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How Digitalization influences Project Management

Acceptance of Cloud-based Project Management Tools

Master's Thesis in the Master's Programme International Project Management

ALI BAJWA
ROBIN DEICHMANN

Department of Civil and Environmental Engineering
CHALMERS UNIVERSITY OF TECHNOLOGY
Master's Thesis
SE-412 96 Gothenburg, Sweden 2018
Telephone: + 46 (0)31-772 1000

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ALI BAJWA
ROBIN DEICHMANN

Department of Civil and Environmental Engineering
Division of Construction Management Chalmers University of Technology CHALMERS UNIVERSITY OF TECHNOLOGY
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Abstract

In project management, various tools are used to carry out projects according to the given conditions in cost, time and quality. Project management tools are used for planning, executing, controlling, documenting and communicating in projects. Digitalization and the associated rapid development in information technology leads to changes in the application of these tools. In particular, the development of cloud computing as a distribution channel causes changes.

Cloud-based project management tools have changed the process of project management over the last few years. With this background, this study examines whether cloud-based project management tools can be accepted and the variables that will play a major role in the acceptance of such deployment.

Cloud-based project management tools are used mostly by organizations for implementing projects. Despite strong interest in this technology from companies, these cloud-based project management tools are not comprehensively used in the business environment. As well as the benefits, the integration of these tools into project execution also leads to challenges for companies. Particularly problematic is the lack of acceptance of new technologies among the target users.

Based on the experiences of active project managers, this research investigates which variables influence the acceptance of cloud-based project management tools by project managers and management personnel. In regard to a detailed literature study, two research questions were formulated to find the variables which influence the acceptance of cloud-based project management tools and corresponding strategies to increase the acceptance level.

To answer the research questions, a research model based on the Technology Acceptance Model (TAM) 2 was applied. The results of this research were collected through a quantitative survey of project managers and management personnel in different industries. The survey was conducted using an online questionnaire. To analyse the data, a Cronbach alpha analysis and a regression analysis were performed by using the software Superior Performing Software System (SPSS).

The research identifies the variables *Subjective Norm*, *Output Quality* and *Result Demonstrability* as the most important, with a significant impact on *Perceived Usefulness*. The *Perceived Usefulness*, together with the *Perceived Ease of Use,* influences the *Intention to Use* and thereby the acceptance of cloud-based project management tools by project managers and management personnel.

In summary, it can be stated that cloud-based project management tool providers, who intend to implement cloud-based project management tools, should in particular focus on the *Output Quality* of the data.

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List of abbreviations

AI ..... Artificial Intelligence
ASP ..... Application Service Provider
CPM ..... Critical Path Method
DoI ..... Diffusion of Innovation
E ..... Experience
I ..... Image
ICT ..... Information and Communications Technology
IoT ..... Internet of Things
IT ..... Information Technology
JR ..... Job Relevance
OQ ..... Output Quality
PEOU ..... Perceived Ease of Use
PERT ..... Program (or Project) Evaluation and Review Technique
PM ..... *Project Management*
PMM ..... Project Management Methodologies
PU ..... Perceived Usefulness
RD ..... Result Demonstrability
SaaS ..... *Software as a Service*
SN ..... Subjective Norm
SPSS ..... Superior Performing Software System
TAM ..... Technology Acceptance Model
V ..... Voluntariness

1 Introduction

This research is concerned with the acceptance of cloud-based project management (PM) tools by project managers. For this purpose, the most important variables for the acceptance of PM tools are analysed by using a renowned model in acceptance research. Subsequently, the variables and their impact on PM tools acceptance by the managers are assessed and a proposal to increase the level of acceptance is made.

The present chapter covers the background and the problem statement of the research. Furthermore, this chapter highlights the research aim and objectives and the research questions. Moreover, this chapter present the scope and significance of this research. Finally, the procedure of the entire thesis is explained in the chapter scheme.

1.1 Background

The increasing digitalization, as in nearly all business areas, also leads to changes in project management (Timonen & Vuori, 2018). The most complex part of project management is finding the balance between the resources and risks, budget, quality, schedule, and scope (Project Management Institute, 2013). Resources that are needed for the PM are "skills, talents, and cooperative efforts of a team of people; facilities, tools, and equipment; information, systems, and techniques; and money" (Haynes, 2009, p. 7). In order to manage the complexity of a project, certain PM tools are used.

By using the right tool, processes can be handled efficiently and the inconvenient rework during the current project can be reduced. For this reason, it advisable to take a step back in planning a project and clarify which tool is useful for the implementation of the project (Andler, 2015).

Project management tools have become indispensable instruments for every project manager. The correct PM tools enable the project manager, to structure the processes, to access, to control and to document the progress of the project at any time. Furthermore, deviations from the plan as well as budget overruns can be detected in a timely manner and appropriate countermeasures can be arranged (Kerzner, 2017).

A novel approach of using PM tools is offered through cloud computing. It is possible to deploy the PM tools in the cloud since it consists of a service of access to the environment of the project. In particular, the software distribution model is called Software as a Service (SaaS),

where the client has access to the necessary software applications placed in the provider server and pays for each use. Cloud computing providers offer special application software that runs on their information technology infrastructure. Such a deployment enables the service of access to the application and the project environment.

Project managers who use cloud computing need to be aware of the issues of this technology. These issues do not relate to the "hard" aspects of the PM like infrastructure adaptation, development of a single management, and selection of technology, but relate to rather "soft" aspects of the PM consisting of resistance of network administrators, education, and planning and execution of the change. The benefit of the deployment of the cloud computing is to help with the capability to secure client inclusion for managing the project and interaction amongst team members (Topor, 2018).

Cloud computing has been on the radar of numerous chief executive roles such as Chief Information Officer, Chief Technical Officer, and Chief Financial Officer. Recently, cloud computing has gained massive traction since it is one of the most rapidly developing technologies (Shawish & Salama, 2014). In reality, the cloud has been an enabler of numerous other disruptive technologies such as big data, Internet of Things (IoT), Artificial Intelligence (AI), etc. Many core banking problems has been solved by Cloud computing. The common concerns of banks including 24x7 uptime, interoperability, secure storage etc. are all addressed effectively by cloud computing.

The deployment of such a cloud-based service can provide the participant in the project the similar advantages as the utilisation of the cloud computing for an organisation. These advantages are as follows:

- No need for a unique devoted server for the management of the project
- Secure data storage related to the project being carried out
- The benefit of using recent version of the application that supports the management of the project
- No need for a software license
- The project can be accessed anywhere from the world, if there is internet connectivity
- Feasibility of automation of some processes
- In the case of complex and large projects, if large computing capability and power are needed, they can be obtained
- If necessary, feasibility of working remotely with other members of the team

- Cloud service providers assistance on technical aspects, which is the most common feature in the cloud-based environment for the management of servers and disk resources, development application and its execution, business and personal tools, teamwork, and information technology IT management (Sloniec, 2015)

However, there are concerns about the usage cloud-based of PM tools since it is still in its infancy. The adoption level of the cloud-based PM tools by project managers need examination (Duncan, Chu, Vecchiola, & Buyya, n.d.). For this reason, the present research examines whether the cloud-based PM tools can be accepted and the variables that will have an impact in the acceptance of such deployment.

1.2 Problem Statement

At the beginning of a project the question arises, which PM software is the right tool for carrying out the project. The progress of digitization offers two major options for finding the right tool to support project implementation. There is the possibility to use the tool from an internal server or to use it via the cloud (Sloniec, 2015).

In spite of the rapidly increasing popularity of cloud-based PM, several researchers indicated a fewer number of studies at the user level (Aminzadeh, Sanaei, & Ab Hamid, 2015; Bayaga, 2015; Hashim, Hassan, & Hashim, 2015). Several of these studies have stated that the biggest stumbling block in the pathway of cloud-based PM adoption is not the technological difficulty; it is rather the attitudinal or perceptual factor (Balaji, Lakshminarayanan, Jajal, & Kumar, 2013; Dihal, Bouwman, de Reuver, Warnier, & Carlsson, 2013). There are some studies which deliberate the way the experiences of the users are taking shape when encountering the cloud-based PM and importantly, what the crucial parameters impacting the satisfaction, objective, and intent of the users in order utilise this evolving technology (Hashim et al., 2015). Alternatively, it can be stated that there is quite an inadequate comprehension as to the crucial variables influencing acceptance by the user with regard to the cloud-based PM tools in order to lead the decision makers to the implementation of such technology in the company.

For the project managers, the employment of cloud-based PM tools is presumed to optimise the responsiveness, capability, and flexibility. The rationale behind the implementation partly includes the harmony and coaction among the members of the team (Saarijarvi, 2016). However, this technology is not without its drawbacks. Of course, there are some demerits that

are inherent in any cloud-based applications. They are lack of cooperation, lack of communication, lack of clear objectives, and lack of resources (Saarijarvi, 2016). Hence the adoption of such technologies by project managers is considered especially with regard to factors such as data security, service availability, backup and contingency plans, and so on (Pocatilu, 2010). Therefore, it is imperative to assess the level of cloud computing PM tool acceptance of project managers. Acceptance covers the attitude of managers towards adoption of cloud computing based PM system wherein in light of the above facts. This study uses the basic structure of Technology Acceptance Model (TAM) in order to analyse the acceptance of cloud-based PM tools by the project managers. The TAM serves to identify variables, which explain the acceptance of new technologies by users. It is a widespread model in acceptance research, developed by Davis in 1998.

The principal problem here is that there are several firms that know the advantages of this new technology; however, there is no focussed and lucid comprehension of important and crucial variables influencing the satisfaction and desire of the users in order to help with the process of acceptance (Balaji et al., 2013; Hashim et al., 2015).

1.3 Research Aim and Objectives

The aim of the present work is to apply an established acceptance research model for cloud-based PM tools and to subsequently test this by the execution of an empirical study. The review of existing literature in the field of acceptance research should help to identify significant variables influencing the intended use of cloud-based PM tools. The work also aims to identify statistically significant relationships among the variables. In order to analyse and evaluate the variables we conducted a TAM-inspired analysis (information on the TAM can be found in chapter 2.8). Furthermore, the significance and direction of the relationships between the variables will be explained by the implementation of hypothesis tests. The empirical investigation is carried out on the basis of a practical example. The data required to test the model is collected by means of quantitative survey. Finally, in the final word, a critical appraisal of the work takes place.

1.4 Research Questions

The following are the research questions that are answered in this research:

- **Research Question 1:** What are the variables influencing cloud-based project management tools acceptance by project managers and management personal?
- **Research Question 2:** What strategies can be suggested, based on this research, to improve the acceptance level of cloud-based project management tools?

1.5 Scope and Significance

The scope of this present study is limited to the managers and other management personnel belonging to the oil production and automotive industry. The reason for this limitation is a good connection into these business areas by the authors of this paper, which enables good data collection. However, the outcomes of this research can be applied to other business areas. Moreover, this particular research uses a TAM-inspired approach in order to analyse the acceptance of cloud-based PM tools.

1.6 Chapter Scheme

The present study has the chapter scheme delineated below:

Chapter I- The first chapter of the present study is the introduction in which detailed information about the study topic has been provided. Further, the research problem statement, the research aims and objectives, the research questions, the research scope and significance are described.

Chapter II- The second chapter is the literature review in which the previous studies in the context related to the present study are explained in detail. In this section, a descriptive elaboration on the concepts and definitions, cloud computing, PM tool implementation in cloud-SaaS based model, use of software PM tools, acceptance of cloud computing solutions in organisations, gaps identified, and conceptual model.

Chapter III- The third chapter covers the research methodology. This chapter explains the type of research methodology carried out in the present research which explains how the data are gathered and explored, and the kind of approach utilised.

Chapter IV- The fourth chapter is the empirical analysis. The results of the present research are given coverage and they are explored in detail.

Chapter V- The fifth chapter is the discussion, which compares the results from empirical analysis of previous literature. Further arguments for the results are declared. In the second part of the chapter, the research questions are answered.

