

In an Endeavour for a New Vision for Personal Task Management: Exploring User  
Preferences in Personal Task Management Tools

by

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## **Abstract**

There are many computerized tools for personal task management (PTM) with many tools on smart devices and personal computers; its research domain includes some related work that focused on different aspects. In this research, I evaluated the current PTM tools from the aspect of their way of operation. I conducted an online survey on 133 participants, and the measures I relied on are adoption rates, efficiency, effectiveness, and user satisfaction. I also evaluated the users' willingness to transfer to a new PTM tool that works in a different integrated way. My findings show high adoption rates and effectiveness of current tools, but questionable efficiency and user satisfaction. They also show that most of the users are willing to transfer to the new tool if it is implemented.

### **List of Abbreviations Used**

App	Smartphone Application
ERP	Enterprise Resource Planning
HCI	Human Computer Interaction
PIM	Personal Information Management
PTM	Personal Task Management

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## Chapter 1 Introduction

Personal task management is an important aspect of people's life today, and it continues to grow in significance and direct effects on us as we –humans– continue to live a very busy modern life. We\* can define personal task management (PTM) as the process we do to organize our responsibilities and daily tasks, to increase our productivity, and to schedule and achieve our timely commitments throughout days. A non-comprehensive list of activities in this process includes managing household chores like buying grocery on time, controlling personal financials and family budgets, organizing calendar and planning for upcoming appointments, events, and significant dates, and self-development and personal entertainment like listing books to read or movies to watch in spare time. One core part of personal task management is to-do list creation and maintenance.

There are several ways for people to apply PTM techniques in their life. These include using software applications on smartphones and personal computers, or using manual methods like physical notes. Some people combine the two methods and take a semi-electronic approach that utilizes technology features along with hardcopy planners and notes. Those who fully or partially use the technology to manage their personal tasks use apps like to-do lists, calendars, budget-managers, alarms, and more.

Personal task management has significant and direct effects on people's lives and their productivity, and research shows that it extends further to affect even their psychological needs (Leshed & Sengers, 2011) and -partially- their role effectiveness (Coetzer & Richmond, 2009), and although there has been computer science research

\* In the context of this paper, "We" is only used to refer to either general population (users) or to the academic community, depending on the context of the sentence. For any referrals to the researcher, "I" is used.

done in this field over the years, there are still several areas with little knowledge in them, and the work done in this field is far from complete, to the point that some authors consider that “little work” has been done in HCI research with the focus of personal task management (Haraty, Tam, Haddad, McGrenere & Tang, 2012a). This proposes opportunities of exploration for researchers to find new valuable data that will benefit PTM tools users.

### **PIM versus PTM**

In the context of this research, it is important to distinguish between personal information management (PIM) and personal task management (PTM). PIM is the broader scope in which PTM works within (Haraty et al., 2012a). PIM discusses tasks such as storing documents (electronic or paper) and recording and keeping personal information in an organized way, but it is not concerned of how people use this information to achieve tasks. The role of PTM is to use this information to achieve and schedule daily tasks and commitments and care for personal responsibilities. PTM provides the tools that use PIM data, and utilizes PIM resources to help people be more productive and efficient in their daily life. There is much literature in PIM field, but it does not necessarily apply to PTM because it discusses different or more generic topics, and the most crucial part of PTM which is to-do list management is not a major part of PIM literature. This research is concerned exclusively with personal task management.



## **Overview of Core Literature**

Kamsin, Blandford, and Cox (2012) concluded that existing tools fail to help people prioritize their tasks based on certain factors. They also said their studies showed that people see existing applications as inadequate to adapt to their changing needs.

Bota, Bennett, Awadallah, and Dumais (2017) demonstrate that the majority of users send e-mails to themselves as reminders of important tasks rather than using other to-do list applications made specifically for that purpose.

Leshed and Sengers (2011) conducted a study about PTM tools and their role in the life of the average American citizen. They showed that these tools assisted in everyday life and also helped raise their users' self-esteem by keeping them organized and busy all the time.

Haraty et al. (2012a) and Kamsin et al. (2012) both proposed sets of design requirements that should be followed by designers of PTM tools for more efficiency to serve users better in their task management. Nowadays there are numerous PTM apps for smartphones, and software applications available on personal computers, however, it is hard to find one specific tool that followed all or most of the design requirements proposed by both research groups.

## **The Current Situation**

As Haraty et al. (2012a) noted, and by navigating research databases for papers or articles that focus on PTM tools, I could see the lack of research in this area, and although papers mentioned in the literature review of this research provide valuable data and insight into the domain of personal task management, some of these papers are

outdated, and the others are not very relevant to the focus of this research. Haraty et al. (2012a) suggested in their research that electronic PTM tools are not widely adopted, however this was concluded in 2012, while according to Kelton Research (2008) in a survey they conducted on US participants, 76% reported relying on to-do lists, and although the survey did not specify if they were electronic to-do apps or just physical notes, this might suggest that at least a portion of this number uses electronic to-do lists, however this does not include other types of PTM tools such as personal budget managers. Between the results of Kelton Research survey (2008) and the claims of Haraty et al. (2012a), it is not clear whether current PTM tools have high or low adoption rates in the current year.

Another issue about the literature in this field is the confusion that sometimes happens between personal task management and personal information management concepts, and that some authors use the two terms interchangeably without clear distinction between them. This makes it harder to search for related work or rely on some of their findings when we focus on PTM because we are not sure whether their conclusions apply to PTM, PIM, or both.

Over the years, and in different places of the world, I could hear many people complaining about the inability to effectively manage their time, tasks, and responsibilities, and that they are not completely satisfied with the current PTM apps and tools. This is not sufficient to form an informed view regarding these tools, because it is not a scientific or analyzed information based on empirical studies. However, when we put into consideration the findings of some of the relatively-old papers included in this research, we can get an indication of how the users of PTM tools viewed them in the near

past, and this pushes towards newer research to find out whether those findings still apply in the current time or they have changed. And since there is not much research done in this field recently, the need for fresh and informative research becomes even more demanding. One part of this research investigates aspects related to the current PTM tools as I will describe later in this paper, but the investigation in this research is different than other research approaches. Instead of evaluating a specific PTM tool (such as Any.do) or category of tools (such as calendars), here I am evaluating the way the existing tools generally work, with regard to separation as opposed to integration.

One notable characteristic of the existing PTM tools is that they work separately in different life aspects. Jones (2007) discussed this issue, and he used the expression “Information Islands”, and he pointed out that people get distracted between separate information islands and get distracted because of that separation. This means that there are separate tools for each life aspect these tools handle. For example, there are tools for to-do list management, tools for budget management, tools for calendar planning and scheduling, tools for taking notes, and tools for alarms. Separation and independence between these tools is clearly noticed and easily highlighted. And although there are some apps in the market that combine some of these categories together (like Evernote combining note-taking, calendar planning, and to-do list management), I could not find a single tool in the market that manages all life aspects of an individual in one central place. More details about this concept will follow in the subsequent sections and chapters and will form the second part of this thesis document.

## **A New and Different Approach for PTM**

As a computer science graduate and having worked in the information technology industry for six years between 2010 and 2016, specifically in the ERP (Enterprise Resource Planning) software systems field, I experienced firsthand how ERP systems work. In this introduction, I will provide a brief and necessary description of these types of systems and what makes them unique among other systems, and how they inspired me to seek a revolutionary solution for personal task management, I will provide more detailed description about them in the following chapters.

ERP systems are software applications designed for companies to manage their business (Oracle, n.d.). They are different than other software applications for companies in that they are constructed of different sub-systems (modules), and these sub-systems are integrated together through one big database at the core of the system, and they communicate data and processes between them, without having unneeded duplicate data in the database. Financials, Human Resources, Supply Chain, Inventory Management, Transportation Management are some examples of the modules included in an ERP system. Other types of software systems that manage companies are stand-alone applications that operate only on parts of the company's business, in that case there would be a financials application, a customer-relationship management application, a human resources application, etc. All these applications are separated from each other and are not connected, neither do they communicate internally in any way, and each one of them has its own isolated database. They are multiple software systems implemented within the same company to manage different areas of business (different departments).

This resembles –in a way– how individuals currently use PTM tools to manage their life, their responsibilities, and their daily tasks.

Unlike many other software systems, ERP systems are pre-made and already prepared for work, including all the needed database structures and graphical user interface components, and the logical procedures and code that connect the two tiers together, and at the same time they are flexible enough to accommodate different industries and business needs and logic. In the process of implementing an ERP system at a new company, the management decides which modules and features of the system to be activated (and therefore purchased), and which are not. This in turn reflects on the system's database, it only activates the needed parts of it and keep the rest inactive. The customer-company also feeds the ERP system's database with the initial and core data that constructs the company's business logic, and on which the future business operations will rely on. Example of these data are department names, job roles, financial accounts, etc.

Working with SAP and Oracle ERP systems and their databases, I was inspired by their design and techniques, and the fact that they control all departments in one integrated system and through one central database, and that they are flexible enough to accommodate all business needs in different industries, without the need to develop a tailored software system from scratch for each different customer, and without the need to go through all different phases of testing and quality assurance every time a new software system is developed. Also the big advantage of not duplicating data, but instead providing one version of it in one database, and using it among different modules, and this helps reduce inconsistency among the system's different areas.

All these concepts motivated me to think of a PTM solution for individuals that works in a similar way: one application including different areas of human life like a company's departments, integrating different life aspects together through one single database that holds no duplicate data, and that provides this data to different application Modules when needed to operate on. For the purpose of this research, I will refer to this tool as the "ERP-Like" tool. In Winter of 2017 I wrote an academic term-paper that describes a framework design for the ERP-Like tool for personal use to manage an individual's tasks and responsibilities in one central place (ElKhateeb, 2017), and although the complete and detailed design described in that paper is out of the scope of this thesis, I will describe some details to provide context for the reader and because the ERP-Like tool is an important part of this research. The term paper can be found in Appendix F.

I hoped that by creating the ERP-Like tool, we might be able to address the PTM dilemma that we face in our daily life, and be more productive and efficient in achieving our tasks and commitments. However, like any new software tool that works in an unprecedented way, there are challenges to implementing it. First, since the literature provided in this field (which suggests that users are not satisfied with the current PTM tools) is a few years old, we cannot be certain that their findings are still applicable today. Second, even if we reach the conclusion that users nowadays are unsatisfied with these tools, we cannot be certain that they will be satisfied with a new PTM tool that works in the same way ERP systems do, and this clarifies the need for this research.

## **Research Questions**

To address the aforementioned challenges, I proposed two research questions. The first one is: do the current PTM tools have high satisfaction and adoption rates? And the second one is: are users willing to switch from using multiple and separate PTM tools to using one integrated tool (if they feel the need to)? I believe that the answer to the first question will help us know whether users are satisfied or dissatisfied with the way the current tools work, and the answer to the second question will help decide the path for application designers to address the current issues (if issues exist) either by fixing the current tools or by abandoning them completely and considering the implementation of the new ERP-Like tool.

## **Overview of Methodology**

I used an online questionnaire to seek answers for the research questions, and by publishing it online I was able to receive complete responses from 133 participants from different countries around the world. I published the questionnaire using Dalhousie's e-mail service by sending a call-for-participants e-mail to mailing lists at the Faculty of Computer Science, and using my personal Facebook profile by inviting my followers and friends to take part in the questionnaire. The participants read and agreed to a consent form before they were able to respond to the questionnaire. The participants' names were not collected and participation was anonymous. However, some identifying data (e-mail addresses and/or phone numbers) were collected for the purpose of participating in a draw for the chance to win one of eight \$50 prizes. Participating in the draw was optional and participants were not obliged to provide their phone numbers or e-mail addresses

unless they wanted to be considered for a prize. The identifying data was kept for a short period of time to select winners, and was destroyed later after delivering the prizes.

### **Thesis Structure**

The rest of this thesis will be as follows: Chapter 2 will provide the background for this research, in which I will deliberate more on the current PTM tools and their way of work, ERP systems and their way of work, how we can think of a PTM tool that is inspired in design by ERP systems, and my design for such tool. In Chapter 3, I provide a detailed review of the literature and previous findings in PTM field. Chapter 4 contains a discussion of the research questions and their measurements, and will show the study phases in a step-by-step style. Chapter 5 will show the study results and Chapter 6 will discuss and analyze the findings. Chapter 7 contains a discussion of the limitations and points of weakness in this research. Chapter 8 outlines paths for future work in order to build more research on the findings of this thesis. Chapter 9 summarizes the thesis and provides a conclusion.



## Chapter 2 Background

We are challenged every day to keep up with the fast pace of modern life. Daily family-related chores, personal financials management, calendar scheduling, household tasks and owned-vehicles maintenance are only a few of many responsibilities that individuals have to care for nowadays. This issue is present everywhere in the world and is not an issue that is limited to a specific region or country, although the types and forms of responsibilities can differ from a place to another depending on the culture and the lifestyle an individual lives.

PTM tools were introduced to address the challenge of living a productive and organized life. Since their introduction, they gained much attention from users who felt their needs can be fulfilled by using such tools. However, several years after these tools were introduced into the market, and after large numbers of users have used them consistently to manage their responsibilities, research showed that they are unsatisfied with the outcome (Kamsin et al., 2012), and other research showed they send e-mails to themselves as reminders of important tasks instead of using PTM tools created specifically for this purpose (Bota et al., 2017).

The methods people use raise questions about the efficiency and effectiveness of these tools, which in turn affect user satisfaction. And although some of this research is seven years old which can be considered a long time during which newer tools with better capabilities may have been introduced into the market, there is one notable and consistent characteristic of these tools that did not change, a characteristic that was embedded in them from their beginning until the current moment, and that characteristic is their isolated way of work.

## **The “Isolated Islands” Concept**

A human’s life consists of several aspects, these include social, career, financials, household, and other aspects. These aspects in turn branch into smaller areas. For example, social life branch into family, friends, relatives, and colleagues. Different life aspects are strongly connected and dependent on one another, and cannot be logically or technically separated apart. When we use separated PTM tools to manage different parts of our life, we treat these parts like isolated islands. And because this treatment is neither right nor effective, we eventually connect these parts together manually. People use this treatment because the available tools do not provide these connections. It seems to me that this treatment consumes much of time and effort, and affects users’ ability to be productive and organized, because instead of spending all of our resources in achieving tasks and goals, we spend a big portion of them linking the unlinked PTM tools, and trying to understand the dependencies between them to be able to manually create our to-do lists and schedule our calendars and do other tasks. I have not been able to find earlier research that verifies my impression.

