth below.

Specialist Journals – As mentioned most of the respondents mentioned computerworld as a journal where it was easy to keep on track with the most popular knowledge. But also different books and the printed medias.

Other than computerworld the IT managers mentioned Børsen, Jyllandsposten, Ingeniøren, Politiken and Berlinske. The IT managers also mentioned that many of these journals are hyped so that they appeal more to the reader and they often do not paint the real picture of what is hot and what is not. The journals are used as appetizer where further reading online is needed to confirm the story.

Internet – Almost every IT manager interviewet mentioned newsletters as an important source of information. Furthermore many also mentioned supplier's WebPages has a place where you can find solutions to many questions. It is also mentioned that a lot of searching the internet is related to solving a specific problem. Therefore Google is one of the main used webPages were you are able to search for a solution. Jørgen mentions also some American webpages like MIT (Massachuset institute of technology), CNN and BBC. Morten and Kim also uses Microsoft as a problemsolving webpage but mainly we can conclude that the IT managers uses newsletters as a nice and easy way to keep them updated on the most reason stuff.

In regarding to newsletters Morten mentions that you have to be careful not using newsletters as the only source. Often you need to confirm the newsletters by searching for more information on the given topic.

Network – They all mention conferences and seminars as places where they network with other IT managers, and Jørgen contributes with that he also makes presentations himself and that also contributes to a lot of feedback from the audience. Furthermore the IT managers mention steering groups, friends, co-workers and more official known networks as Dansk IT and management networks as places where they communicate with other managers.

Analysis Companies – A lot of the interviewed companies has a subscription on Gartner where they are able to read the news. Danske Spil is one of the companies the does not have a Gartner subscribtion but even though Jørgen also uses Gartner to search for interesting reports and if he finds a promising report he purchases it. Jens believes that Gartner is the preferred place where IT managers in general keep their knowledge updated. You are also able to subscribe on newsletters where you can specialize the information forwarded to your mail. Among other analysis companies "Forrester" is mentioned as an alternative.

How many hours a week do you spend gaining knowledge on IT – In the end of the interview the IT managers were asked to state a number of hours they spent a week on keeping their knowledge updated. The IT managers differed in their answers but approximately between 1-5 hours a week was spend on keeping their knowledge updated. The IT managers also emphasized that it was important to outsource knowledge areas to the employees because it is impossible to possess all knowledge and in the same time manage a department. Maybe one of the issues are that too many IT managers tries to possess all knowledge and do not delegate responsibility areas to the employees.

V. DISCUSSION

In the research for this paper we have been very limited by the resources available. As mentioned in the delimitation section we have used approximately 250 hours on the research. It can be discussed if the result would have been different if more resources were allocated to this research. With more resources available it would be interesting to look more into the interviews, the culture and the companies.

Interviews - With more resources available it would be interesting to make the interviews in person. When using telephone semistructured in-depth interviews you cannot interpret the body language of the respondent. If personal interviews were conducted it you might be able to reflect more on the answers and ask additional questions to get more knowledge out of the respondent. Furthermore it would also be interesting to interview the employees of the IT managers to validate the answers.

Companies – In this paper we have only interviews 7 companies. You can discuss if you are able to make solid conclusions on a study with only 7 respondents. We have in this paper tried to cover as much of the medium and large size company segment in Denmark by choosing very different companies. The companies represent the large and medium

sized manufacture companies like Vestas and Nissen. They represent the Banking world, online companies and a huge retail business like Dansk Supermarked. It is arguable that more companies within the same industries would validate the findings in this paper. The IT managers were all managers with employee responsibility, we could have chosen to focus on IT specialist instead of people who are more likely to be generalist. If we have chosen IT-specialist as our respondent group the answers to where they keep their knowledge updated most likely would be different. Is this paper is used in the MSc in technology based business development education which is an engineering education with a general focus the choice of using IT-managers instead of specialist was easy.

Culture – It is easy to discuss if the results from the Danish companies applies to companies outside Denmark. We believe that countries like the Scandinavian countries and Western Europe countries where the culture is similar to the Danish this study is relevant. If we look outside of Europe the results are easier discussable. In countries where companies have a high hierarchy level it can be discussed if there is a need for a manager with general abilities instead of specialist abilities. These are countries where you dictate instead of coach and the employees do what they are told without asking any questions. It would be interesting to see how IT managers in these countries keep them updated on IT knowledge and how their daily work is scheduled.

Theory vs. interviews – Information technology is the fastest changing areas of knowledge in the world. There are constantly changes online and what you believe is the common thing to do today might be outdated tomorrow. The articles used in this paper are from the millennium and up until 2008 this means that a lot has happened already since 2008. The theory used in this paper provides a general view on IT. It was very difficult to find theory on where and how IT managers keep their knowledge up to date and for a good reason. Some of the findings in this paper will in 6 months be outdated as well and this I due to the rapid changing information technology. So you can argue what this paper is good for if the findings are already outdated. We believe that maybe the sources are outdated in 6 month but the approach of the IT managers in how they seek knowledge remain.

VI. CONCLUSION

This paper sets out to explore IT managers with employee responsibility in Danish companies. We aimed out to research how IT managers spend their time at work and how they keep their knowledge on IT up to date. As a first result we have to conclude that a lot more research has to done. It is argued that 7 companies in the empirical research is to small as a reference group. Having said this we also believe that the 7 companies represent a large segment of the medium and large sized companies in Denmark and many of the findings represent the reality.

In the discussion sections we mentioned two types of findings in this paper. Some findings are more unsecure and have a possibility of being outdated in 6 month. The other findings are related to the different approaches IT managers

use to gain knowledge and we believe that these are the findings that last.

In general the IT managers interviewed in this paper used 4 types of knowledge sources. We are of the opinion that these sources are the same data sources that is going to be used in the many years to come. The IT managers use the internet, networking, analysis companies and specialist journals as their main information source. Within networking the IT managers mainly participated in different conferences but some also used their personal network like friends and family. In this study we found that IT managers often used the internet as a problem solving medium. They did not use the internet to search for new types of knowledge but instead they search for solutions to the everyday problem. Furthermore the internet was used to retrieve newsletters from different important websites. Analysis companies was also used a lot by the IT managers but we saw a tendency that it was more likely to be the larger companies that had a subscription on the analysis companies services. Finally there was a general perception that many journals only provided a small amount of knowledge but they were used as inspiration for doing some further research.

We have in this paper found that some of the different sources that the IT managers used are more and less the same. As they use the internet for problem solving many of the IT managers mentioned Google as their starting point in the search for answers. Google enables the IT managers to do a quick search on a topic or a specific product number and it provides the opportunity to make a quick overview. Furthermore Gartner was widely used among the IT managers both as a analysis company but also as a webpage where you are able to read news and get a specialized newsletter forwarded to you. The final source that many of the IT managers mentioned is the journal Computerworld. As mentioned above this was used as inspiration but you could not take the stories for granted, further research has to be done to validate the information from Computerworld.

In this paper we have also investigated the IT managers and whether they are generalist or specialist. The IT managers believed that IT managers with employee responsibility in the future became more generalist. Some believed that they were generalist already and some said that they were moving towards becoming more generalist. Either way we go into a future where IT managers possess the same kind of abilities has other department or project managers. The IT managers will in the future has to outsource knowledge areas as they have to focus on motivation, planning, project portfolio and so on.

Finally we found in this paper that the connection between theory and empirical research is limited. When doing a paper on IT management and IT knowledge you have to be careful not using outdated information. The question for the future is when the findings in this paper become outdated. Continually research is nessesary to keep the information found in this paper continually evolving.

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