Chapter VI- The sixth chapter is the conclusion part in which the outcomes are concluded and suggestions are revealed. The chapter ends with a suggestion for further research.

2 Theoretical Framework and Review of Literature

2.1 Introduction

Handling programs and projects are becoming more challenging and troublesome during this present corporate world. With the purpose of enhancing its expense, productivity and potential, such condition is demanding to cover entire current methods of PM. As an interesting factor, cloud computing has been offering marvellous necessary changes in the world of technology. As an efficient accessible on request in every situation, the key role of cloud computing is the contribution of computing. Nevertheless, practically numerous projects faced in a short-time are becoming more challenging (Nicoletti, 2012). As an interesting factor, cloud computing is possible to be an ideal solution in such conditions. Simultaneously, the approval level of PM based on cloud computing by employees and managers in organizations has been least studied. Hence, this paper attempts to reveal the evidence connected to the usage of PM tools based on cloud computing in earlier literature wherein researches connected to the study topic are investigated. The approval of the PM tools based on cloud computing in some selected organisations will be studied from Technology Acceptance Model where the explanations for the choice of the model are given. Finally, the chapter accomplishes with a research gap that states the motivation for this current research.

2.2 Traditional Project Management Tools

The Project Management Institute has explained PM as "*a temporary endeavour undertaken to produce a unique product, service, or result"* (Project Management Institute, 2011, p.3). This explanation shows that project is a single method when it is repeated, then it is meant as an operation of a repetitive activity. "*A project is a time and cost constrained operation to realize a set of defined deliverables (the scope to fulfill the project's objectives) up to quality standards and requirements*" (IPMA, 2006, p.13). Generally, every project needs particular budget and time, and an obviously specified space of work to be carried out. Simultaneously, work quality must be achieved.

Project management tools support the tasks of management and operational project work. Nowadays, PM tools are mostly applied in the form of software applications. In principle, PM is possible even without a special software application (Maserang, 2002). PM software, however, can provide valuable services, especially in the case of high project complexity, many

participants or integration into company-wide systems (enterprise resource planning, cost accounting, document management system, etc.)(Kerzner, 2017).

Because it handles several complicated tasks, PM is one of the vital complicated divisions. Fortunately, several tools are implemented to advance finalising the performance of responsibilities and the works. Nevertheless, some teams carry out their projects physically when others require a software-installed computer. As an important factor, PM tools should be known for project managers. Only then, the project managers can select the right tools which fits the best for the management process. Simultaneously, one tool may not provide an enhanced solution for every requirement of PM team. The mainly functional PM tools are Gantt Charts and Program Evaluation Review Technique defined thoroughly here below. The above-mentioned PM tools are possible to be created with PM software that is commercially obtainable (Maserang, 2002).

The program (or project) evaluation and review technique (PERT) is a tool for regulating and scheming the project, explains and dominates the works significant to achieve a project. Frequently, PERT charts and Critical Path Method (CPM) charts are used identically when the only variance among them is connected to the calculated task times. Nevertheless, project completed with every project work will be shown in order in both charts. This revealing aids to recognise the parallel tasks and thereby those tasks can be carried out at the same time (Maserang, 2002). Moreover, "Project Network" or "CPM Diagram" is the graphic demonstrations reinforced to portray the interrelationships of the basics of a project vividly and this demonstration aids to recognise direction for the tasks must be carried out (Maserang, 2002).

In contradiction of PERT, Gantt charts include task assignments in the existence of calendar time in days, weeks and months. The graphic representation in the tool shows the start, passed, and accomplishment times of every task within a project. The project progress is possible to be trailed with the idyllic Gantt charts. Especially, this Gantt charts aids to recognize the real number of days necessary in order to achieve a work that achieves a milestone is possible to be connected to the planned and assessed value. The originally programmed workdays are strategized with the actual beginning to actual far-reaching days. These data support to recognise the aim and effective timeline aberrations or ineffective period. Typically, these charts aid as a beneficial budgeting tool and is possible to reveal dollars assigned versus dollars spent (Maserang, 2002).

2.3 Project Management Tool Implementation in Cloud- SaaS-based Model

Cloud computing was specified as a pool of abstracted, highly scalable, and managed compute infrastructure capable of hosting end-customer applications and billed by consumption (Kaur, 2011).

During the years of 1950s and 1960s, the idea of cloud computing was blooming first in the USA. According to the statement of John McCarthy in 1960, “the calculation may someday be organised as a public service” (Sloniec, 2015). Thus, cloud computing is a powerful industry (Brinda & Heric, 2017). Cloud-based PM can be possible with the present dynamic world of technology and it contains in a service of access to the project setting and application. The distribution model of software is identified as Software as a Service (SaaS) in which the client is accessible for the pertinent significant software applications located in the server of provider and pays at every usage. The PM managers reveal that the matters that should carry out a project manager executing cloud computing does not include hard aspects like the adoption of technology, enhancing infrastructure adaptation and distinctive management, when there are more management based on software such as the establishment of change process and scheduling, network administrators resistance, education (Sloniec, 2015).

As cloud computing provides several advantages with its application, it aids to support the process of communication among team members and the potential for the client security to manage the project. Particularly for the IT management, the cloud work applications aid to support business and personal tools, application development, teamwork and execution, and disk resources management and servers (Sloniec, 2015).

Software as a Service (SaaS), a well-known delivery model in the cloud computing, is a business model in the software industry which is newly emerging. The life to SaaS business model is given by the backbone technology that is internet (Chou & Chou, 2008). It is a significant model in which a customer can use various cloud-related software functions in real time service delivered by the cloud servers across the several websites of the internet (Furht & Escalante, 2010; Makila, Jarvi, Ronkko, & Nissila, 2010; C. Yang & Huang, 2017). The definition of (SaaS), given by Microsoft (2007) as:

“*Software as a Service (SaaS)-meaning delivering software over the Internet—is increasingly popular for its ability to simplify deployment and reduce customer acquisition costs; it also allows developers to support many customers with a single version of a product. SaaS is also often associated with a "pay as you go" subscription licensing model*” (Chou & Chou, 2008, p.387).

SaaS platform is a development platform as well as resources platform. All data and software can be used as services in the scheme of SaaS and hence these services are represented as the applications provided or application programming interface for users (Satyanarayana, 2012). It is also possible to compare SaaS with traditional deployment models such as Application Service Provider (ASP). The key variance between SaaS and ASP is that SaaS is possible to be carried out as an important tool and does not require to buy any licenses when ASP and other deployment models based on the internet are applied for tailored software and more significantly they required to buy licenses (Benlian & Hess, 2011; Makila et al., 2010). Applications of (SaaS) are remotely installed at the sever locations while on premise models are installed onsite to client locations. Moreover, applications of SaaS are managed by the providers of cloud service while on premise application regulation and management are carried out by the clients of IT department clients (Carraro & Chong, 2006). Advantages of SaaS is classified into two sections namely cloud user and cloud provider, in the cloud user side it is customizable and also decentralized and in the cloud provider side it is easy to maintain and it is highly stable as well as customizable.

2.4 Use of Software Project Management Tools

In the past, several researchers studied the usability of tools of Software PM in companies. According to the survey carried out by AlMobarak, AlAbdulrahman, AlHarbi, & AlRashed, (2013) examined the results of an online survey study, which was conducted to investigate the use of software PM tools in Saudi Arabia. The research was carried out to find out, what are the key elements and players that leat to choose a project management tool. The result showes that the most important analytical functions for chosing in a by project managers are “Simplicity”, “Ability to integrate with other tools, as well as, provide time estimation feature” and “project progress & changes” (AlMobarak et al. 2013).

A study conducted by Vukomanovic, Radujkovic, and Alduk (2012) emphasized the use of PM software in construction industry of southeast Europe. According to the main objective of this research, it is examined to reveal the tools of PM applied by the teams and managers of software PM with the aim of comprehending the supported aspects that could impact their choice. According to the findings of this study, the Arabic language does not make any influence on the application of PM tools while software based on tools were taken into account to have aided the effort of the respondents in the earlier studies (Vukomanovic et al., 2012).

Even though its support is important for companies in order to achieve goals of their business, the present business world transforms the process of PM into more complex processes. Methods and efficiency of PM tools for delivering projects was examined by Hajjaji, Denton, and Jackson (2010). This study is to investigate and endorse the approaches to keep avoiding project failure and thereby attaining great of project achievement through the views of researcher and practitioner. From this study, important characteristics connected to PM of engineering founds out the risk management application software efficiency as an efficient tool for PM. This study supports managers of PM to take into account efficient decisions when supported by the right methods and tools for making a project to have a success.

2.5 Usage and Acceptance of General Software Project Management Tools

The usage and acceptance of general software PM tools is analysed by in studies of several researchers. Table A1 in the appendix shows a detailed literature research about the usage and acceptance of general software project management tools. From the analysis of several studies, the general software management tool adoption has some limitations and complexity and also it is observed that some enhancement in the PM tools should be entertained. Moreover, there is a lack of adoption of cloud computing concept in software PM tools and hence acceptance of cloud computing solutions in organisations is adopted and will be explained in the upcoming sections.

2.6 Acceptance of Cloud Computing Solutions in Organisations

According to the objectives of Stieninger, Nedbal, Wetzlinger, Wagner, and Erskine, (2014), it is the operationalisation and reconceptualization of broadly recognised influencing factors on technology adoption related to cloud computing. Also, the assessment presents an impression of related empirical studies on cloud computing based on theories of innovation adoption like the Technology Acceptance Model (TAM) and the Diffusion of Innovation (DoI) theory. Therefore, the emphasis is set on the study of the features “relative advantage”, “image” “compatibility”, “complexity” and “trust and security”.

In 2016, Noor (2016) suggested a research model of two-dimension namely inhibitors and motivators to inspect the adoption and the usage of cloud computing technology used in Saudi Arabia. On the basis of findings, we discovered that the two highest motivators for utilising cloud computing from Saudi cloud consumers’ perspectives are abundant network access and

on demand when the highest five inhibitors are reliability, privacy, security, availability and compliance correspondingly.

Shuleski, Birsan, Cristea, and Radu (2016) argued the factor impacting cloud computing implementation influence in the usage of Romanian public transportation is a mixture of methods that exist, like fishbone diagrams. Cloud computing technologies, which is the next development in the history of computing, offer flexibility and low cost. It is possible to rent it from service providers of cloud computing. Cloud service presents vast opportunities to IT sectors. As deduction of our study, the public cloud is possible to rent compared to a private cloud. Cloud computing is the correct and suitable solution for cost efficiency and security of present time.

In 2016, Xin and Xue studied the challenges and advantages of cloud computing and the research decided, bringing advantages and conveniences to companies such as cost reduction, business flexibility, automatic software and hardware advancement, scalability and agility. The key usage of cloud computing is to lessen the needless expenses such as maintenance and purchasing software and hardware. Moreover, the employees working in IT are lessened. Nevertheless, like every technology, there are some problems if we use cloud computing. The main issue is security, particularly data theft. Several companies will be interested to use the benefits of cloud computing only if the security issues are solved. Some solutions suggested may overcome these issues. The cloud computing service safety should be in the first place.

In 2014, Devasena (2014) carried out a study that is a convenience and easy usage is the effect quoted by SMEs to adopt cloud. The second effect to back and utilise Cloud Technology is enhanced security and privacy. The third impact to practise and take up cloud is cost lessening. Both SMEs and SMBs discover the cloud convenient, easy to use, adequately secured for their business and privacy in their business are well protected and finally but not the least is that the Cloud aids SMEs to remove their expense in an important approach. The fourth impact is reliability. However, this is not a vital aspect for SMEs to select and practise cloud technology. According to SMEs, cloud downtime depends on their physical devices within their physical nearness for storage, backup, etc. The last impact is teamwork and sharing which specifies that SMEs highly require teamwork and sharing instead of preferring direct meetings, business travel, phone calls, keeping physical devices, etc. for their business requirements since cloud offers the same impact in less expense.