To make this clear to the reader, I will demonstrate it by an example. Consider that a user has note-taking, to-do list, budget manager, calendar, and contacts apps on their smartphone. These apps are independent, rely on separate databases, are produced by different and unrelated developers, and they are not connected to each other in any way. When the user enters a new calendar entry called “Hosting a House Party” on a specific date, they then need to open the to-do list app to manually create a long list of items they need to purchase to prepare for the party. Then they need to check the budget manager app to make sure they can afford all the needed items. They might then need to

write some important notes about the party in the note-taking app, like a list of fun activities or the dinner serving time. At the end, they need to send messages to their contacts to invite them to the party. During this process, the user had to open multiple apps with different interfaces and different operating logic, they had to watch for dependencies in different areas and apply them in PTM apps, they had to manually create lists and write notes and link them to one event in their mind or on paper, and they had to make financial calculations to be sure of the event's success. Before all of that, the user had to spend considerable time and effort familiarizing themselves with multiple apps that have different interfaces and they work differently. In conclusion, the user spent many resources to manually connect the functions of separate apps, and this was for only one event in their calendar. Nowadays, users may have multiple events and commitments, and spending that much time and effort on each one of them is a daunting task that can lead to either frustration or completely abandoning these tools, and it wastes valuable user resources. This is what I mean by saying that the current PTM tools treat our life aspects like isolated islands.

### **The Opposite Concept: Integration**

What if the process described above was completed by opening only one app that is divided into different modules, each one of them addresses a different life aspect, all these modules are connected to one database that utilizes the information obtained from all modules, and all of them internally communicate together to automatically create lists, notes, and activities, checks for budget availability, and sends the appropriate correspondence to the needed contact list? This may sound like a too-optimistic form of

personal task management, but if we look at the technology around us today we will find that yesterday's dreams are today's realities, and not only that, but this way of task management is not a dream or an imagination, in fact it is a reality that has been present in a certain type of software systems for almost three decades, and that type is called ERP systems.

### **ERP Systems: The Inspiration**

Enterprise Resource Planning systems (ERPs) are integrated software systems that manage organizations' business (Goyal, 2011). ERP systems as we know them today started in the 1990s when they were able to handle multiple business departments like financials, human resources and project management simultaneously and integrate them together to supplement each other with different forms of data which in turn helps the business process to be more harmonized and efficient.

ERP systems evolution went through multiple phases since the 1960s of the twentieth century until they reached their current form, but it was only in the 1990s when they started to be unique through the characteristic of integration and centralization (Joshi, 2017).

Nowadays, ERP systems are used to manage thousands of businesses in different industries in a way that makes companies completely rely on them (Oracle, n.d.).

My main motivation for seeking a solution that works similarly to ERP systems is the added value of integration. I believe that integrating different PTM tools of various life aspects, putting them together in one large tool and force them all to communicate through one unique database can help reduce the inconsistency of information among

different PTM tools and can help us have the ability to control all our life aspects from one place and not be distracted between different tools.

The design of an integrated and comprehensive PTM tool that I introduced in a previous work is not necessarily an exact isomorph to an ERP system for humans. The reason that the tool I proposed earlier is not an exact isomorph to an ERP system is because of the obvious differences between managing a human life and managing an organization's business, however it addresses the issues of personal task management in generally a similar way: categorizing different life aspects into modules in one large system, and having one central database in its core. Any further details in such PTM tool are expected to be very different from an ERP system. In that sense, I am using ERP systems as a model to imitate on a high level, and the only similarity between them and the tool I am suggesting is that they both incorporate modules within one tool, integrating these modules, and having one core database. This design is based partially on the findings of Kamsin et al. (2012) who demonstrated that the existing tools fail to accommodate to users' needs and that users see them as inadequate tools, because they do not offer functionalities to address tasks' complexity and interdependencies between tasks, and Bota et al. (2017) findings that show that users use e-mail services as a task producer and organizer instead of using to-do list apps, and in my 2017 paper (ElKhateeb, 2017), I extend Jones (2007) concept of integration and take it to a further level, and that is by imitating the way of operation of ERP systems and integrating all areas of PTM tools (various life aspects) in one comprehensive tool with one comprehensive database.

### Chapter 3 Related Work

Previous work in the domain of personal task management varies between research that explores user preferences in the field and tries to understand them or proposes better design ideas and concepts, and research that offers or evaluates certain PTM technologies or products and checks their efficiency and performance in certain aspects. In this chapter I discuss these types of research. The research databases that I browsed for related work in are ACM Digital Library, Google Scholar, Dal Space, IEEE Library, AIS Electronic Library, ProQuest, Semantic Scholar, and Springer.

Kamsin (2014) did four studies in his PhD research regarding personal task management, these include an interview-based study that he used to develop a PTM framework, a study that checks the accuracy of the developed framework, a study that checked for inconsistencies found between the first two studies, and a study that provided analytical evaluation of some of the existing PTM tools at the time. He had three research questions, the one of interest to this thesis is the second one which asked whether PTM tools offered sufficient support for individuals working in the academic field. The PTM framework he introduced discussed the underlying activities that push and constitutes the base of personal task management, and these were planning, prioritization, and list-making as he identified them. The framework also discussed the internal (e.g. motivation) and external (e.g. time) factors that contribute to personal task management. Kamsin evaluated some of the PTM tools, but he focused on specific tools. In my research, I am evaluating the separated approach that PTM tools take, rather than evaluating particular tools, and in that sense, his evaluations are not of much interest to my research. Moreover, his sample were exclusively academic individuals who all belonged to one

university in the United Kingdom, however my research's population is broader and does not have that limitation, so when he identified some of the challenges that are faced particularly by his participants, I could not relate these challenges to all my sample or my population, and these challenges were not at the focus of my research, although they are somehow related to it.

In two studies, Haraty, McGrenere, and Tang (2016) studied how task management behaviors vary between different persons. In the first one they were able to categorize the participants into three categories with regard to the style of task management, these were make-doers, do-it-yourselfers, and adopters (who use PTM tools). In the second one they tested their categorization to see how people fit into one of the three categories, but they found that most of them did not fit within one single category, but rather fell into more than one of them. They also discussed some obstacles that are usually faced by people when trying to use PTM tools, they include discovery of the tool, learning to use the tool, and customizing the tool.

Haraty, McGrenere, and Tang (2015) studied how the behavior of users in personal task management changes over time and how PTM tools accommodate these changes. They were able to provide three major factors that cause change in task management behavior, and these are changing needs of users over time, the dissatisfaction they feel when their needs are not met, and missed opportunities of unnoticed needs. They then offered a set of implications for PTM tools' design that affect the behavior change.

Haraty, Tam, Haddad, McGrenere, and Tang (2012b) conducted two studies with two set of participants to explore their behaviors in managing their everyday tasks. They

again show the three categories of users discussed earlier and then provide a set of design guidelines that they suggest should be followed by application developers to personalize PTM tools.

Bellotti et al. (2004) examined prior studies of personal task management and relied on them to offer a new design for a task list manager. They also found that users of their sample had high skills in handling challenges of personal task management (skills like time planning and task prioritization). They provided the design for the task manager based on factors that affect task completion. They did not provide a full design but a preliminary effort as a foundation for it.

Haraty and McGrenere (2016) argued that current PTM tools do not provide advanced personalization for users to fully customize the tools to accommodate their use, they defined advanced personalization as “extending system functionality”, and they mentioned that this is only available for programmers. In their study, they developed and tested a PTM tool that allows advanced personalization for ordinary users and called it ScriPer. Their results showed that the participants were able to use the tool for advanced personalization although none of them had more than some background in programming (all except two participants finished all the given personalization tasks).

Jones (2007) used the term “Information Islands” to describe people’s information distribution in their different life aspects. He also discussed the issue of inability to organize our information and maintain them well enough to be able to use it to manage our personal tasks and responsibilities. Moreover, he touched the concept of integration but not exactly in the way I present it in my design of an integrated PTM tool, although I



consider this as additional support to the path I am trying to offer to address the issues of personal task management.

As we can see when looking at some of the related literature in the domain, none of the work attempted to evaluate or review the separated way of operation of the current PTM tools, which is explainable by the fact that I need to do this kind of evaluation because I have a vision for a PTM tool that works in the opposite style (integration). This shows the need for my research and the contributions that it could offer to the domain.

Haraty *inter alia*'s work can be summarized in the following: they categorized people into three categories with regard to using PTM tools (these are Adopters, Makers, and Do-it-yourselfers) (Haraty et al., 2012a), then they later showed that many people do not fit within only one category of these, but rather they fall into more than one, according to the different behaviors of the same person (Haraty et al., 2016). They also showed that the factors that cause PTM behavioral change over time are changing needs, dissatisfaction caused by unmet needs, and opportunities revealing unnoticed needs, and they offered a set of design recommendations that included supporting of collaboration between people to share their PTM behaviors (Haraty et al., 2015). Finally, they showed that regular non-technical users can do advanced personalization in PTM tools to better adapt to their changing needs (Haraty & McGrenere, 2016). Based on these findings and design recommendations, I introduced a design of an integrated PTM tool that follows addresses the issues they highlighted: an all-in-one comprehensive tool that covers all life aspects of a person, it allows collaboration between individuals, and it has a great level of personalization that can adapt to changing needs (ElKhateeb, 2017). My research is built on theirs and differs from it in that it focuses on generally evaluating the

existing PTM tools with regard to their separate way of operation, in an effort to check the feasibility of implementing my designed integrated tool, and trying to get an indication of its expected popularity.

## Chapter 4 Study

The study of this research involved social media and e-mail service to recruit participants, and used an online questionnaire as a methodology to collect data about the topic under research. Study details are as follows:

### Research Questions

As one major aim of the study is to evaluate the way that current PTM tools work in, in regard to separation as opposed to integration, it would not be feasible to bring a particular tool under the spotlight to evaluate it, as this will result in information specific to that particular tool. Instead, I decided to ask generic questions that are more suitable to the research topic, and also because the unintegrated approach that PTM tools take can only be evaluated by examining all tools together, in a generalized way.

Based on the above, the first research question is: “Do the current PTM tools have high satisfaction and adoption rates?” To find the answer to that question, I asked participants a series of questions that evaluate four measurements: efficiency, effectiveness, user satisfaction, and PTM tools’ adoption rate.

The second aim of the study is to find out if users of smart devices are willing to transfer from using multiple and separate PTM tools to using one consolidated tool that encompasses all life aspects’ responsibilities in one application. Based on that, the second research question is: “Are users willing to switch from using multiple and separate PTM tools to using one integrated tool (if they feel the need to)?” I asked participants a series of questions to find the answer to that research question, they included questions about their will to transfer, and their preferences regarding this theoretical PTM tool.

I was concerned that after the users are informed about the idea of having an all-in-one PTM tool they might be negatively biased towards the current tools they have, and therefore their responses regarding the first research question might be biased as well, therefore I took measures on the technical side to assure that bias do not occur, as I will explain in the Questionnaire Section of this chapter.

## **Population**

The study population is defined as people who are at least 18 years-old, who have a minimum of a high school degree, and are familiar with the use of smart devices (phones, tablets, and computers). The reason why the population is broad is that PTM tools are very common on all smart devices and available in their markets, and any person who possesses a smartphone, a tablet, or a personal computer is able to download and use PTM applications. Therefore, if we want to make an evaluation of these apps that actually reflects the true situation, then we need to hear from all those people who have access to PTM tools.

Demographics such as country of residence, job role, gender, marital status, and number of dependent children do not affect the fact that people have access to PTM tools anywhere they have access to Internet, which requires that the study population be broad as well. These demographics however might affect the type and weight of responsibilities an individual has, and therefore the way they react to PTM tools, which justifies the need to collect them during the study as I will explain more in subsequent chapters.

I chose the minimum age to be 18 years-old because in many places this is the age when people are no longer minors and start to become responsible for managing their

life. Being independent on their parents or guardians, this means they start to care for themselves, and subsequently they start having their own set of tasks and responsibilities, and therefore they start looking for ways to facilitate this mission, either by utilizing electronic PTM tools, or by manually managing their tasks using hardcopy planners, notes, and calendars.

The criteria of having at least a high school degree is based on the findings of Bailey & Sheehan (2009) who concluded that older persons who had more advanced levels of education are more likely to use technology. In my research, the population is broad as explained and has no upper age limit. To make sure that older persons participating in the study are familiar with using the technology (and therefore the possibility to use PTM tools), I had to include the education level criteria to avoid having participants who do not use smart devices often, as this may skew the study's findings toward unrealistic results due to lack of access to technology on smart devices.

## **Sample**

Because the population of this study is very broad, I used the sampling method that Naing, Winn, & Rusli (2006) described in their paper, which sets the rules for calculating sample size for broad populations. The formula they set contains three variables to determine the needed sample size ( $N$ ), these are prevalence ( $P$ ), precision ( $d$ ), and level of confidence ( $Z$ ). The formula is

$$N = \frac{Z^2 P (1-P)}{d^2}$$

For the purpose of my research, I set prevalence to be 0.5, precision to be 10% (0.1), and the level of confidence to be 90% ( $Z=1.64$ ). By substituting the values in the mentioned formula, the result was 67.42, which means 68 participants.

However, when I published the online questionnaire and called for participants, I was able to receive complete responses from 133 participants during a period of nine days. I closed it after the ninth day. Receiving almost double the number of the responses planned for the research, I consider having this number of participants an advantage that contributes to more credibility of this research, and that represents a bigger number of people than otherwise receiving only 68 responses.

### **Recruitment Materials**

I used two means to recruit participants for this study, these are Dalhousie University e-mail service and Facebook.

#### **Facebook post.**

Using Facebook platform to call for participants was an essential part of this research to satisfy its needs and to make sure the broader population receives the message. As I mentioned earlier, the population for this study is broad, it is not limited by living in Canada, by having a higher educational degree than high school, or by specializing in computer science field. My available recruiting platforms were Facebook and the e-mail service of the Faculty of Computer Science at Dalhousie University. Using only the e-mail service only sends the message to a subset of the needed population:

people who live in Canada, and are computer science staff, faculty or students, therefore it was insufficient to use this method alone.

On my Facebook profile, I have more than 2200 followers and 500 friends that have different ages, genders, and cultural and educational backgrounds. They are also from different world regions, these include North America, Europe, the Middle East, Asia, and South Asia. I also expected that at least a portion of this audience will share the Facebook post with their connections—either on Facebook or on other social media platforms—and their connections can in turn share it with theirs, and so on. In fact, after I published my call for participants on Facebook, the post received 35 shares on Facebook alone.