In 2015, Korhonen (2015) focussed on examining Project Management Methodologies (PMM) of SaaS deployment projects. SaaS is a new method of software delivery that is progressively popular in IT sectors. It has been recognized that SaaS deployment varies from

a usual (non-SaaS) software deployment. And that SaaS projects have numerous factors to be addressed when opting an appropriate PMM. The most significant factors of the PMM were recognised to be flexible on requirements of iterative working, frequent and transparent communication, client involvement, engineering and change management, increased collaboration and recurrent demoing of the findings.

2.7 Research Gap

An examination of previous literature led to the fact that there is no research that purposefully examined the acceptance of cloud-based PM tools by project managers. It is deemed that PM tools are the most crucial software used to make sure that all projects move in an effective manner; however, the intricacies that lie in using the same that is deployed in cloud-based environment makes managers feel that such software could be hindrances to their nominal operations at their everyday work. There was no study that examined cloud-based PM acceptance in organization by its managers. Furthermore, while qualitative researches and articles were conducted in line with the research context, there was no quantitative methodology applied to study the phenomenon. The TAM model, which is an established framework to test technology acceptance hence used as a theoretical framework for the research wherein such an implementation is even a novel concept that is never perceived before in literature.

2.8 Conceptual model

2.8.1 Introduction to Technology Acceptance Model (TAM)

The basis of the TAM is the social-psychological model Theory of Reasoned Action (TRA) by Ajzen and Fishbein from 1980. The TAM was developed by Davis (1989) and represents a central approach to acceptance research. Further, it forms the basis for many subsequent technology acceptance models.

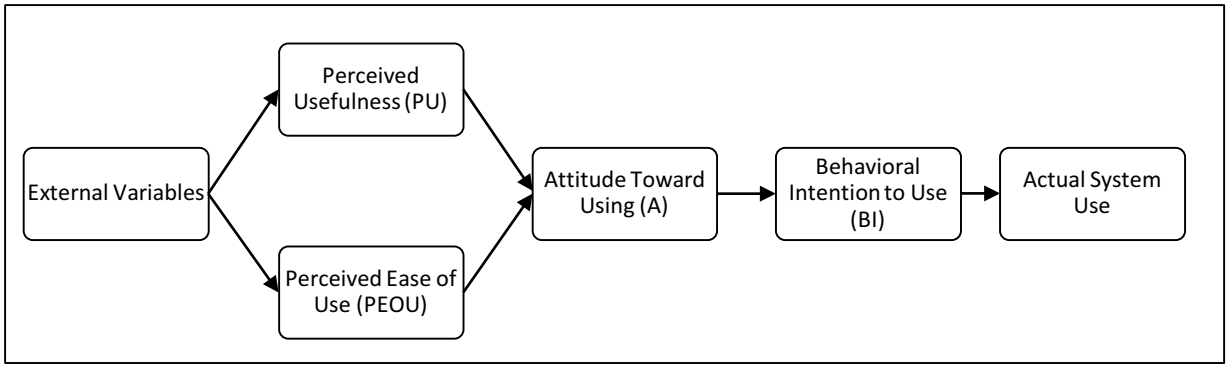
TAM was originally developed and used to model the user acceptance of information technologies (Davis, Bagozzi, & Warshaw, 1989, p. 985). The model assumes that two characteristics are critical to users' technology acceptance: Perceived Ease of Use and Perceived Usefulness. Davis defines the two dimensions as follows (Davis, 1989, p. 320):

Perceived Ease of Use (PEOU): „*The degree to which a person believes that using a particular system would be free of effort.* “

Perceived Usefulness (PU): „*The degree to which a person believes that using a particular system would enhance his or her job performance.* “

Both dimensions have a direct impact on an individual's attitude towards the use of a system and they are determined by external variables, such as demographic factors and personality traits. This theory proposes that PEOU and PU impact the attitude toward using the IT, and PU also has a straight effect on behavioural purpose. However, PEOU has an effect on PU. The attitude in turn has a direct influence on the behavioural Intention to Use, which in turn affects the actual system use. The development of the model is intended to provide a generalized form by which end-use behaviour can be explained for various computer technologies (Davis et al., 1989, p. 985). The TAM is shown in Figure 1.

Figure 1, Technology Acceptance Model (TAM) by Davis et al., 1989



2.8.2 Technology Acceptance Model II (TAM II)

The TAM is undeniably an accepted model for describing and predicting of the usage of IT-systems. The model is the basis of a high number of studies that describe TAM as a suitable model for describing technology acceptance. However, scientists criticize the limited applicability and theoretical accuracy of the model. Responding to the criticism of TAM, the authors Venkatesh and Davis (2000, pp. 186-204) have extended the existing model to include further variables influencing the so-called technology acceptance model 2 (TAM 2). It can be demonstrated that both social and cognitive-instrumental process variables influence user acceptance. The extension affects next to the external variables, which influence the Perceived Usefulness, also the Intention to Use. Table 1 explains the meaning of the variables, used in TAM 2 (Venkatesh & Davis, 2000, S. 186-204).

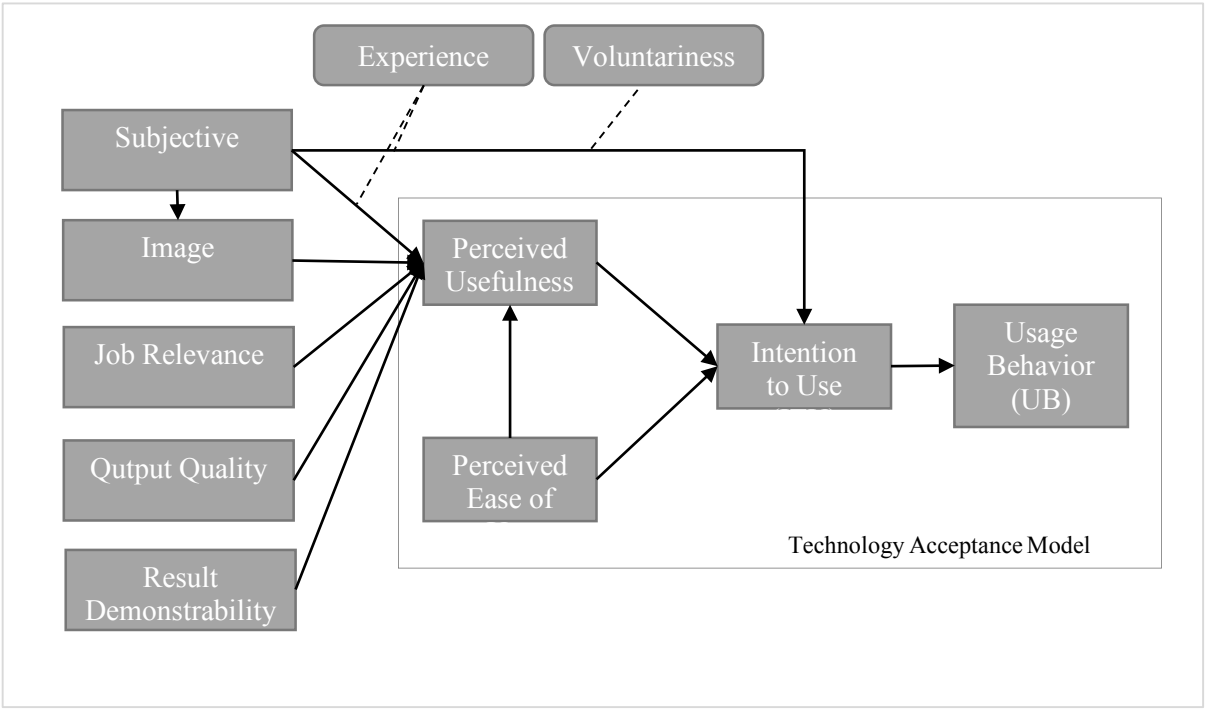
Processes of Social Influence

The Subjective Norms directly determinants the behaviour. If there is no agreement with personal norms, things are reluctantly done. Furthermore, Image has a positive effect on the Perceived Usefulness, as long as the use of the technology improves the social status of the individual (Venkatesh & Davis, 2000, pp. 186-204). Davis and Venkatesh explain this as follows: *„People may choose to perform a behaviour, even if they are not themselves favourable toward the behaviour or its consequences, if they believe one or more important referents think they should, and they are sufficiently motivated to comply with the referents "*(Venkatesh & Davis, 2000, S. 187). The basic idea behind this theory is, that individuals can be influenced by ideas and attitudes of other people. This is the reason why people, motivated by others, behave in a certain way. Further, the voluntariness of use has a moderation effect on the relationship between the Subjective Norm and the Intention to Use. The described moderation variable measures the strength of the influence of one independent variable (Subjective Norm) on another variable (Intention to Use).

Cognitive-Instrumental

The relevance of the results of use for the work results (Job Relevance), the quality of the results (Output Quality) and the traceability of the result (Result Demonstrability) form the cognitive-instrumental process variables. All of the mentioned variables affect the perceived

Figure 2, Technology Acceptance Model 2 (TAM 2) (original by Venkatesh &Davis, 2000)



usefulness of the system. The Experience of the user acts as an interaction variable for the Subjective Norm, which has a direct influence on the Perceived Usefulness and the Intention to Use (Venkatesh & Davis, 2000, pp. 186-204). The TAM II model is shown in figure 2. Table 1 explains the meaning of the variables.

Table 1, Conceptual Explanation of the Variable from TAM2

SN	Subjective Norm	indicates the respondents' assessment of the extent to which relevant third parties (for example, colleagues, supervisors, etc.) expect system usage from them.
V	Voluntariness	denotes the perception of the voluntariness of system usage. It is presumed, that the variable has a significant impact on the "impact force" of Subjective Norm.
E	Experience	measures the experience of the user with the technology. It operates as a interaction variable for the Subjective Norm, which has a direct influence on Perceived Usefulness and Intention to Use.
I	Image	is a status-based variable. It states in how far the technology improves the social status of the individual.
JR	Job Relevance	as dimension refers to the question of whether the system to be evaluated can be used in a meaningful way in the context of work activity.
OQ	Output Quality	refers to the assessment of the quality of the results that can be achieved with an application.
RD	Result Demonstrability	refers to the respondents' assessment of the representability of the added value resulting from system usage in the context of their own activities.
PU	Perceived Usefulness	the degree to which a person believes that using a particular system would enhance his or her job performance.
PEOU	Perceived Ease of Use	the degree to which a person believes that using a particular system would be free of effort.

2.8.3 Effectiveness of TAM Model

The technology acceptance model is the one which most availed framework in forecasting technology adoption of information (Paul, Ingham, & Collerette, 2003). In 2007, Jun and Lee discussed that TAM should be capable of examining aspects that affect adoption intentions beyond perceptions related to usefulness and convenience. Even though TAM had attained much support (K. C. C. Yang, 2005), it concentrated on the impacts of perceptions related to technology's convenience and practicality on adoption intentions (Poey Chin Lai & Zainal, 2015a; Luarn & Lin, 2005). Consequently, it is constructive for the usage of defining novelty in technology like PM tools of the cloud acceptance of single platform.

TAM has become well-known, which has been quoted in most of the research that handles technology acceptance of users (Y. Lee et al., 2003). TAM tries to support practitioners and researchers to differentiate why a certain method or technology may be unacceptable or acceptable and consider suitable procedures by definition further presenting prediction. Even though TAM has been examined broadly with various samples in various circumstances and showed to be effective and dependable model defining acceptance and information system (Davis & Venkatesh & Davis, 1996; Mathieson, 1991). Several extensions to the TAM have been suggested and tested (Henderson & Divett, 2003; P C Lai, 2016; P C Lai & Zainal, 2014; Poey Chin Lai & Zainal, 2015b; Lu, Yu, Liu, & Yao, 2003; Venkatesh & Davis, 2000; Venkatesh et al., 2003).

The TAM is a broadly acknowledged model for understanding information and communications technology (ICT) usage and adoption procedures (Venkatesh & Davis, 2000). It has been practised in a big amount of research into technology adoption in the organisation (Gefen, Karahanna, & Straub, 2003a). TAM constantly defines a big part of difference in the purpose of usage of a diversity of ICT by users in several countries and environments (Au & Zafar, 2008; Gefen, Karahanna, & Straub, 2003b; Venkatesh & Bala, 2008b). Because it first seemed, TAM model is broadly examined and extended into various alternatives. A few of important developments have been the (Venkatesh & Davis, 2000) TAM 2, the Unified Theory of Acceptance and Use of Technology, for instance, applied to mobile applications (Gao, Krogstie, & Siau, 2013), the (Wixom & Todd, 2005) combined model of user satisfaction and technology acceptance, and the TAM 3 model projected by Bala and Venkatesh (2008) in the area of e-commerce.

In addition to cloud system adoption, several present types of research are possible to be recognised within the information systems area that uses TAM to define adoption related to

various technologies. Most of these technologies increase some other external variables to the real model of TAM which are considered to be the most important for study. Therefore, it is often applied in researches on use in companies and ERP implementation (Bradley & Lee, 2007; Bueno & Salmeron, 2008; D. Lee, Lee, Olson, & Hwan Chung, 2010; Youngberg, Olsen, & Hauser, 2009), Internet banking (Yoon & Barker Steege, 2013), applications for e-commerce (Agrebi & Jallais, 2015), file digitization systems (Hong, Hwang, Hsu, Wong, & Chen, 2011), mobile social gaming (Chen, Rong, Ma, Qu, & Xiong, 2017), and e-learning platforms (Cheung & Vogel, 2013; Sánchez & Hueros, 2010; Tarhini, Hone, & Liu, 2014), among several other business sectors.

2.8.4 TAM Used for Cloud Acceptance

In 2012, (Opitz, Langkau, Schmidt, & Kolbe, 2012). used TAM model to study the cloud computing user acceptance. The results show that cloud computing user acceptance can be forecasted and defined by different non-financial variables regarding cognitive instrumental and social influence procedure. Especially, aspects such as career relevance, image, and perceived utility play a major part in cloud computing acceptance.

Empirically, this research studied several theoretical instruments and models to comprehend the aspects that impact the adoption of cloud computing. It suggested an extended TAM model personalised to suit the setting of cloud computing, by incorporating three external aspects; anxiety, trust and perceived risk. Experience attained from this examination proposes that cloud computing adoption has a high possibility for IT professionals (Alotaibi, 2014).

Palos-Sanchez, Arenas-Marquez, & Aguayo-Camacho examined the aspects that decide the cloud computing adoption (SaaS model) in companies in which this approach is taken into account as strategies for implementing their activity. A research model has been advanced to assess the aspects that impact the purpose of cloud computing usage that connects the variables discovered in the technology acceptance model with some other external variables such as training, top management support, organization size, communication and technological complexity. The outcomes of this research indicate what the important aspects are to be considered and how they are interconnected. Also, they display the organizational demands that must be measured by those organisations interested to execute a original management model selected to the digital economy, particularly those connected with cloud computing (Palos-Sanchez, Arenas-Marquez, & Aguayo-Camacho, 2017).

3 Research Methodology

3.1 Introduction

The present research aims at assessing the variables influencing the acceptance of cloud-based PM tools in project managers and management personnel. Acceptance covers the attitude of managers towards the adoption of cloud computing based PM systems. This research uses the Technology Acceptance Model 2 (TAM2) in order to analyse the acceptance of the cloud-based PM tools.

The adopted methods to conduct the study are clearly defined in this chapter. The explanation for the chosen method and what are key data to address the research objective and research questions are explained with the data collection procedure and data analysis. In addition, rationale and justification are presented for each and every selected method including research design, research instruments, data sources, data collection techniques, data presentation techniques and analytical techniques.

3.2 Research Design

The research design is the layout for a researcher to conduct the research and serves as an outline of the methods and procedures that required collecting and analysing data. The requisites of a researcher are fulfilled by the appropriate research design that could be descriptive, historical, comparative, correlation-based, simulation-based, experimental, action-based, evaluation-based, feminist, ethnological, or culture based (Walliman, 2011). However, all these research designs could come under two categories ‘Qualitative’ and ‘Quantitative’ researches. To conduct quantitative and qualitative research designs both primary and secondary data- based research was conducted to collect data. Many researchers have provided different insights about the research designs. In general, the data collection is non-numerical in qualitative research design (Saunders et al., 2009a) whereas the quantitative research design involves the collection of data which is numerical and can be statistical analysed (Creswell, 2011).

The justification for the selection of quantitative research design:

During the initial stages of the research, we found no quantitative researches performed on the analysis of variables influencing the acceptance of cloud-based PM tools by project

managers and management personnel. In order to answer the research questions, we used a quantitative research design.

3.3 Research Approach

Research approaches can be classified into three approaches as deduction, induction and abduction according to Saunders et al. (2012). The deduction approach is the review of the previous literature to identify concepts and theories through employing a research strategy specifically designed for the purpose of the study. This approach starts with a hypothesis or theory and finally provides either modification or confirmation of the considered theory (Saunders et al., 2012). In contrast to deductive approach, the inductive approach followed to collect data and often develops a new theory by the researcher data analysis. In general, inductive approach begins with the research objectives and presents a theory at the end (Saunders et al., 2012). However, abduction type of approach is the mix of induction and deduction because an abductive approach starts with induction and ends with the deduction approach (Saunders et al., 2012; Suddaby, 2006). According to Bryman and Bell (2011), qualitative research methods are generally inductive whereas quantitative research methods are deductive.

The justification of the deductive approach:

In the present research, we devised a set of hypotheses by revising the previous literature wherein variables of the research are identified. The hypotheses were framed on the basis of examination of previous theories and studies, and the researcher intends to test the framed hypotheses. The reason for selecting this approach is the research objectives and questions of this research. This study was an explanatory hypothesis testing study, which is deductive in approach with quantitative methodology. The relationship between the variables will be examined in the research. Therefore, the study will collect significant number of quantitative data that will be empirically tested by statistical techniques.

3.4 Research Strategy

For any research, research strategy is imperative like a root map which directs the research goal and the plan to attain the research aim and find answers for the research questions. The type of research strategy includes survey, experiment, action research, case study, ethnography, grounded theory and archival research (Saunders et al., 2009a). According to find answers for

the research question, an established instrument from the acceptance research of IT technologies is used in this study.

In the literature, a widely used instrument to detect and measure the acceptance of IT technologies is the TAM 2 model. As described in chapter 2.7 the TAM 2 is a construct, which defines and measures influencing variables of the IT acceptance. Several authors have already used this model to find variables, which influence the acceptance of cloud-based software (Opitz, 2012; Alharbi 2012; Bachleda et al., 2017). Since the cloud-based PM tools are software, it makes sense to apply this model to detect and measure the variables of acceptance. In this study, we apply the variables from previous studies to perform a research on the acceptance of cloud-based PM tools by project managers and management personal. Once the relationships between the variables are identified, the hypotheses can be postulated easily and the dynamics of the situation is clearly comprehensible. The hypotheses were developed by use of a template based on the TAM 2 (Venkatesh & Davis, 2000, pp. 186).

In order to test the hypothesis, this study adopts a questionnaire. It was derivative on the basis of already proven questions in previous literature (Venkatesh & Davis, 2000, pp. 186-204). The questions are formulated according to the Likert Scale format. The Likert Scale Format is a layout, in which the respondents have to answer on a scale of 1 to 5. The scale reaches from 1 - strongly disagree to 5 - fully agree (Alexandrov, 2010). This format has been used in comparable studies and has proven to be reasonable in this context (Venkatesh, 2000 pp. 186-204; Opitz, 2012, Bachleda et al., 2017). Therefore, this format was used in the present work.

3.5 Data Analysis Tools and Techniques

Relationships between latent variables can be estimated by hypotheses. The variables can be verified on the basis of empirically collected data. Latent means that the expression is not directly observable and can only be measured with the help of indicators (Backhaus et al., 2016, pp. 67-69). Indicators are directly measurable facts, which indicate the presence of the intended, but not directly detectable phenomena (Kroeber-Riel & Weinberg, 2003, p. 31). The indicators are modelled within the measurement model. Hypotheses define the relationships between the variables. Further, the regression indicates whether the hypothesis is confirmed or rejected.

The goal of descriptive statistics is to clearly, present and organize empirical data through tables, key figures and graphs. This is especially useful for extensive data, as these cannot be easily examined (Benninghaus, 1998).

For the analyses of the quantitative data, a regression analysis is an established instrument in literature (Venkatesh, 2000; Opitz, 2012) and is carried out in this study. The regression analysis is a statistical analysis method. It is one of the most flexible and widely used statistical analysis method. The analysis can be performed as a simple linear regression analysis or as a multiple linear regression analysis. In simple linear regression, a dependent variable is explained only by an independent variable. The goal of simple linear regression is to estimate the two regression parameters (level and slope parameters) and estimate the error variance. Multiple regression, on the other hand, encompasses linear regressions with multiple explanatory variables. In summary, the regression analysis serves to analyse relationships between a dependent variable and one or more independent variables. In particular, it is used to:

- recognize and explain connections
- estimate or forecast the values of the dependent variables (Backhaus et al., 2010)

The data collected from the participants were filled in an excel sheet, and the same will be imported into the SPSS tool for analysis. The analyses of the data were carried out by using the statistical data analysis software called Superior Performing Software System (SPSS). The SPSS statistics software is a modular program package for the statistical analysis of data (Brosius, 2008). In this study, the authors utilise statistical analysis techniques such as descriptive statistics and regression analysis.

3.6 Sampling

There are two types of sampling techniques such as probability or representative sampling and non-probability or judgmental sampling in the data collection. For this study, we adopt the probability sampling technique as the samples considered for the research from a relatively large population (Tansey, 2007). Project managers, who handling PM tools were selected as a sample/ participant. The project managers working in the oil and automotive industry. We choose this industries because of personal contacts, which were used to collect the data. A

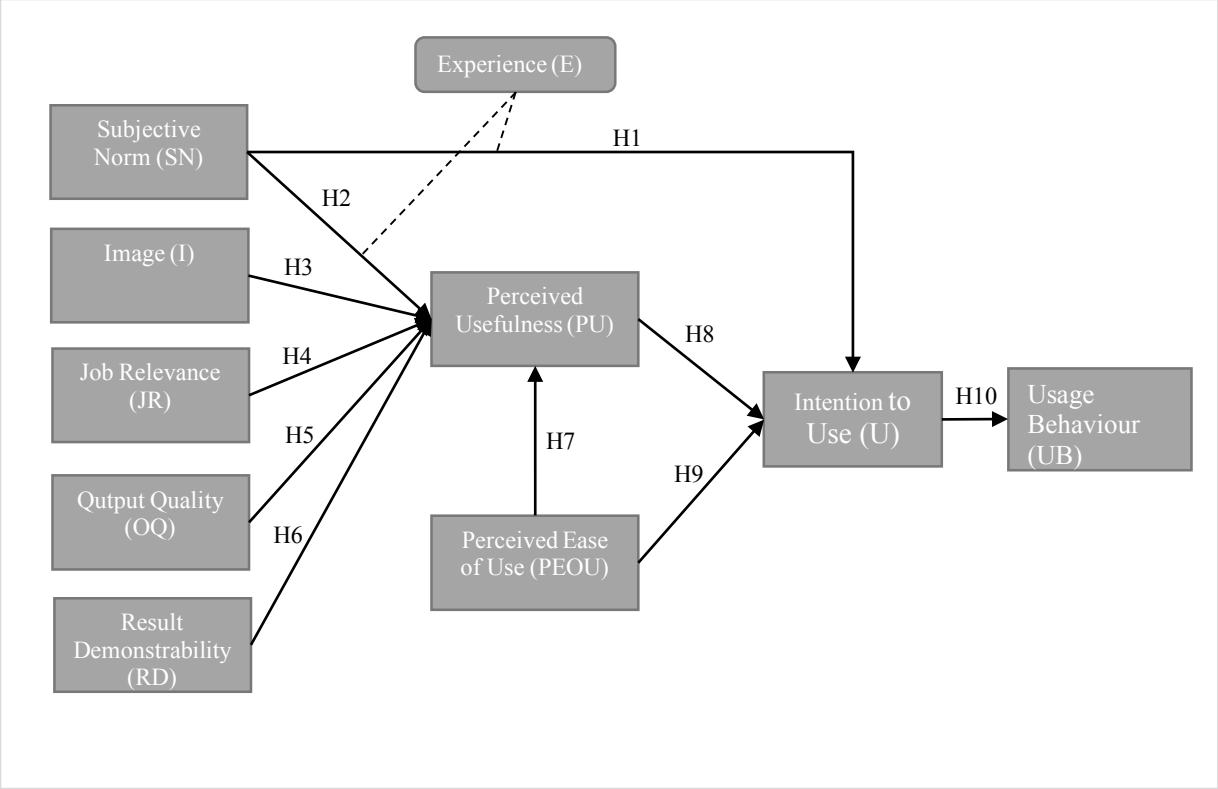
simple random sampling technique where carried out. Around 47 respondents were recruited for the research wherein data is collected using a questionnaire-based survey instrument.