An additional indication of the importance of using Facebook in this study, is the timing when participants opened the survey. One hundred and ninety people opened the survey and viewed the consent form (out of which 145 agreed to the consent form and started the questionnaire, and 133 completed the questionnaire.) I published the call for participants on Facebook three days before I sent the e-mail at Dalhousie (this was due to the need for the helpdesk management approval to send the e-mail for mailing lists), during this three-day period, 122 out of 190 persons had already opened the survey, and I sent Dalhousie's e-mail after that. Although this was not planned, but it indicates that at least 64% of those who opened the survey were notified through Facebook. It is possible that more than this percentage also came through Facebook because the post stayed active even after I sent Dalhousie's e-mail, but there is no way to know for sure how was a participant informed about the study after the three-day period. This indicates the significance of using Facebook platform to call for participants, not only to ensure the

broad population is reached, but also to receive a significantly higher number of responses which in turn contributes to the credibility of this research. The Facebook post text can be found in Appendix A.

### **Faculty of Computer Science at Dalhousie e-mail.**

In addition to Facebook, I also sent an e-mail to every person in the Faculty of Computer Science at Dalhousie University, by sending the message to the mailing lists of faculty, staff, and graduate and undergraduate students. The e-mail message text can be found in Appendix B.

### **Possible Compensation**

I did not offer each participant direct monetary compensation. However, all participants had the choice to enter a draw to win a prize. I offered eight prizes, each one is worth 50 Canadian Dollars. To be eligible to enter the draw, a participant had to enter at least one contact information, this was either a phone number or an e-mail address. They also had to mark a checkbox consenting that they agree to be contacted by the researcher if they win a prize. I believe that offering the prizes was a good encouragement for people to take the questionnaire and this increased the number of participants, instead of otherwise not offering any prizes.

It was not mandatory for participants to complete the whole questionnaire to enter the draw. In fact, 145 participants who electronically signed the consent form and started the questionnaire; but only 133 completed the questionnaire till the end. All 145 had the choice to enter the draw. This means that it is possible that some of the winners did not



complete their participation in the study and their data was not accounted for (deleted), but there is no way to know that with certainty because the data in the consent part of the questionnaire that included the option to enter the draw was not linked to the data in the rest of the questionnaire, and this was part of the privacy and confidentiality process that I will describe in a subsequent section.

After I collected the data and closed the questionnaire, I randomly selected eight participants from all 145 of them. When a winner was selected once, they would not have the chance to win again, as they will be removed from the next round of the draw, so each participant had a chance to win only one prize, and no one of them was able to win twice or more. I contacted the participants using the contact information they provided, and I delivered the prize to each one of them using the method of their choice.

### **Informed Consent Process**

Before participants were able to start the questionnaire, they had to read and agree to a consent form that explained all the details about the research, and the contact information of the lead researcher, the research supervisor, and the Research Ethics Board at Dalhousie University, in case they had questions or concerns about the study. The form had two checkboxes at the end, one of them was mandatory to start the questionnaire, and it included their acceptance to be part of this research, and their acknowledgement that they have read and understood the form. The second checkbox was optional, and it included their acceptance to enter the draw and to be contacted later through their contact information if they won.

I added one additional criterion for participation in the study that I did not mention in the characteristics of the population, and that is English language skill. The questionnaire was written in English, and in order for the participants to read the consent form and the questions and to provide responses based on their good understanding of the questions, they had to possess some knowledge of English. Only a low/intermediate level was required because the questions and the consent form were written in simple English.

The consent form text can be found in Appendix C.

### **Privacy and Confidentiality**

In accordance with Dalhousie University Ethical Conduct of Research Involving Humans and Tri-Council Policy Statement, one major focus of the study was ensuring the privacy of participants and their data confidentiality, and only to collect personal or identifying information when necessary.

In this research, it was necessary to collect contact information for the purpose of conducting the draw to select winners. However, participants were given the choice not to provide this information if they were uncomfortable to do so, as enrollment in the draw was optional, and a participant could take the questionnaire without providing contact information (and therefore not be considered in the draw).

Some of the survey's questions were open-ended, and for research and data analysis purposes, participants were clearly informed that some of their responses might be quoted without identifying them. They agreed to this by accepting the consent form.

The study data is kept in a spreadsheet file which is stored on a Canadian-based cloud server called Sync ([www.sync.com/canadian-cloud-storage](http://www.sync.com/canadian-cloud-storage)). I applied two layers

of security to the data in addition to the host website security measures. First, the file is encrypted with a strong password. Second, a user (the lead researcher) must sign in with a username and password to the website to be able to see the file. I believe that it is better to use a secure cloud service to store the data than to use a hard drive stored in a physical location. Physical locations like an office at Dalhousie University are susceptible to accidents like theft or fire. Also, any removable media or personal computers that we use to store the data can be lost, stolen, or destroyed, risking loss of data or having it fall within the hands of unauthorized persons. Sync cloud service automatically makes backups to any data stored on it, so even in the worst-case scenario of website issues, the data is still backed up and can be retrieved later.

I will keep the data on the cloud server for at least five years from the date the study is finished. After that, I will reassess my need for the data and any possible further analysis that could result in useful findings (for example, if combined with another researches' findings). Then if I find the data is no longer useful, I will destroy it by deleting it from the cloud server and deactivating or removing my user account. However, if after the five-year period I find the data useful, I will keep it and reassess the need for it every year after that. I do not plan to keep the data indefinitely.

With regard to keeping participants' contact information, I stored them in a separate file that was not linked by any mean to the rest of the study data. Neither me nor anyone else can know which contact information belongs to which set of responses to the questionnaire. I designed the study as such to make participation as anonymous as possible. I disposed of the file that contains the contact information after I conducted the

draw, contacted the winners, and delivered their prizes, as there was no need to keep this information for any longer.

### **Demographic Data Collection**

I collected extensive demographic data from participants in this research. This included age, gender, marital status, number of dependents, country of residence, and other data. I also collected data about their education level, employment status, job sector, and work environment. Since this research focuses on personal task management, it was important to collect all possible information about the contributing factors to personal tasks and responsibility, and then use these in data analysis to see which of these factors affect PTM more and how they affect it.

This is easily justified when we think of how people live their life in terms of responsibility. A single person may have a different set of tasks than that who has a spouse. This set of tasks was created due to the lifestyle this person lives, and the lifestyles of single and partnered people are not exactly the same. Also, a person who lives with independents carries responsibilities like taking them to and from school, preparing their daily meals, following up their homework, watching their sports programs, and overall raising them. However, a person who does not have independents living with them does not have any of those tasks in their daily routine. Moreover, employment status can affect a person's responsibilities, whether this person is employed full-time, part-time, or has two jobs, or working and studying, or only studying can produce a completely different set of tasks that depends on the types of activities this person does. This concept is supported by Haraty et al. (2016) findings, which suggest

that demographics like job and level of busy-ness can affect people's behavior in task management.

The list goes on for how demographics can greatly affect personal task management. And in the data analysis phase we can filter the data by certain types of demographics to see how participants' responses differ based on that specific demographic. This in turn can help the research and the industry to focus on specific solutions that are most suitable to people of that demographic group.

### **Provision of Results to Participants**

Because the study was made almost completely anonymous, and the contact information of the participants was deleted after delivering the prizes (as promised in the consent form), it is not possible to contact the participants to send them the study after publishing. However, since a large portion of the participants was informed about the study through my Facebook profile, and some of them might be followers, they can get access to the published study after I announce it on Facebook and include a World Wide Web link to it.

### **Avoiding Bias**

It was possible that some participants be biased towards the new theoretical system included in Part 3 of the questionnaire and therefore provide inaccurate responses in Part 2. If this happened it could have affected the study's credibility.

To avoid potential bias towards the new designed PTM system, I designed the questionnaire in a way so that participants do not know any information about the new

PTM system until they have already finished and submitted responses to the part 2 which focuses on the existing PTM tools that they use. At that point, they had just started to learn about the new PTM system and provide their responses according to that in part 3, and they were not able to go back to part 2 to modify their submitted responses. This way, I guaranteed that the participants were not affected by the fact that there might be a possible alternative to the existing PTM tools, and that they have not altered their responses to questionnaire's part 2 accordingly.

### **Research Instrument: Online Questionnaire**

Because my research focus is different from previous works, in the sense that I want to evaluate the separate way of operation of current PTM tools, I chose to design my own questions and not rely on previous works questionnaires and interviews. Also since my focus was on a method of operation, not a particular tool or a category of tools, I asked generic questions I expected would reflect the way of operation of PTM tools.

I used Opinio service offered by Dalhousie University to implement and publish the survey. The design of the questionnaire can be looked at from two perspectives: technical and interface. The interface perspective is what appeared to participants during their participation, and the technical perspective is the logic that operated the questionnaire and was not visible to participants.

From the interface perspective, there was a consent page where participants read the consent form and optionally provided their contact information to enter the draw. Three parts followed after that, these are Part 1 (Demographic Data), Part 2 (Existing Task Management Tools), and Part 3 (A New Task Management Tool?).

From the technical perspective, there were three consecutive questionnaires that lead to one another. When a participant opened the consent form, they were associated with a Participant ID. When they agreed to the consent form and started Part 1, they lost the ID they had in the consent form and were associated a new ID. There was no ID connection by any means between the consent form and the subsequent parts. This was necessary to ensure that their contact information (which is identifying information) cannot be associated with their responses to the other questionnaire parts, to safeguard their anonymity and privacy.

After participants finished Part 1 and started Part 2, they also were associated a new ID in Part 2, but this time I kept their ID in Part 1 (using a JavaScript program written with the help of IT staff at Dalhousie University) to keep track of their record of responses in different questionnaire parts. The same scenario was applied again in the transition between parts 2 and 3. This way, participants had different IDs in different parts, but the IDs from the previous parts were kept in their record to link their data, with the exception of the consent form page.

Part 2 of the questionnaire included a branching question (viz., Q 12). In that question, I asked participants if they use electronic PTM tools to manage their tasks and responsibilities, when they answered 'Yes', they were directed to the remaining questions of Part 2 that enquired about the existing PTM tools that they use. When they answered 'No', they were asked to explain why they do not use such tools, and then they were taken directly to Part 3, as there was no point of asking them about the existing PTM tools if they do not use them.

It was necessary to divide the questionnaire into different parts to be able to avoid bias as explained in the previous subsection, as this was the only way to prevent them from going back from Part 3 to Part 2 and modify their responses after they became aware of the new theoretical PTM system.

The questionnaire can be found in Appendix D.



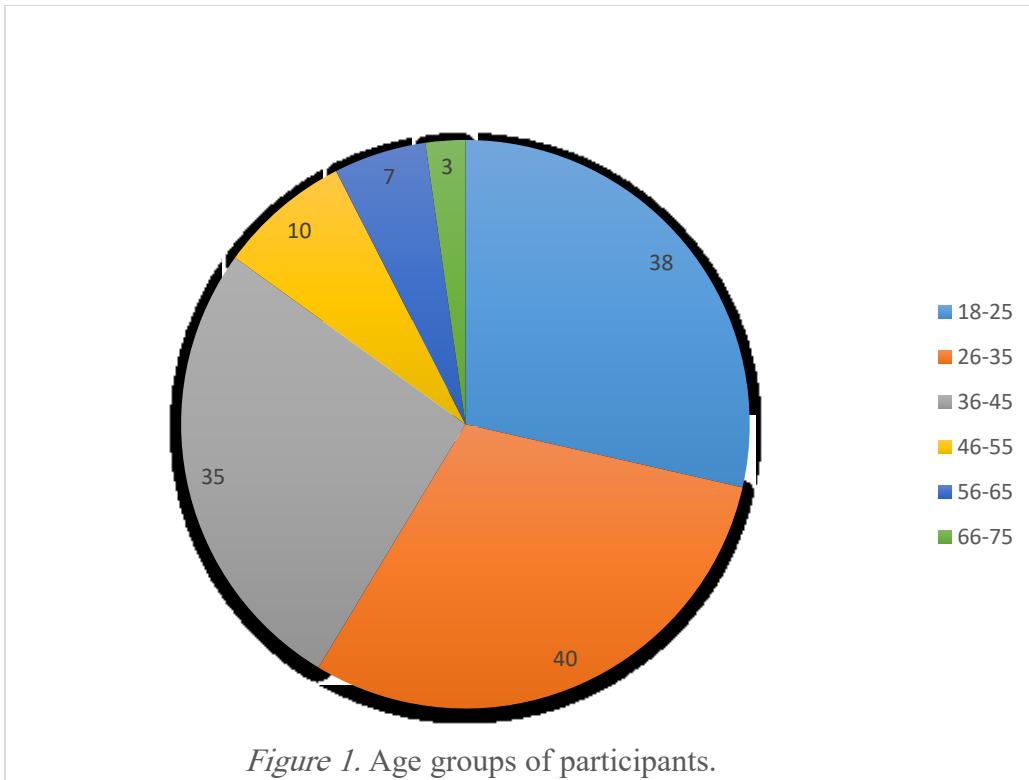
## Chapter 5 Results

In this chapter I list the participants' responses to the questions in each part in the questionnaire. The total number of participants is 133, all the responses below are portions of this total number, with the exception of responses to questions 13b through 20 as they were part of a branching question as will be explained below.

Question 14 asked participants about the commercial names of the PTM tools they use. However, the responses to this question were not as intended or expected. Some participants responded correctly and wrote app names, others misunderstood the question and wrote tools categories (such as "Calendar" instead of "Google Calendar"), and some participants wrote a mix of the two response types. Some participants even wrote device names instead of app names (such as iPhone and Dell).