3.7 Application of TAM 2 to the Research Question

Based on previous studies about the TAM 2 (Venkatesh & Davis, 2000, pp. 186-204), this study will apply a TAM 2-inspired model (see chapter 2.8) to the research questions about the acceptance of cloud-based PM tools. The goal is to identify the key variables in the acceptance of cloud-based PM tools and derive a strategy for increasing acceptance. This research focuses on using cloud-based PM tools in the business content, therefore it is not necessary to classify users into voluntary or non-voluntary users. For this reason, the construct of "voluntary" is excluded in this research.

The discussed constructs are taken from existing acceptance literature (Venkatesh & Davis, 2000, pp. 186-204). In terms Perceived Usefulness, Perceived Ease of Use and Intention to Use are generally consistent in acceptance research. Therefore, an unchanged assumption of these constructs seems reasonable. Analogous to TAM 2, it is assumed that the Perceived Ease of Use and the Perceived Usefulness affects the Intention to Use, whereby the Perceived Ease of Use also has an effect on Perceived Usefulness (Sharifzadeh et al., 2017). In terms of the external variables there is no common agreement in the literature, therefore depending on the research context, different variables have been modelled. The chosen variables are proven by different literature from acceptance research and cloud computing (Opitz et al., 2012). The acceptance model developed on the research question is depicted in figure 3.

Figure 3, Operational Acceptance Model (Original from Venkatesh and Davis 2000)



The hypotheses were drawn up on the basis of the hypotheses of Venkatesh and Davis 2000. Table A2 in the appendix shows the original hypotheses. Based on the developed acceptance model and proven by previous literatures (Venkatesh & Davis, 2000), the following hypotheses are proposed:

H1: Subjective Norm will positively influence users' Intention to Use.
H2: Subjective Norm will positively influence users' Perceived Usefulness.
H3: Image will positively influence users' Perceived Usefulness.
H4: Job Relevance will positively influence users' Perceived Usefulness.
H5: Output Quality will positively influence users' Perceived Usefulness.
H6: Result Demonstrability will positively influence users' Perceived Usefulness.
H7: Perceived Ease of Use will positively influence users' Perceived Usefulness.
H8: Perceived Usefulness will positively influence users' Intention to Use.
H9: Perceived Ease of Use will positively influence users' Intention to Use.
H10: Intention to Use will positively influence users' behaviour.

As previously mentioned, the study design is based on a quantitative research method in the form of a questionnaire to test the established hypotheses of the research model. Table 2 shows the variables with the corresponding items and the questions from the survey. The derivation of the questions can be found in Table A 3, in the appendix.

Table 2, Variable, Items and Questions, (see Table A 3 in the Appendix)

Variable	Item	Question
Subjective Norm (SN)	SN_1	People who influence my behaviour think that I should use Cloud-based project management tools
	SN_2	Experts who are important to me think that I should use Cloud-based project management tools
	SN_3	People who are important for my career think that I should use Cloud-based project management tools
	SN_4	I am expected to use Cloud-based project management tools
Job Relevance (JR)	JR_1	Usage of Cloud-based project management tools is relevant for my job
	JR_2	For my future work in my company, Cloud-based project management tools are important
	JR_3	In my job, usage of Cloud-based project management tools is important
Image (I)	I_1	Usage of Cloud-based project management tools improves my reputation in my company
	I_2	I can level my profile by using Cloud-based project management tools
	I_3	IT decision makers using Cloud-based project management tools have more prestige
	I_4	Cloud-based Project management tools are a status symbol in an organization
Output Quality (OQ)	OQ_1	Cloud-based Project management tools makes sense for increasing our company's output
	OQ_2	I think IT resources can be used more effectively with Cloud-based project management tools
	OQ_3	The service level of our IT will increase with Cloud-based project management tools
	OQ_4	The quality of the output I get from Cloud-based project management tools is high

	OQ_5	IT costs will sink by using Cloud-based project management tools
Result Demonstrability (RD)	RD_1	The results of using Cloud-based project management tools are apparent to me
	RD_2	I believe I could communicate to others the consequences of using Cloud-based project management tools
	RD_3	I have no difficulty telling others about the results of using Cloud-based project management tools
Experience (E)	E_1	I can describe the difference between the concepts of IT outsourcing and Cloud-based project management tools
	E_2	I have experience in using Cloud-based project management tools
	E_3	I know several Cloud-based project management tool service providers and their services
Perceived Usefulness (PU)	PU_1	I expect additional benefits in my company by using Cloud-based project management tools
	PU_2	Cloud-based Project management tools improve my performance in my job
	PU_3	Cloud-based Project management tools enhance my effectiveness in my job
	PU_4	I expect higher flexibility in the execution of my work by using Cloud-based project management tools
Perceived Ease of Use (PEOU)	PEOU_1	Using Cloud-based project management tools would not lead to technical difficulties in my company
	PEOU_2	Cloud-based Project management tools integrate quite easily in our IT infrastructure
	PEOU_3	I find Cloud-based project management tools easy to use
	PEOU_4	For our employees using Cloud-based project management tools does/would not require a lot of mental effort
Intention to Use (ITU)	ITU_1	Assuming I can decide, I intend to use Cloud-based project management tools
	ITU_2	Given that I have access to Cloud-based project management tools, I would use these tools
	ITU_3	I intend to use Cloud-based project management tools
	ITU_4	We will start using Cloud-based project management tools soon (or have started)

Usage Behaviour (UB)	UB_1	Is your acceptance to use Cloud-based project management tools as a result of the quality factors
	UB_2	Is your acceptance to use Cloud-based project management tools services as a result of your experience Perceived Usefulness

3.8 Data Collection Method

The authors of this paper involve two types of data collection, primary and secondary. The primary data will be collected by the online questionnaire survey, and it was designed in a way that the respondents have to answer all the questions to ensure no missing responses. The secondary data collection is the background information regarding the research topic was gathered by the in-depth literature review (Chapter 2).

The questionnaire was designed on April 16, 2018 and sent to project managers in the oil and automotive industry by e-mail. On April 28, 2016, a reminder email was sent with the aim of achieving the highest possible response rate. On May 11, the survey period was over and the data analysis began.

3.9 Ethical Considerations

The present research involves human participants, and hence confidentiality should be maintained in all aspects. In this regard, the researchers assure that no personal information except the researcher's email address was acquired. The participant involved in this research was provided with a unique identification code which was used for analysis purposes only. Furthermore, data collected from the participant were stored on the personal computer of the researchers, confidentiality will be maintained and shared only with the supervisor and the university research committee. Once the research is accepted, the data will be removed from the researcher's personal computer. Email addresses were used to disseminate/ send a copy of the accepted research work to the participants as a token of gratitude for participating in the research.

3.10 Summery

The present chapter covered the information regarding the research methodology adopted for the research. The researcher provided ample justification with respect to the selection of the research design, the approach selected for the research, sampling techniques used and the data

collection methods used. The data analysis tool and techniques used for the research are also covered in this chapter.

In addition, the application of the TAM 2-inspired was explained and the hypotheses to test the variables for the acceptance of the cloud-based PM tools were developed. The next chapter covers the results and analysis of the study.

4 Empirical Analysis

This chapter presents the results of the question are. Beginning with the explanation of the descriptive features. In the next step, a quality check of the structural model is carried out and the overall model is tested.

4.1 Descriptive Characteristics of the Sample

The data analysis involved 47 answered questioners from people, who works as project managers or as management personnel. Of the 47 responses, 36 were answered by males and 11 by female participants. This unilateral ratio can be explained by the fact that most of the answers come from the oil industry, where, according to a study by the Boston Consulting Group, 26% of employees in the international oil industry are women (Rick, 2017). The gender distribution is shown graphically in figure 1.

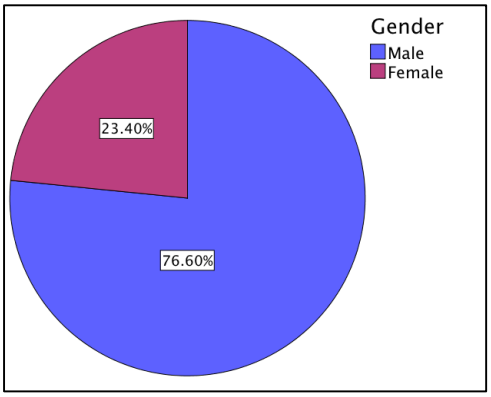


Figure 4, Gender Chart

Figure 2 shows the age distribution of the returned answers of the questionnaires. The graph shows that 54.54% of the questionnaire replies were filled by people up to the age of 45 years. 31.82 % of the respondents are between the ages of 46 and 55 years old, and 13.64% are over 56 years old.

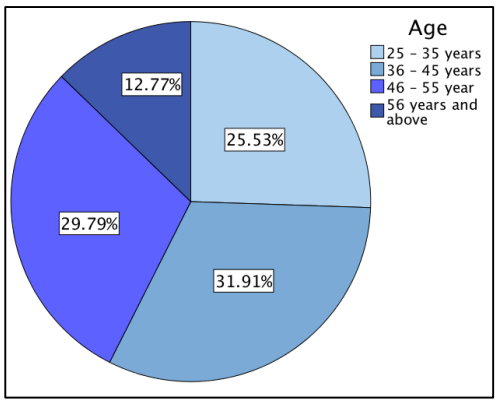


Figure 5, Age Chart

Table 3 summarizes the average values of the acceptance variables. The respective mean values with the associated standard deviation and variance as well as the minimum and maximum values for each item are displayed.

Table 3, Descriptive Statistics of all Items (Evaluated in SPSS)

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
SN_1	47	1	4	3.06	.870	.757
SN_2	47	2	5	3.00	.752	.565
SN_3	47	2	5	3.19	.825	.680
SN_4	47	1	5	3.43	.950	.902
JR_1	47	2	5	3.55	.746	.557
JR_2	47	2	5	3.66	.700	.490
JR_3	47	2	5	3.62	.822	.676
I_1	47	1	4	3.15	.807	.651
I_2	47	1	4	3.09	.803	.645
I_3	47	1	5	2.38	.898	.807
I_4	47	1	4	1.85	.751	.564
OQ_1	47	2	5	3.53	.856	.733
OQ_2	47	2	5	3.87	.850	.722
OQ_3	47	3	5	3.64	.605	.366
OQ_4	47	2	5	3.70	.778	.605
OQ_5	47	2	5	3.79	.690	.475
RD_1	47	1	5	3.36	.987	.975
RD_2	47	1	5	3.17	.985	.970
RD_3	47	1	5	3.32	.783	.613
E_1	47	1	5	2.89	1.026	1.054
E_2	47	2	5	3.72	.713	.509
E_3	47	2	5	3.53	.654	.428
PU_1	47	3	5	4.23	.729	.531
PU_2	47	2	5	3.91	.775	.601
PU_3	47	2	5	3.47	.997	.994
PU_4	47	2	5	3.91	.880	.775
PEOU_1	47	1	5	3.28	.926	.857
PEOU_2	47	2	5	3.57	.994	.989
PEOU_3	47	2	5	3.87	.647	.418
PROU_4	47	2	5	3.47	.881	.776
ITU_1	47	2	5	3.96	.779	.607
ITU_2	47	2	5	3.96	.859	.737
ITU_3	47	3	5	4.06	.791	.626
ITU_4	47	2	5	3.98	.766	.586
UB_1	47	2	5	4.11	.866	.749
UB_2	47	1	5	4.09	.929	.862

The least rated items on average are those of the Image influence I_3 and I_4 (averages I_3 = 2.38, I_4 = 1.85), whereas I_1 and I_2 with the average of I_1 = 3.15 and I_2 = 3.09 are significantly higher. The highest rated items are UB_1 and UB_2 with 4.11 and 4.09.
The minimum value 1 (= strongly disagree) was chosen for 12 out of 36 items, the value 2 (disagree) was chosen as the minimum value for 21 out of 36 items and the value 3 (neutral) was chosen as the minimum value for the remaining 3 items. The maximum value 5 (= strongly agree) was chosen as the maximum value for 31 of 36 items, the remaining items have the maximum value of 4 (agree). The largest standard deviation can be found in the item related to the experience E_1 with 1.026, followed by the Item related to Result Demonstrability PU_3 with 0.997.

4.2 Measurement Model (Reliability and Validity)

A test is valid, if it will effectively measure what should be measured (Kuss et al., 2012). Various steps have been taken to ensure the validity of the data collection tool of the present work. The relevant first part for examining the model is based solely on questions used in previous studies for TAM 2 (Venkatesh & Davis, 2000, Venkatesh et al. 2003, Wixom & Todd, 2005).

Reliability is described as the independence of an examination result of a one-time examination procedure and the associated situational influences (Kuss et al., 2012, p. 27). The reliability describes the accuracy of a method which provides a same measurement result even with repeated measurement. In empirical studies, several items are often used for a specific characteristic in order to be able to reliably assess the characteristic of the feature (Ogden, 2012).

To assess this construct reliability, Cronbach's α (Cronbach, 1951) is a common measure used to measure the average intercorrelation of the items (indicators) of a construct. The value indicates to what extent individual items are suitable for the situation to be examined and which are preferably to be eliminated. The Cronbach's alpha values should above 0.600 (Kuss et al., 2012, p. 109). In order to test the reliability in the present research, using SPSS, the Cronbach`s α is calculated for the individual characteristics. The alpha value on the "Experience (E)" shows, that the subscale`s alpha level was 0.204, which indicates that the subscale did not have an adequate level of inter-item reliability. Further analyses found that deleting any of the items would not significantly increase the alpha level. For the reason that the attribute is not reliable,

the authors have decided to effectively omit this attribute. The obtained alpha values of the individual features are shown in Table 4.

Table 4, Descriptive Statistics and Cronbach`s analysis

Variable	Number of Items	Mean	Std. Deviation	Cronbachs Alpha
SN	4	3.1702	.62142	0.707
JR	3	3.6099	.61116	0.731
I	4	2.6170	.58942	0.694
OQ	5	3.7064	.51220	0.697
RD	3	3.2837	.74529	0.736
E	3	3.3830	.50590	0.204
PU	4	3.9894	.63408	0.732
PEUO	4	4.0957	.83170	0.760
ITU	3	3.5479	.66479	0.803
UB	2	3.8830	.63385	0.835

Table 4 also reveals the descriptive statistics of variables influencing acceptance of project management tools in the cloud. The factor Perceived Ease of Use (PEOU) has the highest mean of 4.0957 with standard deviation 0.8317, while Image (I) has the lowest mean of 2.617 with standard deviation 0.58942.

Also, the mean values show that the study respondents agree with the statements of the variable with an average mean higher than 3.00. Only the mean for the statements regarding Image is lower than 3.00. Overall, it was found that the measurement models of the constructs meet the essential validity and reliability criteria and can be used to test the research model.

4.3 Regression Analysis

4.3.1 Simple Linear Regression

Table 5 shows the relationship between dependent and independent variables. The arrow direction illustrates the dependency relationship of the variables. The analyse test, if the independent variable has a significant effect on the dependent variable.

Table 5, Regression Values

			R square	Beta	P-Value
Subjective Norm	→	Intention to Use	-	-0.009	0.952
Subjective Norm	→	Perceived Usefulness	0.13	0.369	0.012*
Image	→	Perceived Usefulness	-	0.118	0.461
Job Relevance	→	Perceived Usefulness	-	0.171	0.268
Output Quality	→	Perceived Usefulness	0.157	0.410	0.006**
Result Demonstrability	→	Perceived Usefulness	0.148	0.334	0.008**
Perceived Ease of Use	→	Perceived Usefulness	-	0.143	0.362
Perceived Usefulness	→	Intention to Use	0.129	0.259	0.013*
Perceived Ease of Use	→	Intention to Use	0.118	0.327	0.018*
Intention to Use	→	Usage Behaviour	0.1	0.241	0.03*

* Regression is significant at the P < 0.05 level (2-tailed)

** Regression is significant at the P < 0.01 level (2-tailed)

The majority of relationships are significant. The analyses show, that the Output Quality (OQ) has the strongest significant effect on the Perceived Usefulness (PU) with a value of 0.157. In other words, 15.7 percent of the variance of the Perceived Usefulness (PU) can be explained by the Output Quality (OQ). The second highest significant effect is noticed from the Result Demonstrability on the Perceived Usefulness (PU) with a value of 0.148. The direct effect of the Subjective Norm (SN) on the Intention to Use (ITU) is very low with a beta value of -0.009. In addition, the P-value of this relationship does show a not significant impact. The same applies to the relationships of Intention to Use (ITU) to Perceived Usefulness (PU), Job Relevance (JR) to Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) to Perceived Usefulness (PU).

4.4 Hypothesis Testing

Hypothesis 1: Subjective Norm will positively influence users' Intention to Use.

Table 6, Hypothesis 1

H1	Unstandardized Coefficients		R Square	P Value
	Beta	Std. Error		
(Constant)	4.019	0.491	-0.009	0.000
SN	-0.009	0.152		0.952 N.S.

Dependent Variable ITU

N.S. - not significant

Association between Subjective Norm and Intention to Use is shown in table 6 using the linear regression model. From the above table, it is noticed that Subjective Norm does not have a significant impact on the Intention to Use. Since, the p-value of Subjective Norm is above 5 percent level of significance ($p < 0.05$). **Hypothesis 1 is rejected.**

Hypothesis 2: Subjective Norm will positively influence users Perceived Usefulness.

Table 7, Hypothesis 2

H2	Unstandardized Coefficients		R Square	P Value
	Beta	Std. Error		
(Constant)	2.712	0.458	0.131	0.000
SN	0.369	0.142		0.012*

Dependent Variable PU

* - P < 0.05

Association between Subjective Norm and Perceived Usefulness is shown in table 7 using the linear regression model. As per the statistical significance ($p < 0.05$), Subjective Norm does have a significant impact on the Perceived Usefulness. In addition, the beta (0.369) coefficient of Subjective Norm is positive, which reveals that the impact is positive; i.e., if Subjective Norm increases, then the Perceived Usefulness also increases. **Hypothesis 2 is accepted.**

Hypothesis 3: Image will positively influence users Perceived Usefulness.

Table 8, Hypothesis 3

H3	Unstandardized Coefficients		R Square	P Value
	Beta	Std. Error		
(Constant)	3.573	0.427	0.012	0.000
I	0.118	0.159		0.461 N.S.

Dependent Variable PU

N.S. - not significant

Association between Image and Perceived Usefulness is shown in table 8 using the linear regression model. From the above table, it is noticed that Image does not have a significant impact on the Perceived Usefulness. Since, the p-value of Image is above 5 percent level of significance ($p < 0.05$). **Hypothesis 3 is rejected.**

Hypothesis 4: Job Relevance will positively influence users Perceived Usefulness.

Table 9, Hypothesis 4

H4	Unstandardized Coefficients		R Square	P Value
	Beta	Std. Error		
(Constant)	3.266	0.558	0.027	0.000
JR	0.171	0.152		0.268 N.S.

Dependent Variable PU

N.S. - not significant

Association between Job Relevance and Perceived Usefulness is shown in table 9 using the linear regression model. From the above table, it is noticed that Image does not have a significant impact on the Perceived Usefulness. Since, the p-value of Job Relevance is above 5 percent level of significance ($p < 0.05$). **Hypothesis 4 is rejected.**

Hypothesis 5: Output Quality will positively influence users Perceived Usefulness.

Table 10, Hypothesis 5

H5	Unstandardized Coefficients		R Square	P Value
	Beta	Std. Error		
(Constant)	2.432	0.573	0.157	0.000
OQ	0.410	0.141		0.006**

Dependent Variable PU

** - P < 0.01

Association between Output Quality and Perceived Usefulness is shown in table 10 using the linear regression model. As per the statistical significance ($p < 0.01$), Output Quality does have a significant impact on the Perceived Usefulness. In addition, the beta (0.410) coefficient of Output Quality is positive, which reveals that the impact is positive; i.e., if Output Quality increases, then the Perceived Usefulness also increases. **Hypothesis 5 is accepted.**

Hypothesis 6: Result Demonstrability will positively influence users Perceived Usefulness.

Table 11, Hypothesis 6

H6	Unstandardized Coefficients		R Square	P Value
	Beta	Std. Error		
(Constant)	2.410	0.413	0.148	0.000
RD	0.334	0.123		0.008**

Dependent Variable PU

** - P < 0.01

Association between Result Demonstrability and Perceived Usefulness is shown in table 11 using the linear regression model. As per the statistical significance ($p < 0.01$), Result Demonstrability does have a significant impact on the Perceived Usefulness. In addition, the beta (0.334) coefficient of Result Demonstrability is positive, which reveals that the impact is positive; i.e., if Result Demonstrability increases, then the Perceived Usefulness also increases. **Hypothesis 6 is accepted.**

Hypothesis 7: Perceived Ease of Use will positively influence users Perceived Usefulness.

Table 12, Hypothesis 7

H7	Unstandardized Coefficients		R Square	P Value
	Beta	Std. Error		
(Constant)	2.994	0.609	0.136	0.000
PEOU	0.143	0.155		0.362 N.S.

Dependent Variable PU

N.S. - not significant

Association between Perceived Ease of Use and Perceived Usefulness is shown in table 12 using the linear regression model. From the above table, it is noticed that Perceived Ease of Use does not have a significant impact on the Perceived Usefulness. Since, the p-value of Perceived Ease of Use is above 5 percent level of significance ($p < 0.05$). **Hypothesis 7 is rejected.**

Hypothesis 8: Perceived Usefulness will positively influence users' Intention to Use.

Table 13, Hypothesis 8

H8	Unstandardized Coefficients		R Square	P Value
	Beta	Std. Error		
(Constant)	3.092	0.358	0.129	0.000
PU	0.259	0.100		0.013*

Dependent Variable ITU

* - P < 0.05

Association between Perceived Usefulness and Intention to Use is shown in table 13 using the linear regression model. As per the statistical significance ($p < 0.05$), Perceived Usefulness does have a significant impact on the Intention to Use. In addition, the beta (0.259) coefficient of Perceived Usefulness is positive, which reveals that the impact is positive; i.e., if Perceived Usefulness increases, then the Intention to Use also increases. **Hypothesis 8 is accepted.**

Hypothesis 9: Perceived Ease of Use will positively influence users' Intention to Use.

Table 14, Hypothesis 9

H9	Unstandardized Coefficients		R Square	P Value
	Beta	Std. Error		
(Constant)	2.829	0.482	0.118	0.000
PEOU	0.327	0.134		0.018*

Dependent Variable ITU

* - P < 0.05

Association between Perceived Ease of Use and Intention to Use is shown in table 14 using the linear regression model. As per the statistical significance ($p < 0.05$), Perceived Ease of Use does have a significant impact on the Intention to Use. In addition, the beta (0.259) coefficient of Perceived Ease of Use is positive, which reveals that the impact is positive; i.e., if Perceived Ease of Use increases, then the Intention to Use also increases. **Hypothesis 9 is accepted.**

Hypothesis 10: Intention to Use will positively influence user's behaviour.