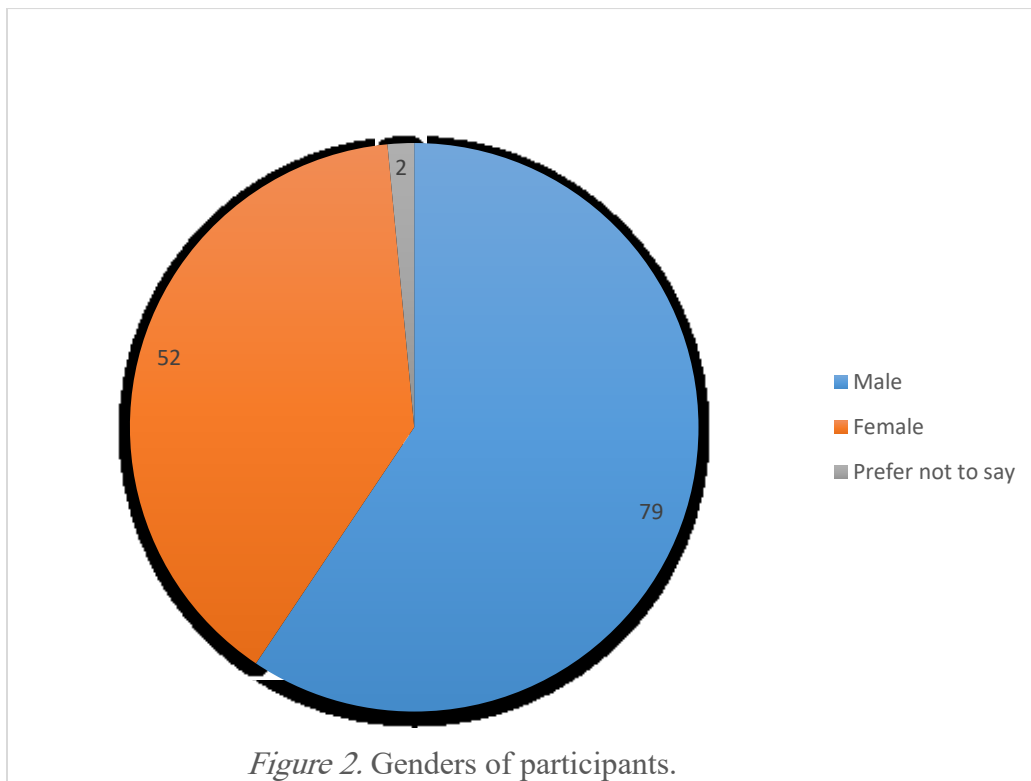
### Part 1: Demographics

1. Age:
  - 18-25: 38
  - 26-35: 40
  - 36-45: 35
  - 46-55: 10
  - 56-65: 7
  - 66-75: 3
  - Over 75: 0



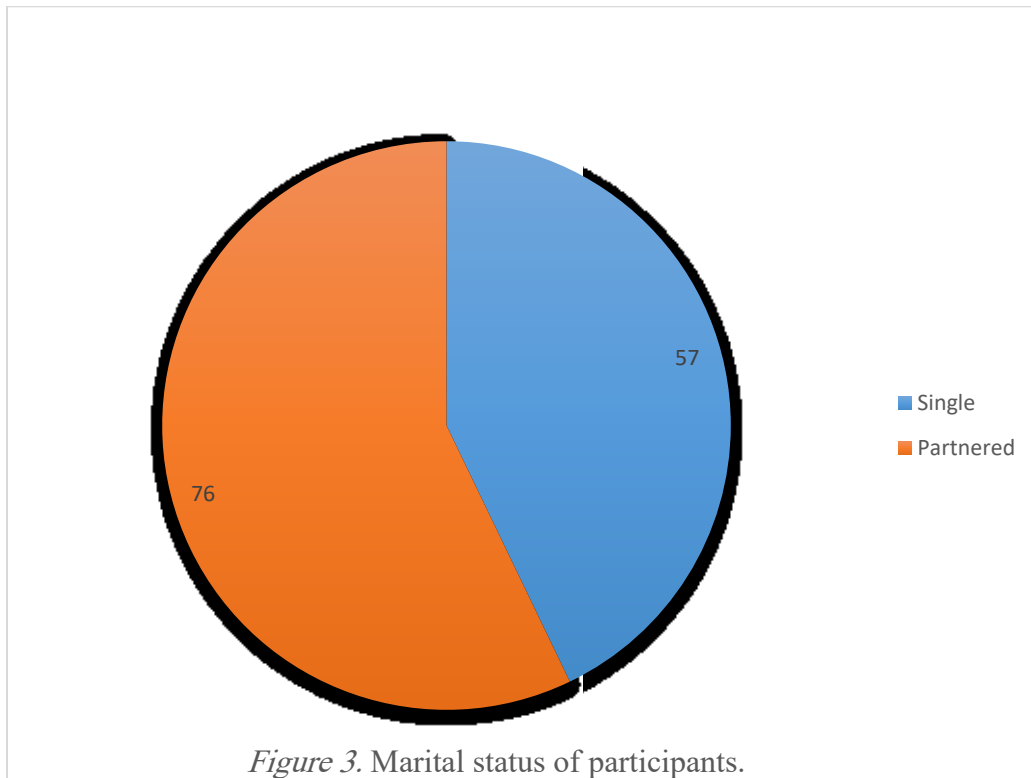
## 2. Gender:

- Male: 79
- Female: 52
- Other: none
- Prefer not to say: 2



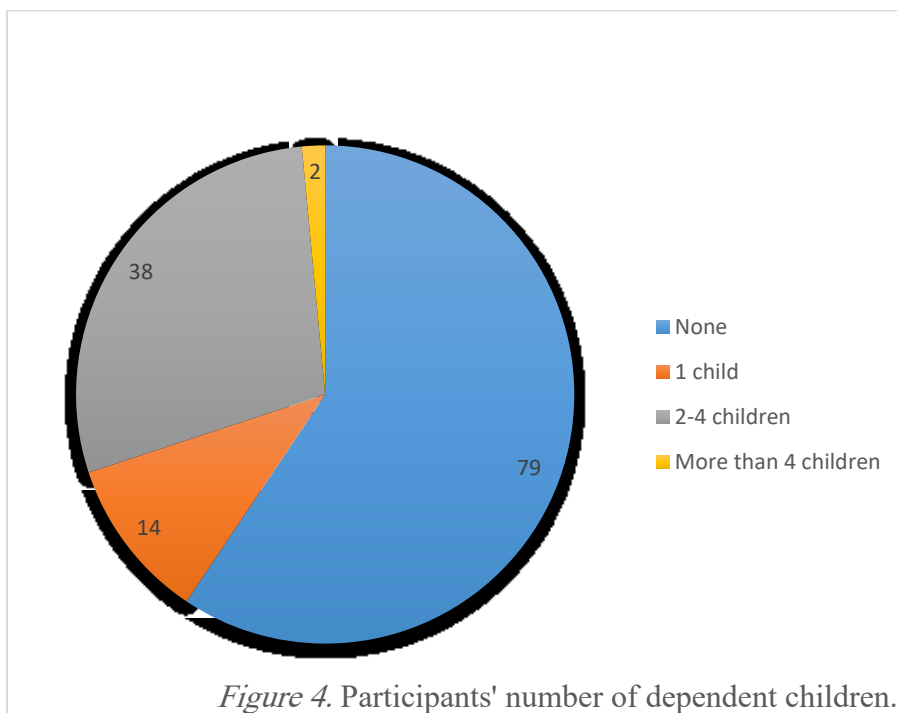
### 3. Marital status:

- Single: 57
- Partnered: 76



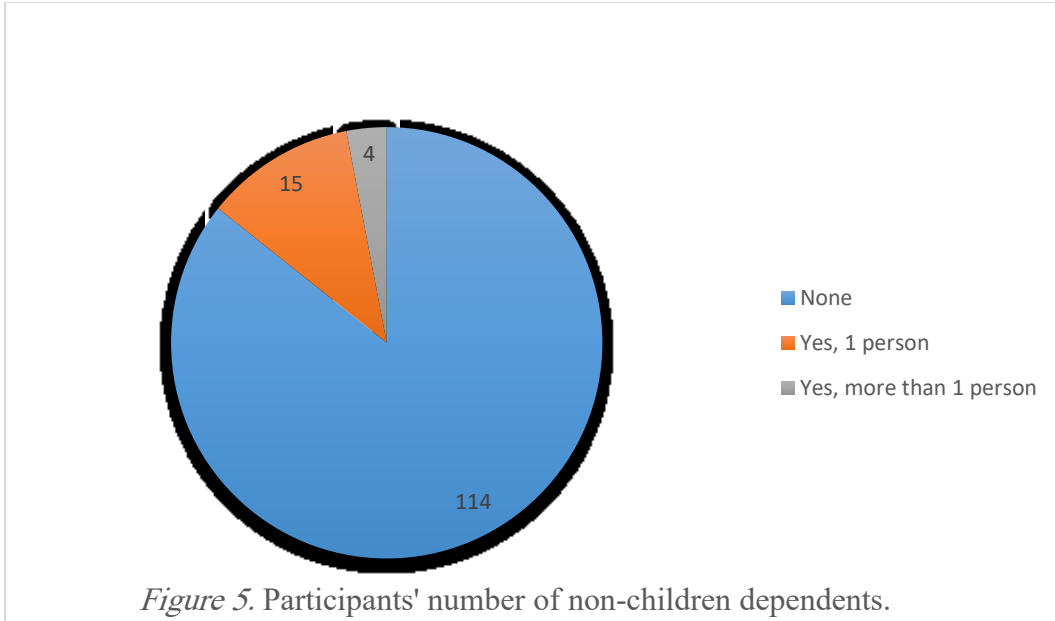
4. Have children under 18:

- No: 79
- 1 child: 14
- 2-4 children: 38
- More than 4 children: 2



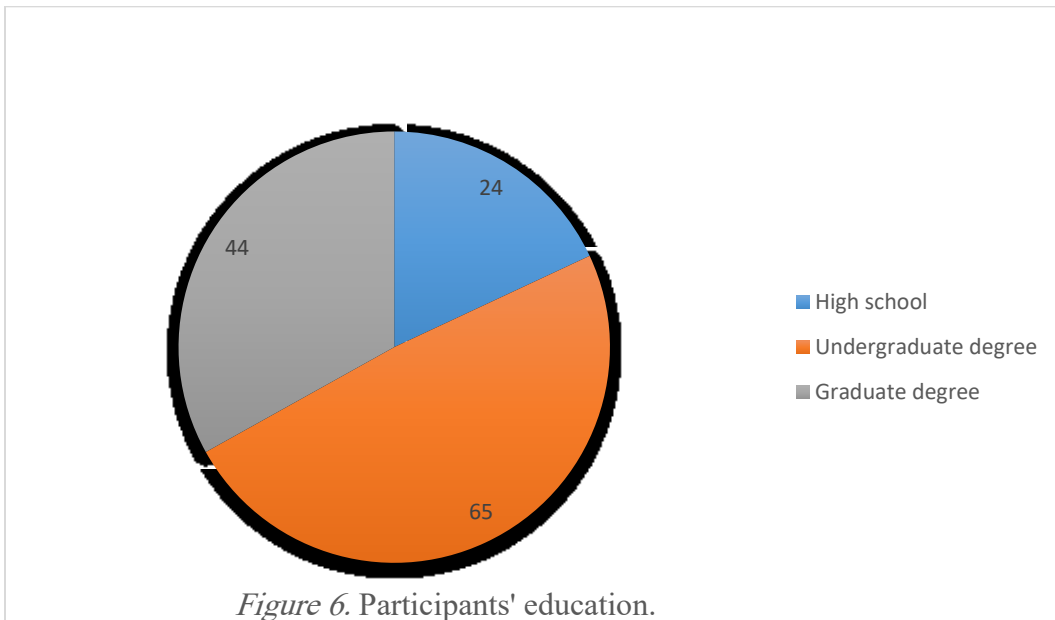
5. Do you live with persons who are not children but mostly dependent on you (e.g. spouse with disability):

- No: 114
- Yes, 1 person: 15
- Yes, more than 1 person: 4



## 6. Education

- High school degree: 24
- Undergraduate degree: 65
- Graduate degree: 44



## 7. Country of residence

- Canada: 58
- Egypt: 19
- Saudi Arabia: 16
- United States of America: 11
- India: 9
- Malaysia: 4
- Philippines: 4
- Turkey: 2
- United Kingdom: 2
- Bangladesh, Brazil, China, Jordan, Kuwait, Oman, Palestinian Authority, United Arab Emirates: 1 participant each.

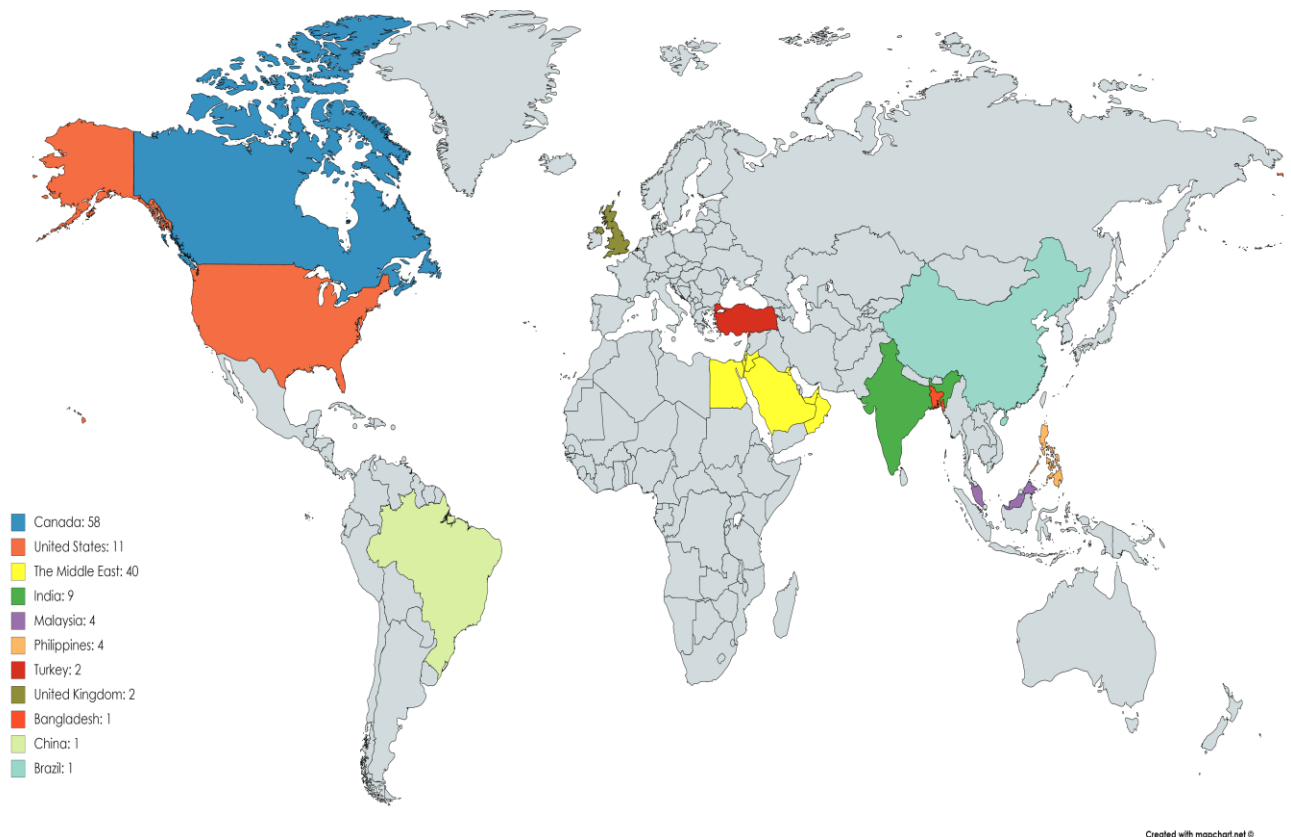


Figure 7. Distribution of participants around the world

(map prepared and downloaded from mapchart.net, grey areas had no participation).