Table 15, Hypothesis 10

H10	Unstandardized Coefficients		R Square	P Value
	Beta	Std. Error		
(Constant)	3.002	0.450	0.100	0.000
ITU	0.241	0.108		0.030

Dependent Variable UB

* - P < 0.05

Association between Intention to Use and Usage Behaviour is shown in table 15 using the linear regression model. As per the statistical significance ($p < 0.05$), Intention to Use does have a significant impact on the Usage Behaviour. In addition, the beta (0.241) coefficient of Intention to Use is positive, which reveals that the impact is positive; i.e., if Intention to Use increases, then the Usage Behaviour also increases. **Hypothesis 10 is accepted.**

4.5 Summary

In the present chapter, the empirical collected data was illustrated by tables and graphs. The accomplished validity and reliability analysis shows that the recorded data from the variable Experience is not reliable. The calculated value is below the minimum value taken from the literature. Therefore, the authors have decided to effectively omit this variable. All other variables are reliable. Subsequently, a regression analysis was carried out to determine the correlations between the variables. The results of the respective hypothesis tests are summarized in Table 16.

Table 16, Summary Table

				R square	Beta	P-Value	Valid
H1	Subjective Norm	→	Intention to Use	-	-0.009	0.952	X
H2	Subjective Norm	→	Perceived Usefulness	0.13	0.369	0.012*	✔
H3	Image	→	Perceived Usefulness	-	0.118	0.461	X
H4	Job Relevance	→	Perceived Usefulness	-	0.171	0.268	X
H5	Output Quality	→	Perceived Usefulness	0.15	0.410	0.006**	✔
H6	Result Demonstrability	→	Perceived Usefulness	0.148	0.334	0.008**	✔
H7	Perceived Ease of Use	→	Perceived Usefulness	-	0.143	0.362	X
H8	Perceived Usefulness	→	Intention to Use	0.129	0.259	0.013*	✔
H9	Perceived Ease of Use	→	Intention to Use	0.118	0.327	0.018*	✔
H10	Intention to Use	→	Usage Behaviour	0.1	0.241	0.03*	✔

* Regression is significant at the P < 0.05 level (2-tailed)

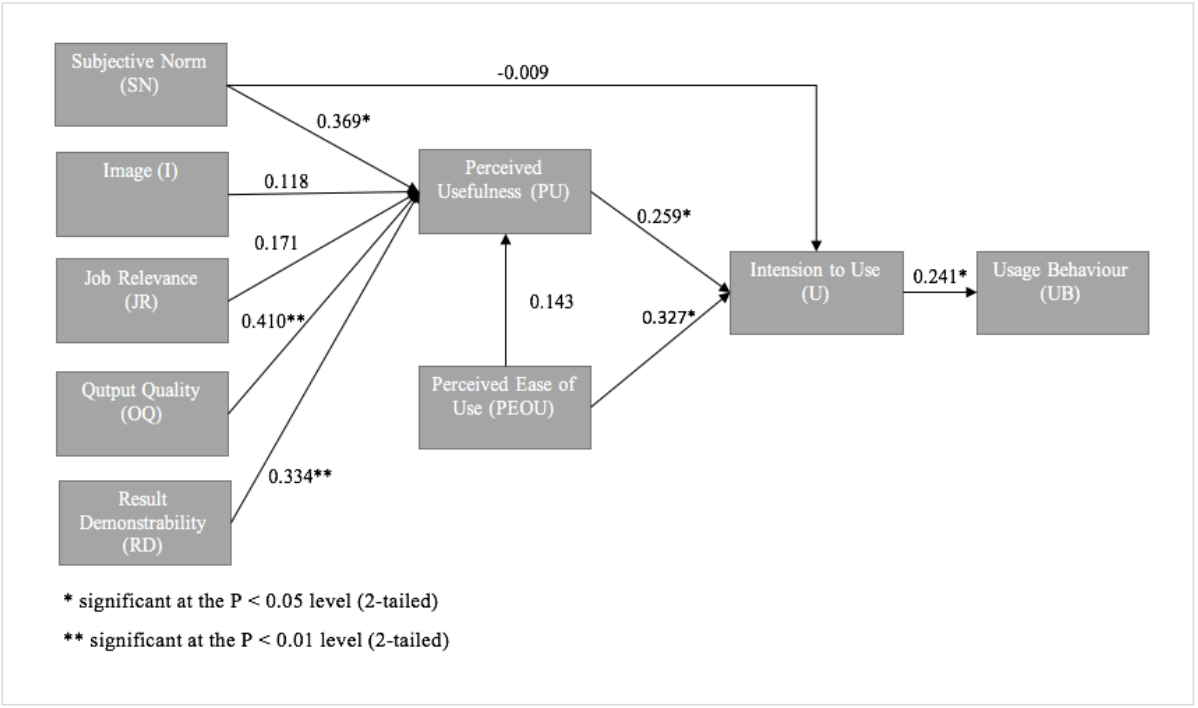
** Regression is significant at the P < 0.01 level (2-tailed)

5 Discussion

Considering the increasing relevance of cloud-based PM tools, this paper highlights a number of variables which influence the acceptance of this technology. This chapter discusses the findings and answers the research questions.

The determined regression values are low, compared to previous studies in this field. A reason for this can be the lower number of samples (N = 47), which can have a negative impact on regression analysis. Nevertheless, the values can be used to answer the first research question, as the overall course of the values shows strong synchronies with comparable studies (cf. Opitz et al. 2012, Bachleda et al., 2017). Figure 7, illustrate the results of regression analysis in the developed TAM 2 model.

Figure 6, Results of Regression Analysis in TAM



5.1 Variables Influencing the Intention to Use

The proposed research model postulates that Perceived Usefulness and Perceived Ease of Use have a direct impact on the Intention to Use. The statistical investigation shows the highest significant influence of the Perceived Usefulness on the Intention to Use, hence the hypothesis H8 is confirmed. The result, with a value of 0.259, is lower than in comparable acceptance studies (cf. Opitz et al. 2012). However, the studies show that the Perceived Usefulness has a

high impact on the intention of use. In addition, the Perceived Ease of Use has also a significant impact on the Intention to Use. This is confirmed in Hypothesis H9. Comparable studies show equal results (Bachleda et al., 2017). The hypothesis H1, on the other hand, is to be discarded since the Subjective Norm does not have a significant influence on the Intention to Use.

Consequently, it is advisable to consider the Perceived Usefulness and the Perceived Ease of Use in the plan of increasing the acceptance of cloud-based PM tools.

5.2 Variables Influencing the Perceived Usefulness

As described in the literature and applied in the present research it is to verify, if the variable Subjective Norm, Image, Job Relevance, Result Demonstrability, Output Quality and Perceived Ease of Use have a significant impact on the Perceived Usefulness. The hypotheses H2, H3, H4, H5, H6 and H7 provide insight into the influence of the independent variables on the dependent variable (Perceived Usefulness). A significant impact is noticed in H2, H5 and H6. The strongest impact was determined by Output Quality on the Perceived Usefulness, followed by Result Demonstrability and Subjective Norm. The comparable literature demonstrates a similar relationship where Output Quality has the most significant impact on Perceived Usefulness (see, Opitz 2012; Venkatesh 2000).

The hypotheses H3, H4 and H7 are rejected which shows, that no significant influence could be detected in these relationships. In comparable literature is no agreement about the impact of the Subjective Norm and Result Demonstrability on Perceived Usefulness. The research of Venkatesh (2000) shows a significant relation between these variables, whereas Opitz (2010) shows that there is no significant correlation. A similar situation is present in the relationship between Perceived Ease of Use to Perceived Usefulness. In this research, no significant influence was found, similar to the findings of Opitz (2000), whereas Alharbi (2012) proved in his study on the users' acceptance of cloud computing in Saudi Arabia that there is a significant influence of Perceived Ease of Use to Perceived Usefulness.

These discrepancies can have different explanations. For example, it could be due to the number of survey participants, the business area of the research or the duration of how long the technology is already on the market.

5.3 Variables Influencing the Usage Behaviour

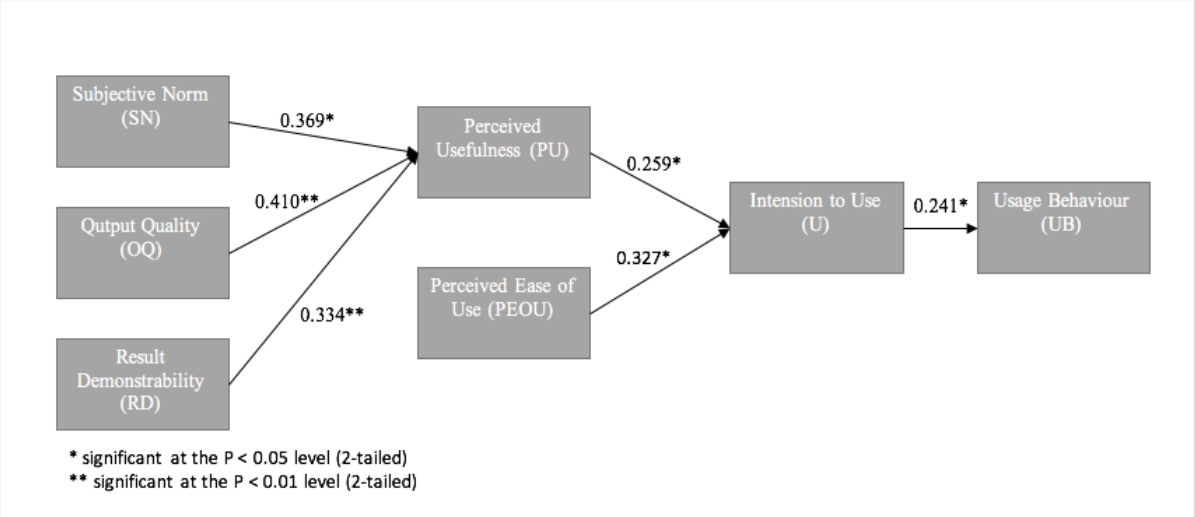
The Intention to Use has a significant influence on the Usage Behaviour, as confirmed in hypothesis H10. This relationship was to be expected since previous studies have demonstrated the significance of this relationship (Venkatesh 2000, Schepers & Wetzels, 2007, p. 96).

5.4 Answers of the Research Questions

Research Question 1: What are the variables influencing cloud-based project management tools acceptance by project managers and management personal?

The variables Subjective Norm, Output Quality and Result Demonstrability influence the Perceived Usefulness, which, together with the Perceived Ease of Use, influences the Intention to Use. The Intention to Use influences the Usage Behaviour, which according to Venkatesh (2000), confirms the acceptance of the technology. Figure 8 illustrates the chain of effects.

Figure 8, Results in TAM



Research Question 2: What strategies can be suggested, based on this research, to improve the acceptance level of cloud-based PM tools?

The results of this study compared to the results of similar acceptance studies shows that the levels of significance are very low. Even the most significant value between Output Quality and Perceived Usefulness with a value of 0.410 is still very low, compared to the values from similar studies (Opitz 2012; Venkatesh 2000).

Based on the results of this study, the acceptance level of cloud-based PM tools can be increased by focusing on Output Quality, Result Demonstrability and Subjective Norm. Although the results show a trend, but they are not meaningful enough to build up a well elaborated strategy. Even though it is proven that some of the variables have a significant impact on the acceptance of cloud-based PM tools, there are obviously other factors that affect the acceptance. Therefore, the authors of this paper state, that no appropriate explanatory power was clarified by this study to create a conclusive strategy for increasing the acceptance level of cloud-based PM tools.

6 Conclusion

After answering the research questions and testing the hypotheses, it is important to assess the results. This chapter deals with the limitations of the thesis and gives an outlook on further research.