## 8. Employment status (multiple choices allowed)

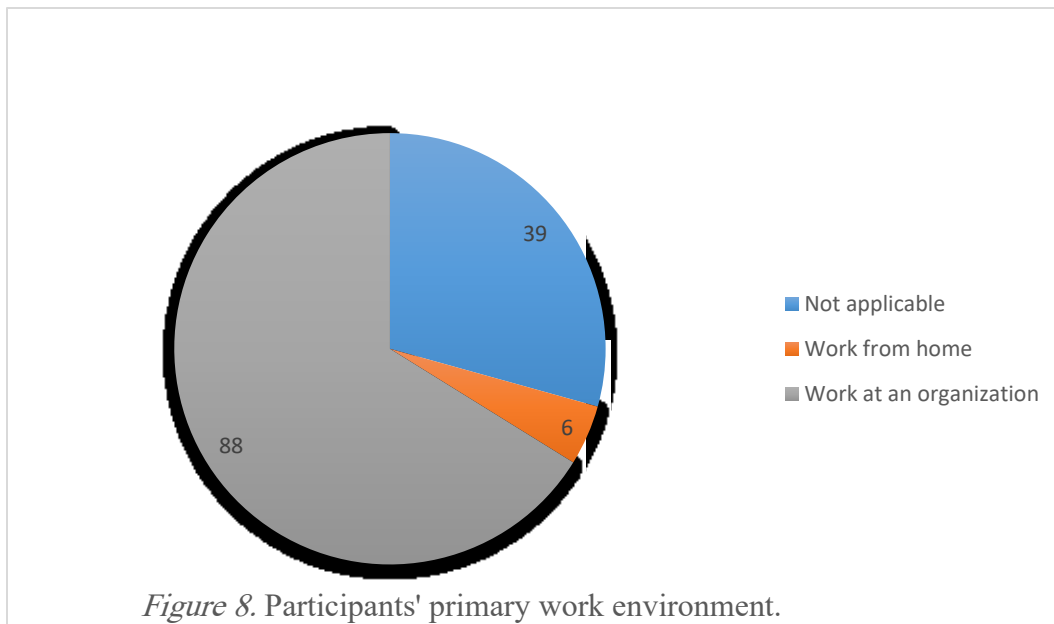
- Entrepreneur/business owner only: 12
- Employee only: 54
- Unemployed full-time student: 30
- Employed and full-time student: 11
- Unemployed part-time student: 7
- Employed and part-time student: 3
- Homemaker: 3
- Unemployed with no other occupation: 14



- Employee and entrepreneur/business owner: 5
- Employee, entrepreneur/business owner, and part-time student: 1

#### 9. Primary work environment

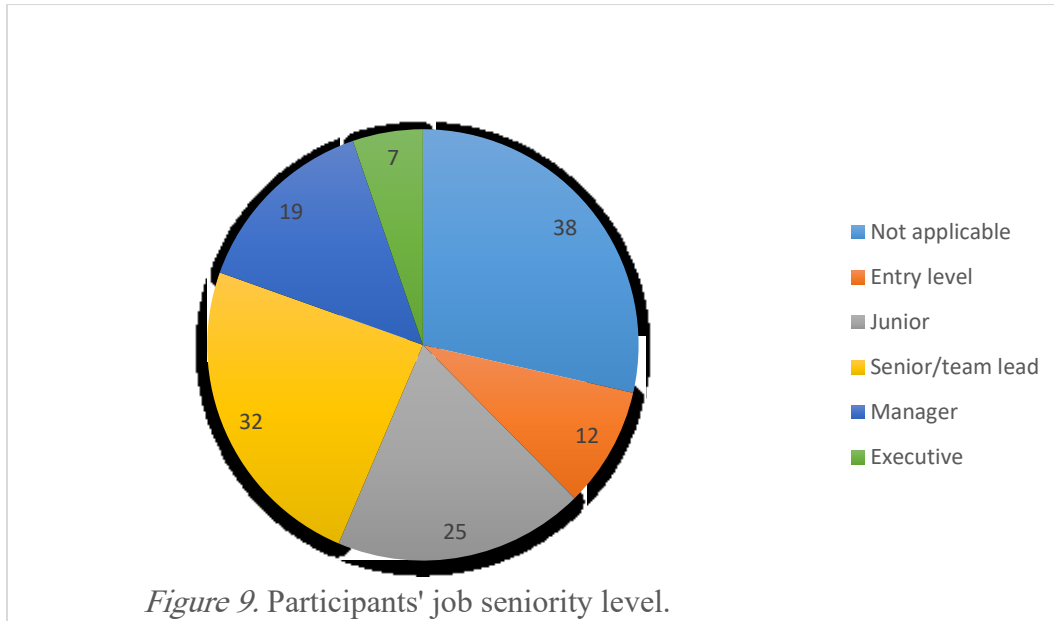
- Not applicable: 39
- Work from home: 6
- Work at an organization: 88



#### 10. Job seniority level

- Not applicable: 38
- Entry level: 12
- Junior: 25
- Senior/team lead: 32

- Manager: 19
- Executive: 7



## 11. Job Sector

- Not applicable: 31
- Accountancy, banking and finance: 5
- Business, consulting and management: 3
- Charity and voluntary work: 2
- Creative arts and design: 2
- Energy and utilities: 1
- Engineering and manufacturing: 11
- Environment and agriculture: 1
- Healthcare: 28
- Information technology: 21

- Leisure, sports and tourism: 2
- Marketing, advertising and public relations: 1
- Public services and administration: 3
- Recruitment and human resources: 2
- Retail: 6
- Sales: 2
- Science and pharmaceuticals: 2
- Transport and logistics: 1
- Other:
  - Customer service: 1
  - Education/teaching: 6
  - Services (outsourcing): 1
  - Medical and renewable energy: 1

## **Part 2: Existing Task Management Tools**

12. Do you use software task management tools to manage your tasks and responsibilities?

- Yes, for most or all of my responsibilities: 59
- Yes, for some of my responsibilities: 60
- Rarely: 12
- Never: 2

13. a. Why do you prefer not to use such tools?

- I prefer not to use software apps for that, I use hard-copy planners, physical notes, and calendars: 6
- I couldn't find a software tool that I'm satisfied with so far: 3
- I don't like to use either software tools or hardware tools, I organize my tasks in my mind: 3
- Other:
  - "Mostly I prefer paper and mind": 1
  - "I am not so knowledgeable with these tools though I want to get to know them better": 1

Note: question 13a was asked only to participants who responded to question 12 by "Rarely" or "Never", these are non-PTM Users. They are 14 out of 133 participants. Questions 13b through 20 (till end of Part 2) are only asked to participants who said in question 12 that they use PTM tools, these are PTM users (119 out of 133 participants). Questions 13b through 20 below show portions out of 119 participants, not out of the total number of the questionnaire participants (133).

13. b. What type of device do you use the task management tools on (multiple choices allowed)

- Smart phone: 109

- Tablet: 19 (all of which also selected smart phone)
- Dedicated assistant: 2 (both of them also selected smart phone)
- Laptop computer: 84
- Desktop computer: 35
- Smart phone and laptop computer: 78
- Smart phone and desktop computer: 28
- Tablet and laptop computer: 15
- Tablet and desktop computer: 7

14. Which task management tools do you use to manage and organize your tasks? (responses were free text and allowed multiple entries)

- Alarms/Alerts (3 total)
  - Alarmy: 1
  - iPhone Alarms: 1
  - iPhone Alerts: 1
- Budget Management (2 total):
  - Basic Budget: 1
  - Easy Money: 1
- Calendar (33 total):
  - Apple Calendar: 3
  - Google Calendar: 19
  - iPhone Calendar: 5
  - Microsoft Office / 365 Calendar: 3

- My Calendar: 1
- Samsung Calendar: 1
- Yahoo Calendar: 1
- E-mail (30 total):
  - Gmail: 6
  - Thunderbird: 2
  - Yahoo Mail: 1
  - Microsoft Office / 365 Outlook: 21
- Flat file (39 total):
  - AbcNote Lite: 1
  - Emacs: 1
  - Evernote: 5
  - Google Docs: 4
  - Microsoft Office / 365 Notes: 1
  - Microsoft Office / 365 OneNote: 6
  - Microsoft Office / 365 Word: 5
  - Notepad: 3
  - iPhone Notes: 3
  - Samsung Notes: 8
  - Sticky Notes 8: 2
- Social media app / site (9 total):
  - Facebook: 2
  - Facebook Events: 1

- Instagram: 2
- LinkedIn: 1
- Telegram: 1
- WhatsApp: 2
- Spreadsheet (6 total):
  - Google Sheets: 2
  - Microsoft Office / 365 Excel: 4
- Task list (9 total):
  - Any.Do: 2
  - Google Tasks: 1
  - Gtask: 2
  - Microsoft Office / 365 To Do: 1
  - Tasks by Blackberry: 1
  - Things: 1
  - Wunderlist: 1
- Team Based Project Coordination (14 total):
  - GitHub: 1
  - Slack: 1
  - Trello: 4
  - Microsoft Office / 365 Project: 3
  - Microsoft Office / 365 Teams: 3
  - Oracle Primavera: 1
  - Team Foundation Server: 1

- Undifferentiated suite (7 total):
  - Microsoft Office / 365: 6
  - Apple Apps: 1
- Miscellaneous and Unrecognized (59 total):
  - Acrobat Reader: 1
  - Agenda: 1
  - Airtable: 1
  - Al-Rajhi: 1
  - Amazon Alexa: 1
  - Asana: 2
  - Azure DevOps: 1
  - BMOOnline: 1
  - Bullet Journal: 1
  - Countdown Days: 1
  - DataFlo: 1
  - Elawson: 1
  - EnMotion: 1
  - Firefox: 1
  - ForDeal: 1
  - Goal Tracker: 1
  - Google App: 1
  - Google Keep: 8



- Google Translation: 1
- Jira: 1
- Jollychic: 1
- Journal: 1
- Keeper: 1
- Mediasafe: 1
- Mi-Moment: 1
- Monday.com: 3
- MySTC: 1
- Netflix: 1
- PeopleNet: 1
- Photo Gallery: 1
- Photogrid: 1
- Plan Plus: 1
- Planner Pro: 1
- Pocket Informant: 1
- PPO: 1
- Prayer Times: 1
- QuickMemo+: 1
- Ramset: 1
- S Planner: 1
- Salesforce: 1
- Souq.com: 1

- Spilwise: 2
- Spotify: 1
- TickTick: 1
- Uber: 1
- Vera: 1
- Waze: 1
- WordArt: 1

15. What types of tasks do you manage using the listed tools:

- Personal life related responsibilities: 17
- Job/business responsibilities: 14
- Both personal and job tasks: 88

16. Do you think that these tools complement each other

- Yes: 100
- No: 19

17. Do you think that these tools are integrated in any way

- Yes: 81
- No: 38

18. How efficient are the tools that you use in helping you manage your tasks  
and responsibilities

- Very efficient: 45
- Somehow efficient: 66
- I'm not sure: 4
- Not very efficient: 4
- Very inefficient: none

19. Do you find all the tools you need to manage all the tasks you have, or do you feel that there is a gap that you can't find an application for it?

- I have all the tools I need: 58
- I can't find all what I need, I think new apps should be developed to address this gap: 61

20. Overall, how satisfied are you with the personal task management tools that you use?

- Very satisfied: 36
- Somehow satisfied: 74
- I'm not sure: 5
- Unsatisfied: 4
- Very unsatisfied: none

### Part 3: A New Task Management Tool?

1. Do you prefer to have all your tasks in all areas of your life managed and organized automatically, or do you prefer to have manual control to manage them?
  - I prefer full automation: 19
  - I prefer a mix of automation and manual control: 106
  - I prefer to fully control them myself: 8
  
2. Do you like to have all tasks and responsibilities in all life aspects (social, financial, career, etc.) managed within one big and integrated tool, or do you prefer to have separate tools (like to-do list, budget manager, calendar, etc.)?
  - I prefer one integrated tool: 89
  - I prefer separate tools: 44
  
3. If a newer tool emerges that encompasses all current tools in one place and assuming that you decide it is a better tool for you to use, will you be willing to transfer to it quickly or is the transfer phase difficult for you to decide?
  - I will transfer as soon as it is available for me: 51
  - I will transfer but I know it will not be an easy transfer: 52
  - I will transfer after the majority of my connections start using it: 22

- Even if I believe it is a better tool, I'm not willing to transfer

(briefly explain why): 8

1. "[I] prefer existing tools since [I'm] habituated [to them]."
2. "If this software was damaged, I would lose all of my tasks' schedules."
3. "Trying is the best way to everything."
4. "I would likely shift items to the new tool, but leave some older ones where they are due to program/integration conflicts."
5. "I am happy with what I have."
6. "Interoperability is a requirement. I'm not starting over."
7. "I don't have enough space on my phone for new tools."
8. "I would only transfer after I could reasonably confirm that my data would be secure, and that the tool doesn't try to ask for permissions it wouldn't conceivably need to perform the tasks I need from it (assuming phone app). If I deem it trustworthy enough, then sure, I'll transfer."

4. If a newer tool is introduced and you are convinced that it is more efficient, will you be willing to pay to use it? Or will you only use it if it's free?

- I'm willing to pay to use it: 45
- I will only use it if it's free: 88

5. If you are willing to pay to use it, do you prefer to pay a timely subscription (monthly, yearly, etc.) or do you prefer to pay one lump sum payment to own it (in which case it will be a bigger payment)?
- I'm not willing to pay for it: 66
  - I prefer timely subscription: 38
  - I prefer to pay a bigger payment once and own it: 29
6. If the new tool is available in the market and received public acceptance, and assuming that the developing company announced that it took serious measures to ensure the privacy and security of users' information, will there still be any privacy or security concerns that might prevent you from using it?
- Yes, even if they say it's very secure, I will still be hesitant: 48
  - If the developing company was transparent about its privacy and security precautions, I will not have issues about that: 85
7. If you start using the new integrated all-in-one tool, are you willing to share your information with third party organizations in order to provide more automation to your responsibilities management? For example share some information with your bank to manage your financial budget, or share some needed information with your employer to manage in your job tasks management?

- Yes, I'm willing to share any amount of information with other third party organizations as long as it is through secure channels: 21
- Yes, I'm willing to share only the needed information to automate tasks: 52
- No, I don't want to share any information with any third parties: 60

8. If you accept to use a new integrated tool, it will need continuous data entry to efficiently manage your responsibilities. Assuming that data entry takes 15 minutes for one session, how many data entry sessions will be acceptable for you to use the tool?

- Daily: 30
- 2-4 times a week: 46
- Weekly: 25
- Bi-weekly: 13
- Monthly: 19

## Chapter 6 Discussion and Data Analysis

The two research questions this study seeks answers to are: “Do the current PTM tools have high satisfaction and adoption rates?” and “Are users willing to switch from using multiple and separate PTM tools to using one integrated tool (if they feel the need to)?” Part 2 of the questionnaire addresses the first research question, and Part 3 addresses the second research question. The findings of each part are included in this chapter. I rounded the percentage results to the nearest whole number (which could be smaller or larger).

### Research Question 1: Current PTM Tools

In this part, I asked the participants six key questions to evaluate four measurements, these are:

- Adoption rates, evaluated by questions 12 and 13b,
- User satisfaction, evaluated by questions 19 and 20,
- Efficiency, evaluated by question 18, and
- Effectiveness, evaluated by questions 12 and 15.

#### **Adoption rates.**

Question 12 asked “Do you use software task management tools to manage your tasks and responsibilities?” and offered four choices, these are “Yes, for most or all of my responsibilities”, “Yes, for some of my responsibilities”, “Rarely”, and “Never”. I considered participants who chose either one of the first two choices to be among those who adopt PTM tools, while participants who chose “Rarely” or “Never” to be among



those who do not adopt PTM tools. Those who chose “Yes” were 119 out of 133 (89%), whereas who chose “Never” or “Rarely” were 14 (11%). This shows a substantial change in PTM adoption rates since the findings of Haraty et al. (2012) which suggested that PTM tools have low adoption rates, and although they did not specify a number that details any percentage of users who adopted them versus those who did not, but even if we consider “low” to be around 50% of the users, there would still be a huge leap towards more adoption rates between 2012 and 2019. The users who indicated that they use PTM tools (who answered “Yes” to question 12, 89%) continued Part 2 of the questionnaire that asks more questions about the existing PTM tools that they use, I will refer to this portion of the participants as “PTM Users” in the rest of this paper.

Those who indicated that they do not use them (who answered “Rarely” or “Never” to question 12, 11%) were asked one more question (13a) in Part 2 of the questionnaire, and that was to understand why they chose not to depend on PTM tools to manage their responsibilities. After that, they were taken directly to Part 3. I will refer to this portion of participants as “non-PTM Users” in the rest of this paper. Question 13a asked this portion of participants to give more details on why they do not use PTM tools. They had choices to choose from, and were given the ability to pass all the choices and write a free text. Three of them (21% of non-PTM Users) chose “I couldn’t find a software tool that I’m satisfied with so far”, three chose “I don’t like to use either software tools or hardware tools, I organize my tasks in my mind”, six of them (42% of non-PTM Users) chose “I prefer not to use software apps for that, I use hard-copy planners, physical notes, and calendars”, one participant (7% of non-PTM Users)

explained that he/she uses a mix of “paper and mind”, and one explained that he/she lacks knowledge about PTM tools and would like to know more about them.

The answer of non-PTM Users to question 13a suggests that most of them (71%) willingly chose not to depend on PTM tools because they prefer other methods, while the rest (29%) either lacked the knowledge they need to use such tools or did not find a satisfying tool to start using them. We might view this proportion of participants as insignificant compared to the rest because they are less than a third of non-PTM Users and constitute 3% of the total number of the study participants, however, one might argue that even this small proportion —if addressed properly— can increase the total percentage of PTM Users from 89% to 92%, which eventually can positively contribute to the market in several ways, one of them is by increasing the profits of application developers through increasing the number of consumers, and another is by allowing for more prevalence of the technology, which in turn, and on the long run, contributes to more improvements by increasing the audience and attending to their feedback.

### **User satisfaction.**

Question 20 asked PTM Users “Overall, how satisfied are you with the personal task management tools that you use?”, interestingly, only 36 participants out of 119 (30%) answered “Very satisfied”, the rest of PTM Users’ responses (70%) ranged between “Somewhat satisfied” (74 out of 119, 62%), “Unsatisfied” (4 out of 119, 3%), and “I’m not sure” (5 out of 119, 4%). This large proportion of PTM Users who are not fully satisfied with existing PTM tools is notable and worth much attention.

The big portion of PTM Users who chose “somehow satisfied” might support previous findings about user satisfaction in this area of applications, however it does not provide much information about the amount of satisfaction users have. The distance between dissatisfaction and complete satisfaction with PTM tools is long, and each particular user can be on any point between these two ends. The choice “somehow satisfied” carries some ambiguity within it, and it might encompass a big range of possibilities, these include partial satisfaction that does not clarify a percentage (it can be low or high), and high but not complete satisfaction. I believe that it would have been a better study design to include more detailed choices to question 20 that provide more details about users’ preferences, or to ask participants to enter a percentage that represents their satisfaction level of PTM tools.

However, and although question 20 carried some ambiguity about satisfaction rates, the fact that 70% of PTM Users are not completely satisfied about these tools can be looked at as support to the claim that the vast majority of users are unhappy and unsatisfied, which might encourage us to find newer and more innovative PTM solutions. In all cases, more research is needed in this area to provide better understanding and more detailed results about this topic, as we cannot yet say with high confidence that the aforementioned claim is true.

Question 19 asked whether participants can find all PTM tools they need, or they see gaps in their needs that are not fulfilled by any applications in the market. Sixty-one out of 119 (51%) said they cannot find all the needed tools and they think new apps should be developed to address the gap, and 58 (49%) said they have all the tools they need. Responses to this question show huge division as they are nearly divided into two

equal halves of opposing opinions and user experiences. Nonetheless, the fact that nearly one half of all PTM Users think there is a market gap is an interesting fact and it strongly suggests that newer apps that have innovative capabilities are much needed to satisfy the consumers.

Looking into the combined responses to questions 19 and 20 sheds the light over more valuable findings. Out of 36 participants who chose “very satisfied” in question 20, 34 (94%) said they have all the tools they need in question 19. Those who did not choose “very satisfied” in question 20 (chose “somehow satisfied”, “I’m not sure”, or “unsatisfied”) are 83 participants, 59 of them (71%) chose the other answer in question 19 which stated “I can’t find all what I need, I think new apps should be developed to address this gap”. We notice from these combined responses that the vast majority of satisfied PTM Users do not feel there are any market gaps, while the majority of PTM Users who are not fully satisfied feel there is a gap in their needs that is currently not addressed by any PTM apps in the market. Their satisfaction level points out the possibility that the lack of needed apps in the market can be a major contributor to incomplete satisfaction among PTM Users. This finding is shown in detail in the Statistical Analysis section later.

### **Efficiency.**

Question 18 asked about the efficiency of PTM tools that participants use. “Very efficient” was chosen by 45 out of 119 (38%), 66 (55%) chose “somehow efficient”, 4 (3%) chose “I’m not sure”, and 4 chose “not very efficient”. In this measure, we again face the ambiguity created by the broadness of some choices. In fact, the choices of

“somehow efficient” and “not very efficient” might overlap in their meaning depending on the degree of efficiency or inefficiency intended by each participant. However, it is still clear that 62% of PTM Users see the current PTM tools as not “very efficient”, because they refrained from choosing this response to question 18. This finding can support claims that the current PTM tools fall short in efficiency and need to be improved since nearly two thirds of PTM Users in this research view them as not very efficient, although more research might be needed to gain deeper insight into this issue.

### **Effectiveness.**

The number of PTM Users (those who responded affirmatively to question 12) shows very high adoption rates for PTM tools among participants, this suggests that current PTM tools are effective in managing people’s responsibilities because the vast majority of participants use them (regardless of how efficient they are in doing their job, which is a different measure). Question 15 provides more details to this measure, it asked participants what medium of responsibilities they use the tools to manage, and it provided three choices: personal life, business, and both responsibilities. The majority of them chose the third option (88 PTM Users, 74%), which shows more emphasis on high effectiveness of these tools in people’s lives, because they use these tools to manage both their work and personal life aspects.

### **Supplementary questions.**

In addition to the four measures I evaluated, I added more questions that are not intended to evaluate the mentioned measures, but to help understand the reasons behind scores achieved by the evaluated measures. Questions 13b, 16, and 17 serve this purpose.

#### ***Devices of PTM tools.***

PTM Users were asked in question 13b about the types of devices that they use PTM tools on, and were given the choices of “Smart phone”, “Tablet”, “Dedicated Assistant (Like PDA)”, “Laptop computer”, and “Desktop computer”, with the ability to choose multiple answers. “Smart phone” answer was the most chosen one, with 109 out of 119 (92% of PTM Users) checked it. “Laptop computer” was the second most checked device with 84 participants (71% of PTM Users), followed by “Desktop computer” which was checked by 35 participants (29% of PTM Users), and “Tablet” was checked by 19 participants (16% of PTM Users), and the least checked device was “Dedicated Assistant”, only checked by two participants (2% of PTM Users).

These numbers show that smart phones are on the top of all other devices when PTM tools are used. This might be attributed to the ease of use and availability of these devices compared to other bigger types of devices, which are not always available to users and need a special setting to be used. This informs application developers of the most used platform for PTM tools, so they can target this large proportion of users and focus on creating tools that work in the best possible way on smart phones. This also might explain –or be a reason for- high adoption rates of PTM tools that was indicated in question 12, as smart phones are the most used electronic devices by consumers.

Looking at the combined choices of the participants, and because the question allowed choosing multiple types of devices, I noticed that most of the participants who used PTM tools on tablets also used them on laptop computers (15 out of 19, 79%), while the opposite was not the case, as only a small portion of participants who used laptop computers also used tablets (15 out of 84, 18%). This suggests that using PTM tools on tablets is only secondary for PTM Users, because only a small proportion of them use tablets, and the majority of this small proportion use laptops in addition to tablets.

***Do PTM tools complement each other?***

Question 16 asked if PTM Users think that current tools complement each other. The purpose of this question was to check if they think that different PTM tools cover different areas of tasks and responsibilities so that all of these areas are served. Most of them answered Yes to this question (100 out of 119, 84%). However, I believe that this question was poorly phrased for its purpose and that participants did not fully understand its meaning, this becomes clear when we look at the combined responses to question 19 and this question.

Those who said in question 19 that they cannot find all the tools they need in the market were 61 participants, and 51 out of them answered “Yes” to question 16. There is some conflict between the answers of the same participants which indicates that they might have misinterpreted question 16, as it does not stand to reason that those who see a gap in the market that should be addressed by new non-existent apps, think at the same time that the current apps cover all areas of personal task management.

### ***Are PTM tools integrated?***

Question 17 asked if participants think that current PTM tools are integrated in any way. The intended meaning of integration in this question was that PTM tools communicate with each other, or can pass information and transactions between each other that can help with automation and data integration. Again, most PTM Users (81 out of 119, 68%) chose Yes. In this question the same issue of question 16 is raised: did participants understand what is meant by integration? This is hard to judge, but looking again at the combined responses to this question and question 19, and putting into consideration that most PTM Users come from non-technical backgrounds, it is most likely that they misunderstood question 17. Two thirds (40 out of 61, 66%) of those who cannot find all the tools they need in the market chose Yes in question 17. I think that the question was ambiguous to the participants and it needed more explanation.

The issues found in questions 16 and 17 reduced the research benefits and findings that I planned to gain from them.

### ***Names and categories of most used PTM tools.***

In Question 14, I asked participants about the commercial names of the PTM tools they use. Their answers to this question show interesting insight, as many of the responses included apps that many people may not think they are PTM tools, e.g., Facebook, Instagram, FireFox, LinkedIn, WhatsApp, Souq.com, Acrobat Reader, Uber, SalesForce, Amazon Alexa, Slack, and e-mail clients such as Gmail, Yahoo, and Outlook. Some also mentioned photo gallery applications. This indicates people's interpretation of personal task management, and that it is not limited to apps that schedule



and are specifically designed to help achieve tasks, but it is much broader than and extends further than expected. This in turn shows the importance of integration to reduce user distraction between so many different apps, and at the same time raises challenges to the way we can integrate so many apps and tools together in one comprehensive PTM tool. One suggestion might be not to put everything within one large tool, but instead allow integration with external apps like Facebook and Outlook.

### ***PTM users categories.***

With regard to the three categories that Haraty et al. (2012a) presented, it was difficult in my research to categorize participants in one of them, because I did not ask questions that gave me enough information about how they manage their tasks in details, and although responses to Question 12 show high adoption rates, it does not conclude whether these users are Adopters only, or also Do-it-yourselfers. On the other hand, in their following work, Haraty et al. (2016) found out that people do not fall within only one category of these, and that it might be an “oversimplification” of reality to try to categorize all people within specific groups.

### **Research Question 1 Contributions to Knowledge**

In conclusion, this part of the questionnaire helped us gain deeper knowledge about users’ preferences towards the current PTM tools, some notable findings are: one reason for not adopting e-PTM tools is lack of tools that satisfy some users: many users feel that the current tools do not cover all areas of personal task management, and that

smart phones are the primary platform that people use to manage their personal tasks and responsibilities.

### **Research Question 2: A New All-in-One PTM Tool?**

With this research question, I seek feedback from participants regarding a theoretical PTM system that integrates all the areas and tasks of different PTM tools in a single comprehensive tool with several modules, each module represents a personal task management aspect (such as calendar, budget, and household management). Because this PTM system is non-existent yet, and all the information the participants have about it comes from the questions they were asked in questionnaire's Part 3, the findings in this section should be treated only as preliminary guidance, rather than detailed and final user preferences. If such system is produced and experienced by users, they might have different opinions than what they had in this research. I believe that more research needs to be done towards this theoretical system before it can be evaluated with objectivity, some of said research will need to be done after it has been produced and used for some time by users (more details in the Future Work Chapter).

Questions in this part of the questionnaire were asked to all participants regardless of their response to question 12 in the previous part (PTM Users and non-PTM Users), this is because I considered the possibility that non-PTM Users might change their preference if the all-in-one PTM system is produced, as it works in a completely different way.

Question 1 in Part 3 asked participants whether they prefer to have their tasks managed with full automation, prefer a mix of automation and manual control, or prefer

to manually manage them,. The second option was chosen by 106 out of 133 (80%), while 19 chose the full automation option, and eight chose full manual control.