6.1 Critical Appreciation and Methodological Limitations

Within the scope of this thesis, a TAM 2-inspired model has been developed to measure the acceptance of cloud-based project management tools by project managers and management personnel. The model is based on the findings from the TAM 2 developed by Venkatesh and Davis (2000). The data was collected through a questionnaire, which was sent to project managers and management personnel in different industries. The statistical evaluation was carried out with the software Excel and SPSS.

In terms of the influence variables of Intention to Use and thus of Usage Behaviour, the research model cannot give a comprehensive picture. Although, it is confirmed that the Subjective Norm, Output Quality and Result Demonstrability have a significant influence on the Perceived Usefulness, however, the fact that six out of ten expected relationships could not be demonstrated, leads to various limitations of the present study. In the present research, the TAM 2 was used as a basic research model. Most of the constructs used in the original version of Venkatesh and Davis (2000), have been adopted and adjusted to the context. The only change, that has been made in the adjustment was the deliberate omission of the variable "Voluntariness". An influence through the omission of the variable "Voluntariness" on the relationships between the other variables is possible but rather implausible.

The validity of the data was assessed using the Cronbach α calculation. The measurement results show that in almost all variables a construct reliability is given. Only the variable "Experience" shows an inadequate reliability, therefore this variable was excluded from further analysis. This omission could be another indication of the inconsistency of the results in comparison with the original version of Venkatesh and Davis (2000).

The results show that Output Quality, Result Demonstrability and Subjective Norm have significant impact on the Perceived Usefulness. Perceived Usefulness has together with Perceived Ease of Use a significant impact on Intention to Use. Further, Intention to Use has a significant impact on Usage Behaviour. This chain of effects explains the acceptance of cloud-based PM tools.

This study provides a first approach to understanding the variables for the acceptance of cloud-based PM tools by project managers and management personnel. A final decision on the strategy of increasing acceptance should not be made on the basis of the data of this research.

6.2 Future Research

Considering the limitations of the present research, it seems reasonable, to consider certain starting points for further research. By incorporating new variables, deleting irrelevant variables and modelling the relationships, which are actually relevant between the variables, the explanatory content of the acceptance model can be improved. Expert interviews also seem to make sense in order to gain further insights into possible influencing variables.

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8 Appendix

Table A 1, Derivation of Hypotheses

Author	Goal of Research	Important Output of Research
Chadli et al. (2016)	To discover and classify the various tools of software PM (SPM) which have been provided in the literature that contribute global software development (GSD) project managers for group interactions in order to contribute for GSD.	For this methodical mapping, research was carried out when entirely 102 software tools were tested concerning SPM activities in GSD. This research finding reveals that Software Project Management adoption in Global Software Development is not sufficiently backed by corresponding tools and merits more consideration from tool makers.
Kostalova, Tetrevova, and Svedik, (2015)	They examine, if methods of PM procedures are supported by use of Project Management Information System.	The finding of this research reveals that applications obtainable freely and cloud tools that back PM present inadequate range of backed procedures. These tools are only functional for small budget-based simple projects, small periods of execution or simple execution processes. If there are widespread and complex projects, it is essential to make use of more complex and technical software applications, like Primavera and MS Project. Nevertheless, their shortcomings cover financial demands, knowledge demands of project managers and members of project team for work with these software applications, and the requirement that reveals their use in a methodology single PM on the phase of the companies.
Aguilera, Villalobos, and Dávila, (2018)	Examine the aspects connected with the organisation and users for management tools acceptance. The study was planned and carried out based on a related and earlier research.	The responses were obtained from 77 managers who had medium-sized projects with importance on the aspects examined. Factors of project complexity, functionality, administrative size and software usage are the most illustrative. Moreover, the research discovered: (i) an important and powerful association between project manager's performance perception and software usage (ii) aspects connected to education, training and experience phase have no influence.
Cicibaş, Unal, and Demir, (2010)	The authors examine automated software tools usage is vital for effective handling and scheduling projects. In the business sector, several automated software tools are developed. This research paper offers a comparison among PM software tools (PMST).	The authors initially developed standards to regulate that PMSTs would be dependent on their study. After that, they developed standards to assess and compare these PMSTs. Lastly, they provide the results in a tabular arrangement. The results will aid project managers to evaluate the weaknesses and strengths of these tools.

Fowler, Lindahl, and Sköld (2015)	this paper is to crucially study and debate how formal PM methods and tools impact the association of university research.	One of the major results shows how the PM formalisation is attacked by incomplete containment and accommodation. This is possible to be described regarding a representation of both front-stage and backstage of the research centre. In the front-stage, formal PM terminology and technology are applied by specifically selected research managers as approaches of presenting to external parties and funding agencies. In the backstage, researchers perform tasks in traditional designs.
Carvalho, Patah, and de Souza Bido (2015)	Examine and compared the impacts of PM with the success of project under the parameters of expense, planning and margins.	The findings reveal a positive and important relationship between efforts of PM in training and competences development and the variable schedule of response with PM enablers. When it comes to project complexity, it consists of an important impact on two features of project success: schedule and margin. Both cross-country analyses reveal an important descriptive influence.
Sukhoo, Barnard, Eloff, & Van der Poll (2004)	Examine the condition of software PM that is used in Mauritius with the aim of doing further in this research. Datasets for statistical study were gathered through two questionnaires, one was collecting information from software development firms and another one was aiming computer software users.	Based on the study analysis performed, it was discovered that there are more options for enhancement related to software PM that is used in Mauritius. Approaches created for the use of western countries may not be entirely appropriate for developing nations. Moreover, cultural variances, the supposition of economic rationality and the requirement to cope with political and community demand on the resources of project, a new PM method to be enhanced may ensure that developing nations.

Table A 2, Derivation of Hypotheses

Original Hypothesis *** Venkatesh & Davis, 2000** **** Opitz et al. 2012**	**Applied Hypothesis**
HYPOTHESIS 1a. Subjective Norm will have a positive direct effect on Intention to Use when system use is perceived to be mandatory *	**H1**: Subjective Norm will positively influence users' intension to use.
HYPOTHESIS 2. Subjective Norm will have a positive direct effect on perceived useful *	**H2**: Subjective Norm will positively influence users Perceived Usefulness.
HYPOTHESIS 3b. Image will have a positive effect on Perceived Usefulness *	**H3**: Image will positively influence users Perceived Usefulness.

HYPOTHESIS 5. Job Relevance will have a positive effect on Perceived Usefulness *	**H4**: Job Relevance will positively influence users Perceived Usefulness.
HYPOTHESIS 6. Output Quality will have a positive effect on perceived useful *	**H5**: Output Quality will positively influence users Perceived Usefulness.
HYPOTHESIS 7. Result Demonstrability will have a positive effect on Perceived Usefulness *	**H6**: Result Demonstrability will positively influence users Perceived Usefulness.
HYPOTHESIS 8. Perceived Ease of Use will have a positive effect on Perceived Usefulness *	**H7**: Perceived Ease of Use will positively influence users Perceived Usefulness.
H10. Perceived Usefulness will have a positive effect on Intention to Use.	**H8**: Perceived Usefulness will positively influence users' intension to use.
H9. Perceived Ease of Use will have a positive effect on Intention to Use.	**H9**: Perceived Ease of Use will positively influence users' intension to use.
H11. Intention to Use will have a positive effect on Actual System Use.	**H10:** Intension to use will positively influence user's behaviour.

Table A 3, Derivation of questions from the questionnaire

Variable	**Item**	**Original Question * Venkatesh & Davis, 2000. ** Opitz et al. 2012**	**Applied Question on Research Content**
Subjective Norm (SN)	SN_1	People who influence my behavior think that I should use the system *	People who influence my behaviour think that I should use Cloud-based project management tools
	SN_2	Experts who are important to me think that I should use cloud computing **	Experts who are important to me think that I should use Cloud-based project management tools
	SN_3	People who are important to me think that I should use the system *	People who are important for my career think that I should use Cloud-based project management tools
	SN_4	I am expected to use cloud computing **	I am expected to use Cloud-based project management tools
Job Relevance (JR)	JR_1	In my job, usage of the system is relevant *	Usage of Cloud-based project management tools is relevant for my job
	JR_2	For my future work in my company, cloud computing is important **	For my future work in my company, Cloud-based project management tools are important
	JR_3	In my job, usage of the system is important *	In my job, usage of Cloud-based project management tools is important
Image (I)	I_1	Usage of cloud computing improves my reputation in my company **	Usage of Cloud-based project management tools improves my reputation in my company
	I_2	People in my organization who use the system have a high profile *	I can level my profile by using Cloud-based project management tools
	I_3	People in my organization who use the system have more prestige than those who do not *	IT decision makers using Cloud-based project management tools have more prestige

	I_4	Having the system is a status symbol in my organization *	Cloud-based Project management tools are a status symbol in an organization
Output Quality (OQ)	OQ_1	Cloud computing makes sense for increasing our company's output **	Cloud-based Project management tools makes sense for increasing our company's output
	OQ_2	I think IT resources can be used more effectively with cloud computing **	I think IT resources can be used more effectively with Cloud-based project management tools
	OQ_3	The service level of our IT will increase with cloud computing **	The service level of our IT will increase with Cloud-based project management tools
	OQ_4	The quality of the output I get from the system is high *	The quality of the output I get from Cloud-based project management tools is high
	OQ_5	IT costs will sink by using cloud computing **	IT costs will sink by using Cloud-based project management tools
Result Demonstrability (RD)	RD_1	The results of using the system are apparent to me *	The results of using Cloud-based project management tools are apparent to me
	RD_2	I believe I could communicate to others the consequences of using the system *	I believe I could communicate to others the consequences of using Cloud-based project management tools
	RD_3	I have no difficulty telling others about the results of using the system *	I have no difficulty telling others about the results of using Cloud-based project management tools
Experience (E)	E_1	I can describe the difference between the concepts of IT outsourcing and cloud computing **	I can describe the difference between the concepts of IT outsourcing and Cloud-based project management tools
	E_2	I have experience in using cloud computing **	I have experience in using Cloud-based project management tools
	E_3	I know several cloud computing service providers and their services **	I know several Cloud-based project management tool service providers and their services
Perceived Usefulness (PU)	PU_1	I find the system to be useful in my job *	I expect additional benefits in my company by using Cloud-based project management tools
	PU_2	Using the system improves my performance in my job *	Cloud-based Project management tools improve my performance in my job
	PU_3	Using the system enhances my effectiveness in my job *	Cloud-based Project management tools enhance my effectiveness in my job
	PU_4	I expect higher flexibility in our IT by using cloud computing **	I expect higher flexibility in the execution of my work by using Cloud-based project management tools
Perceived Ease of Use (PEOU)	PEOU_1	Using cloud computing would not lead to technical difficulties in my company **	Using Cloud-based project management tools would not lead to technical difficulties in my company
	PEOU_2	I find it easy to get the system to do what I want it to do *	Cloud-based Project management tools integrate quite easily in our IT infrastructure
	PEOU_3	I find the system to be easy to use *	I find Cloud-based project management tools easy to use
	PEOU_4	Interacting with the system does not require a lot of my mental effort *	For our employees using Cloud-based project management tools does/would not require a lot of mental effort
Intention to Use (ITU)	ITU_1	Assuming I have access to the *	Assuming I can decide, I intend to use Cloud-based project management tools
	ITU_2	Given that I have access to cloud computing, I predict that I would use is **	Given that I have access to Cloud-based project management tools, I would use these tools

	ITU_3	I intend to use cloud computing **	I intend to use Cloud-based project management tools
	ITU_4	We will start using cloud computing soon (or have started) **	We will start using Cloud-based project management tools soon (or have started)
Usage Behaviour (UB)	UB_1	Self-developed question to measure the Usage Behaviour.	Is your acceptance to use Cloud-based project management tools as a result of the quality factors
	UB_2	Self-developed question to measure the Usage Behaviour.	Is your acceptance to use Cloud-based project management tools services as a result of your experience Perceived Usefulness