Question 2 is the most crucial question in Part 3 of the questionnaire, as it offered choice between the way current PTM tools work, and the way the theoretical PTM tool is designed to work, meaning several separated stand-alone tools to manage different life aspects as opposed to one integrated PTM tool that manages all life aspects in one place, or in a more simplified description, separation versus integration. Participants were asked whether they like to have all their responsibilities managed in one big tool or they like several separate tools. The one big integrated tool option was selected by 89 of them (67%) while 44 (33%) selected the other option. This gives us hope that the theoretical all-in-one PTM system might be a solution to the current issues faced by PTM users, and although this is not confirmed information yet, but at least it is worth trying because most participants showed interest to have such solution.

Question 3 asked participants about their willingness to transfer to a newer integrated PTM tool if they deem it better than the current tools they use. I offered them four choices, 51 of them (38%) said they will transfer as soon as the tool becomes available, 52 (39%) said they will transfer but they feel that it will not be an easy transition, 22 (17%) said they will transfer after the majority of their family and friends transfer to it, and eight of them (6%) said they are not willing to transfer even if they believe it is a better tool. Those who chose the last option were asked to briefly explain why, and the most notable reasons they mentioned were concerns about data security, data loss in case of a system crash, and the habituation/satisfaction of the tools they currently use.

The third choice in Question 3 that some participants selected (willingness to transfer after the majority of their connections do so) highlights the importance of group collaboration in PTM tools. Members of the same family, as well as members of the same teams at work or in business projects, need to have the ability to collaborate their work together and synchronize it among different devices and in the profiles of other contributing members. I considered this functionality when I conceived of the new integrated PTM tool. I did not otherwise study theories of acceptance of new technologies.

Question 4 asked if participants are willing to pay to use such PTM tool or they will only use it if it is offered for free. Two thirds of them (88 out of 133) said they will only use it if it is free, and one third (45 out of 133) said they are willing to pay for it. During data analysis phase and after rethinking the choices of this question, I thought it is unreasonable, and maybe impractical, to have such big PTM system offered for free. This is not a small smart phone app that can be created in a relatively short period of time, rather it is a big software system that includes several modules and a big complex database, as I explained in the introduction, it is a personal version of ERP systems which are huge systems developed and enhanced over the course of years. However, since the majority of participants chose to use it only if it is free indicates that such system will need huge efforts done to convince the consumers to purchase it.

Question 5 offered participants two choices for the payment style, either one-time big payment, or a timely subscription (monthly or yearly), and a third option for those who are not willing to pay. The one-time payment was chosen by 29 participants (22%), the timely subscription was chosen by 38 participants (28%), and 66 (50%) said they do

not want to pay for it. One might wonder why 88 respondents to question 4 said they are not willing to pay, while in question 5 they are 66 participants. This does not have to be a case of conflicting responses, but those who do not want to pay might still have a preference regarding payment, in case they were convinced later that they want to purchase this product, or like having a first priority of not paying and a second priority of another payment preference.

Question 6 discussed the security of the software tool, and if users will have any security concerns provided that the tool received wide acceptance and that the producing company was transparent about the security measures it took to ensure maximum protection for consumers' data. Most participants said they will not have concerns if the developing company ensured the necessary precautions are taken, these are 85 out of 133 (64%), while 48 of them (36%) said they will be hesitant towards it even if the producers ensure maximum possible security precautions are taken. This shows that the majority of participants have a certain level of trust in the software companies in general, as they provided a positive answer to a theoretical question while they do not actually know which company will develop the mentioned tool. However, if that tool is created, serious security measures need to be taken, first to ensure maximum security for people's sensitive information, and second to be able to address the concerns of the population represented here by nearly one third of the participants.

Question 7 asked participants if they accept to share some of their data with third party entities in order to provide more automation to the tool's performance, such as sharing some data with employers to help with job tasks, or sharing data with the user's bank to manage their personal budget. There was some division among participants

regarding this question: 21 of them (16%) said they are willing to share any amount of data as long as this happens through secure channels, 52 (39%) said they will share limited information (only that is needed to automate tasks), and 60 (45%) said they do not want to share any data with third party organizations. This division regarding data sharing with third parties suggests it can be made an optional feature of the tool, so that users who appreciate automation can make use of it, while users who do not trust third party organizations can disable it and not share any data with any other entities.

The last question in Part 3 of the questionnaire asked participants about how many times they see as an acceptable number of data entry sessions to the tool, as the tool is expected to need continuous data entry to work efficiently, and assuming that each session takes 15 minutes to accomplish. Choices were “Daily” (selected by 30 participants, 23%), “2-4 times a week” (46 participants, 35%), “Weekly” (25 participants, 19%), “Bi-weekly” (13 participants, 10%), and “Monthly” (19 participants, 14%). This data can be valuable if the theoretical PTM tool was found feasible, in which case application developers can implement it and plan its performance, partially according to the number of data entry sessions users are willing to spend.

## **Research Question 2 Contributions to Knowledge**

Responses to the second research question indicate that participants do not oppose the idea of one comprehensive integrated tool, although when such tool is actually implemented they might review their preference based on the details and specific characteristics of such a tool. Also the responses show the importance of users’ collaboration in PTM tools, and how this can affect their decision to start using a newly

developed tool. Most respondents said they preferred to have a mix of automation and manual control over such tool. The cost of such integrated tool might be a challenge, because most participants indicated that they do not want to pay for using such tool.

### **Statistical Analysis**

Because this is an exploratory research with qualitative non-numerical data, it is infeasible to calculate descriptive or inferential statistics for the collected data. However, a Chi-squared ( $\chi^2$ ) test for independence can be applied to test any possible relationships between the collected demographic data and the participants' responses to key questions in the questionnaire. Such relationships –if found– will help application developers address the issues of each demographic group using specific solutions that may better suit each group.

The demographics I tested their influence on some key questions are age group, marital status, number of dependent children, number of disabled non-child dependents, education level, employment status, and job seniority level. The key questions that I tested the influence of some demographics on them are questions 12, 18, 19, and 20 in Part 2, and question 2 in Part 3 of the questionnaire. In some test combinations like age and question 12, some of the calculated expected values are too low (below five), this prevented me from applying the test in this case because one of the test conditions is to have all the expected values greater than five (Statistics Solutions, 2019).

In the cases of the test applied with regard to questions 18, 19, and 20 of Part 2, I only considered PTM Users, as those are the only participants who were asked and responded to these questions.

For the purpose of this statistical test, I grouped the data of each demographic of interest into two groups, even if the question had more than two possible outcomes. For example, in question 4 I asked participants whether they have dependent children and how many are they. They were able to choose no children, one child, 2–4 children, or more than four. In the test I grouped the responses to either having children or no children. I applied the same rule in the test to their responses to the key questions, such as question 12 by making two groups of either using current PTM tools or not using them (I grouped the responses “Rarely” and “Never” in one group, and the other two responses in another group).

The Chi-square test formula used in all the calculations below is:

$$X^2 = \sum \frac{(O-E)^2}{E}$$

Where O is the actual value, and E is the expected value (Statistics Solutions, 2019). The degree of freedom is 1 because I made all the comparisons in groups of two, and the  $p$  threshold I used is  $p < 0.05$ .

### **Demographics and adoption rate.**

Question 12 measured adoption rate, its text is “Do you use software task management tools to manage your tasks and responsibilities?”, it offered four responses, they are “Yes for most or all of my responsibilities”, “Yes for some of my responsibilities”, “Rarely”, and “Never”. I put the first two responses in one group as an affirmative response (“Yes” in the tables below), and the second two responses in one group as a negative response (“No” in the tables below).



***Marital status and adoption rate.***

For illustration purposes, in this first test I showed more steps before the final result. In the subsequent tests, I only included the actual values table and then the output Chi-square and  $p$  value directly, and in some tests I did not include the table as the values of  $p$  were too high.

The actual values are:

	Yes	No
Single	50	7
Partnered	69	7

The next step is to calculate the totals of rows and columns, and the overall total:

	Yes	No	Total
Single	50	7	57
Partnered	69	7	76
Total	119	14	133

Then we calculate the expected values by multiplying each row total by each column total and dividing by the overall total.

	Yes	No	Total
Single	$\frac{57 \times 119}{133}$	$\frac{57 \times 14}{133}$	57
Partnered	$\frac{76 \times 119}{133}$	$\frac{76 \times 14}{133}$	76
	119	14	133

Which results in:

	Yes	No	Total
Single	E=51	E=6	57
Partnered	E=68	E=8	76
Total	119	14	133

Then we subtract expected values from actual values, square them, then divide by the expected values, which results in:

	Yes	No	Total
Single	0.019	0.166	57
Partnered	0.014	0.125	76
Total	119	14	133

Then we add all values:  $0.019+0.166+0.014+0.125 = 0.324$

We find that the Chi-square value for this case of the test is 0.324, then to find the associated  $p$  value of the Chi-square value we use the Chi-square distribution table, and we find the  $p$  value to be 0.569. Since this value is greater than our threshold (0.05), then we can deduce that there is no dependence between the marital status and adoption rate.

***Having dependent children and adoption rate.***

The two groups of this case are either having any number of dependent children or not having dependent children at all. The actual values are and their totals are:

	Yes	No	Total
No dependent children	71	8	79
Have dependent children	48	6	54
Total	119	14	133

Applying the formula here, we get a Chi-square of 0.033 and  $p$  value of 0.855.

There is no dependence between having dependent children and PTM tools adoption rate.

**Demographics and efficiency.**

Question 18 measured efficiency, its text is “How efficient are the tools that you use in helping you manage your tasks and responsibilities?”, participants chose one of four responses: “Very efficient”, “Somehow efficient”, “I’m not sure”, and “Not very

efficient”. I put responses of “Very efficient” in one group, and the other responses in the second group.

***Age range and efficiency.***

The two groups of this case are the age groups 18-45 and 46-75 years old. The actual values are and their totals are:

	Very efficient	Other responses	Total
18-45	38	63	101
46-75	7	11	18
Total	45	74	119

Applying the formula here, we get a Chi-square of 0.010 and  $p$  value of 0.918.

There is no dependence between the two selected age groups and efficiency.

***Having dependent children and efficiency.***

I put participants who have any number of children in one group, and those who do not have children at all in the other group. The actual values are and their totals are:

	Very efficient	Other responses	Total
No dependent children	24	47	71
Have dependent children	21	27	48
Total	45	74	119

Applying the formula here, we get a Chi-square of 1.2 and  $p$  value of 0.273. There is no dependence in my sample between having children and the efficiency of PTM tools.

### **Demographics and satisfaction with regard to need fulfillment.**

Question 19 asked whether participants can find all the PTM tools they need or they think there is a gap in the market that needs new applications to fill it. They responded either affirmatively or negatively.

I applied the Chi-square test to the demographics of marital status, number of dependent children, number of disabled non-child dependents, and job seniority level with question 19, and I have found no dependency between any of the mentioned demographics and participants' responses to this question, as the  $p$  values in these cases were too far from the threshold (ranged around 0.7).

### **Demographics and overall satisfaction.**

Question 20 asked participants about their overall satisfaction towards current PTM tools. The selected choices were one of "Very satisfied", "Somehow satisfied", "I'm not sure", and "Unsatisfied". I put "Very satisfied" in one group and other choices in the other group, as I wanted to see if demographics impacted their full satisfaction.

I conducted the test with marital status, number of dependent children, and job seniority level. None of them showed any dependencies with regard to overall satisfaction, and the calculated  $p$  values ranged around 0.25.

### **Demographics and preference of integration or separation.**

Question 2 in Part 3 of the questionnaire asked participants whether they prefer one integrated PTM tool that includes all types of different tasks' types within it (as in the ERP-Like tool), or they prefer separate tools (as is the current situation). They responded with their preference of either integration or separation.

I conducted the Chi-square test with marital status, number of dependent children, and job seniority level. There was no dependencies found with regard to these demographics and the preference of an integrated tool versus separate tools.

### **Overall satisfaction and the need for newer PTM tools.**

Question 19 checked if participants have all the needed tools or they need more tools that are not existent in the market, and it had two choices of affirmative or negative responses. Question 20 asked about their overall satisfaction towards PTM tools, and the participants' responses ranged from "Very satisfied" to "Unsatisfied". I applied Chi-square test in this case, and I divided question 20's responses to two groups: "Very satisfied" for one and the other responses for the second. The values and totals are as shown below:

	Very satisfied	Other answers	Total
“I have all the tools I need”	34	24	58
“I can’t find all what I need”	2	59	61
Total	36	83	119

This indicates the strong relationship between the participants’ overall full satisfaction and their ability to find the apps that fulfill their needs ( $\chi^2 = 43.155$ ,  $df=1$ ,  $p < 0.0001$ ).

Note that not finding a relationship between the demographics I collected and the participants’ responses to questions does not definitely indicate a conflict between these findings and Haraty et al.’s (2016) findings (they showed that some demographics can affect behaviors of personal task management). My questions in this study were purposely generic, and I expect that different questions with more details on PTM behaviors can demonstrate a relationship between their responses and participants’ demographics.

### **Summary of Findings**

The findings discussed in this chapter can be summarized in the below points:

#### **Current PTM tools.**

- Adoption rates of the current tools are very high.

- Participants who do not adopt PTM tools do so mainly because of their unwillingness to depend on any tools of any kind, their preference to use non-electronic tools, or lack of tools that satisfy them.
- User satisfaction is questionable for two-thirds of users (somehow satisfied), and high for a third of them.
- Nearly half of users think they need tools that do not exist in the market yet, and a half have all the tools they need.
- Users who view the current tools as very efficient are 38%, and the vast majority of the rest of the users view them as somehow efficient.
- Many respondents think their current tools are highly effective. Of course the current study cannot be used to verify if the respondents' opinion is correct.
- PTM tools are mostly used on smart phones.

#### **A new all-in-one PTM tool.**

If application developers were to introduce a new ERP-Like PTM tool to the market:

- The majority of users prefer a mix of automation and manual control.
- Two thirds of users prefer an integrated one tool, while one third prefers separate PTM tools.
- A small portion of the users (6%) are not willing to do a transition to a new PTM tool, while the rest are willing to do so at some point.



- Two thirds of users do not want to pay to use a new tool, and one third will pay.
- Fifty-six percent of those who are willing to pay for it preferred a continuing timely subscription, and 44% preferred a one-time bigger payment.
- Nearly two thirds of users did not show concerns about the security of the new tool, and the rest were concerned about the security of their information if they use it.
- Forty-five percent of the users do not want to share information with third-party organizations, and the rest do not have issues about this.
- There was no prevalent choice for how many times of data entry the users consider to be acceptable, their choices ranged between “Daily” and “Monthly”.

#### **Chi-square test.**

- I found no influence between the demographic data and the responses in the rest of the questionnaire. I applied the test with each demographic piece of information independently (no combined demographics). The collection of demographic data was very useful to indicate this finding.
- There was high dependency between the level of satisfaction and the ability to find all the tools a user needs. Higher ability to find needed tools meant higher satisfaction.

## **Chapter 7    Limitations**

There are some limitations related to the study design and the selected method of data collection, as well as some flaws that I recognized after the data was collected.

While some limitations were inevitable, the design flaws could be avoided had I designed the questionnaire differently.

### **Study Design Decisions and Limitations**

The most major decision I needed to make was the research methodology. I had to choose between interviews and focus groups, or an online survey. Each one of these choices had its advantages and disadvantages with regard to research benefits. My choice was to make an online survey, as this was the only method to reach the biggest possible number of participants which is more likely to represent the bigger population. The population is very broad, and having a limited number of research participants would have greatly impacted the credibility of the findings, so it was crucial to have high participation. Also, the population does not reside only in the city of Halifax, Nova Scotia, where the research is being conducted, but users are scattered all around the world in many countries, and since it is almost practically impossible to interview people from different world regions, I had to exclude this choice.

Another burden for conducting interviews or focus groups was the financial matter. In order to ask participants for interviews, I would need to compensate them with money, and considering their big number, this would have resulted in the need for a big sum of financial support which was not available for this research. While in the case of

an online survey, it needs less time to participate and can be done from the comfort of any place a participant chooses, hence the draw for prizes was enough as a possible compensation.

The choice of an online survey came at the price of less detailed responses, and the inability to follow up with participants after the initial questionnaire was taken. I experienced these drawbacks during the data analysis phase when I was unable to further enquire about what a participant meant in a particular response, or why they chose that response. Some could argue that it would have been better to keep the personal and contact information for participants to follow up with them later and for the possibility of future research done on the same data, however there was no specific plans for any future work with this data, and it was the requirement of the Ethics Board at Dalhousie University to make participation anonymous and protect the confidentiality of participants' information. This also affected my ability to provide the participants with a copy of the study findings, however I will publish it on social media and part of them will be notified and will have access to it.

One factor that contributed to the existence of some design flaws is that I did not do a pilot test for the study before I conduct it on actual participants. Of course even if I had conducted such a test it would not guarantee perfectly interpretable results. However, if I have done some pilot-testing, I would have been able to make a better design that avoids the flaws found here.

## Design Flaws

As discussed in the previous chapter, some questions in the survey were poorly phrased in a way that impacted my ability to analyze their responses and extract the most useful findings from them, these are questions 16, 17, 18, and 20.

In question 16, participants were asked if the current tools complement each other or not, and in question 17 they were asked whether the tools are integrated or not. In both questions, more details, explanation, and examples should have been given to help participants better understand the question and therefore provide the answer that best represents their view.

Question 18 was intended to measure the efficiency of PTM tools, and question 20 was intended to measure the user satisfaction, both are two of the four measures the main research question is trying to evaluate. The most selected responses in them were “Somehow efficient” and “Somehow satisfied” respectively. Much ambiguity is presented by the word “Somehow” as it does not specify a certain level of evaluation and encompasses a big range of efficiency and satisfaction levels. It would have been a much better design if I asked participants to rate their experience on a level of one to ten, or to ask them to give a percentage of their choice. That way their preferences would have been easier to evaluate and understand on a more detailed level.

## Chapter 8 Future Work

There are several opportunities of future research based on the findings of this study. These include smaller research that particularly addresses the drawbacks caused by the flaws in this study, and other research that builds up on the findings presented here to gain deeper insight into this area and to provide actual solutions for existing issues.

Research can be conducted to evaluate the efficiency and user satisfaction of current PTM tools in a more accurate way. We can run a shorter study with a few questions about these issues and offer participants a scale to rate their experience, and we can also ask them to provide some explanation as to why they have chosen a particular evaluation.

Other research can also be done with less generality in the questions, and focusing on deeper details like asking people how they do their tasks and how they manage them. It can also depend on another research methodology and that is by making interviews, or combining the use of a questionnaire and interviews by starting with the questionnaire and then following up with some or all of the participants that are available for interviews. In the interviews, we can have deeper insight and more details about users' preferences and behavior, which in turn can help us decide which direction of research and application development to take.

We can extend the analysis to this same thesis, and in particular to Question 14 (that asked about the specific commercial names of the used PTM tools), which was misinterpreted by many participants and had responses of PTM tools categories instead of specific products, and also responses of devices used for the task management. These responses if combined with future work that focuses on how people interpret the concepts

and expressions in personal task management can help us understand some of their behavior towards PTM tools and towards personal task management in general. It can also help us understand some of their responses to the questionnaire that was presented in this thesis.

More advanced research can focus on the feasibility of developing the ERP-Like tool, but in a more empirical way. This will need a bigger research team and the actual development of a working version of the application, so that participants can actually test it and provide details about their experience in terms of efficiency, effectiveness, satisfaction, and their overall evaluation of such tool and design.

Quantitative research can then be done to evaluate the ERP-Like tool based on measurable dependent variables with regard to it and the traditional PTM tools. This could include performance and effectiveness as dependent variables, and the new integrated tool versus the current separate tools.

Part of the research towards implementing my design for an integrated PTM tool should look at technology adoption research that discusses models and theories of how people can start adopting the new tool, however it is too early now to predict or rely on these models, because the adoption of the new tool will depend in part on its interface design and technical details related to its logic of workflow and such technical aspects.

There are several big steps needed to make the ERP-Like tool a successful reality, and this needs the combined work of research teams and application developers, and also needs enough financial support to complete it. My research is a beginning to evaluate the feasibility of such innovative tool, and I believe that my findings give hope that it might

be the solution to PTM issues, but at this stage we cannot be certain enough about this, however the future work based on my research is able to either prove or reject this idea.

More work can be conducted to further introduce techniques and functionalities with suitable interfaces to help users better plan, prioritize, and schedule their responsibilities and commitments as previous research discussed (Kamsin, 2014), and then we can include these techniques in our research to take closer steps of implementing the integrated PTM tool while having these features included in it.

## Chapter 9 Conclusion

This qualitative research addressed two different but related research questions in the field of personal task management (PTM), in an endeavor to explore the current status of the field, and a preliminary effort to offer a possible innovative solution for any existing issues. The main research question is about users' preferences towards the existing PTM tools, measured by adoption rate, efficiency, effectiveness, and user satisfaction. The second question asked if users have the willingness to transition from the current PTM tools they use in managing their everyday life to a new tool that works in a completely different style, such tool does not exist yet and only has a theoretical prototype design.

An introductory chapter was provided including an explanation of personal task management field and tools and how they work, and a necessary distinction between personal task management and personal information management. It also included a quick review of the core literature behind this research and how it is positioned between the different previous research papers. Then it provided an idea of the new PTM tool design, a brief description of the research questions and the study methodology.

In the Background Chapter followed in which I discussed in detail how the current state-of-the-art PTM tools operate and what are the potential issues regarding them, and I made a comparison between the traditional (current) style of personal task management and the vision that I have for a new PTM tool that is based on a completely different way of operation. I also explained the motivation and inspiration behind this idea and how it was born and how I designed it in a previous unpublished paper (ElKhateeb, 2017).



I provided a literature review of previous related research in the same field, the previous findings and results, the issues surrounding research in the field, and why more research is needed to address unexplored areas and unknown answers.

In the Study Chapter I outlined the details of the research questions under investigation, what the study population is and how the sample was calculated and participants recruited, their chance for compensation and their consent. I then discussed how their privacy and information are protected and why I needed to collect their demographic data for the research purposes. I explained how the online questionnaire was designed and how the design was made with the idea of avoiding any possible bias in its core.

I included the raw results in Chapter 5; in Chapter 6 I discussed the findings of each research question in detail. The findings of the first research question show high adoption rates and effectiveness, but questionable efficiency and user satisfaction. The findings of the second research question show potential willingness from most users to transition to the new designed tool, and they give an overview of some of the user preferences towards such tool if it existed. They also show the significance of collaboration between different people in their PTM tools to better manage their personal and career responsibilities. I also did some statistical tests on the results that showed no dependency between the demographic data and the user responses to the questionnaire.

After that I discussed the limitations faced during the study and the decisions I had to make, their outcomes, and their advantages and disadvantages. I also addressed some flaws that I made in the study design and how they negatively affected the data analysis and findings process, and how these flaws can be avoided in the future.

Chapter 8 discussed opportunities of future work based on this research and how to repeat parts of it while avoiding the design flaws, how we can get closer to achieving the vision of a new integrated PTM tool, and what are the resources needed to achieve this target.

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### **Appendix A– Facebook Post**

“Hello followers and friends, I need as many shares as possible for this post.

Do you want to participate in a short online study and get the chance to win one of eight \$50 CAD prizes? Please read on.

I’m a graduate student at the Faculty of Computer Science at Dalhousie University, located in Halifax, Nova Scotia, and I’m doing an online questionnaire as part of my master’s thesis. My research is about the personal task management tools that you use on smart devices (phones, tablets, personal computers) to manage your tasks. Examples are to-do lists, task managers, budget managers, calendars, etc. I’m trying to understand the user preferences, needs, and satisfactions in relation to these tools. I’m offering 8 prizes for 8 persons among those who took part in the study, each is worth 50 CAD. Winners will be chosen randomly and contacted after the study is finished, and their prizes will be sent to them using the method of their choice.

I need participants who have a minimum level of understanding English language (a low-intermediate level is sufficient), are at least 18 years old, are familiar with the use of smart devices (phones, tablets, computers, etc.), and have a minimum of a high school degree.

The questionnaire will take 15 minutes on average. I encourage you to share this post to your friends and followers and ask them to share it.

If you have any questions regarding this research, please contact me through e-mail (ayman.elkhateeb@dal.ca), or call or text my cell phone at +1902XXXXXXX.

Please help me make this post go viral.

Participate here: <https://surveys.dal.ca/opinio/s?s=47350>”

*The post also included the following photo:*

Help Advance Research  
and  
Get the Chance to Win 1  
of 8 Prizes (50 CAD  
Each)

## **Appendix B– Dalhousie University e-mail**

Subject: Participate in Online Study and Get the Chance to Win 1 of 8 \$50 Prizes

Body: Hi all,

I'm Ayman ElKhateeb, a graduate student at the faculty of Computer Science. I'm doing research on the user preferences of personal task management tools on smart devices like phones, tablets, and personal computers. These tools include applications like to-do lists, calendars, e-mail, notes, budget managers, etc. My research focuses on the user needs and satisfaction in relation to these tools. I'm recruiting participants to answer an online questionnaire that will take 15 minutes on average to finish it. I'm looking for users who have a minimum level of understanding English language (a low-intermediate level is sufficient), be at least 18 years old, be familiar with the use of smart devices (phones, tablets, computers, etc.), and have a minimum of a high school degree.

There is no direct compensation for taking part in this study, but there will be 8 prizes each is worth 50 CAD, and a draw will be done at the end of the study to choose 8 winners from those who took part in the study.

Please feel free to share this e-mail with whoever you think will be interested in taking part in the study. If you have any questions regarding this research, please contact me through e-mail ([ayman.elkhateeb@dal.ca](mailto:ayman.elkhateeb@dal.ca)), or call or text my cell phone at 902XXXXXXX.

If you are interested to participate, please follow this link to read the consent form and participate: <https://surveys.dal.ca/opinio/s?s=47350>

Ayman ElKhateeb

Faculty of Computer Science

Dalhousie University



## **Appendix C – Consent Form**

You are invited to take part in a research study being conducted by me, Ayman ElKhateeb, a graduate student at the Faculty of Computer Science at Dalhousie University, as part of my master's degree. The purpose of this research is to understand user preferences related to personal task management tools used on smart devices (to-do lists, notes, calendars, etc.). This research might contribute to new knowledge in this field.

The requirements to participate in this study are to have a minimum level of understanding English language (a low-intermediate level is sufficient), be at least 18 years old, be familiar with the use of smart devices (phones, tablets, computers, etc.), and to have a minimum of a high school degree.

As a participant in the research you will be asked to answer an online questionnaire consisting of 29 questions. All responses will be saved on a secure and encrypted server. Your information will be kept confidential and no personal information will be published. Your contact information will be visible only to the researcher and his supervisor, and it will not be linked to your responses to the questionnaire, as your responses will be completely anonymous. Your contact information will be deleted shortly after selecting prize winners.

Your participation in this research is entirely your choice. You are welcome to exit the questionnaire at any time if you no longer want to participate. All you need to do is close your browser page. I will not include any incomplete responses in my analyses. Even if you choose to cancel your participation after

you have already started, you are still eligible for the draw to win one of the prizes.

There may not be any direct benefits to you in participating in this research and you may not receive compensation. However, there will be 8 prizes each worth \$50 (Canadian), which will be randomly given to 8 of the participants after the data gathering phase. To be eligible for this draw, you must enter valid contact information to be contacted in the case of winning. You also need to mark the checkbox in this form confirming that you wish to enter the draw and that you agree to be contacted by the researcher in case you win a prize. If you do not enter valid contact information, I may not be able to deliver the prize to you if you are one of the winners.

You should discuss any questions you have about this study with Ayman ElKhateeb (ayman.elkhateeb@dal.ca, +1902XXXXXXX), or with his supervisor, Prof. Jamie Blustein (jamie@cs.dalprofs.org).

If you have any ethical concerns about this study, please contact me, Ayman ElKhateeb, at ayman.elkhateeb@dal.ca, or contact the Research Ethics Office at Dalhousie University at ethics@dal.ca or +19024943423.

Please read the below statement carefully. The marking of the below checkbox indicates that you have read, understood, and agreed to the statement.

I have read the explanation about this study. I understand that I have been asked to answer an online questionnaire. I understand that direct quotes of things I say may be used without identifying me. I agree to take part in this study. My

participation is voluntary and I understand that I am free to cancel my participation anytime during the study.

I have read the above statement and I agree to it.

Please check the below box if you will enter valid contact information and you wish to enter the draw to win one of eight \$50 CAD prizes:

I will enter valid contact info, and I wish to enter the draw to win one of eight \$50 CAD prizes. If I win a prize, I agree to be contacted by the researcher to receive my prize.

## Appendix D – Questionnaire

Part 1 of 3

### Demographic Data

\*All fields required

1. **Age**

- 18-25
- 26-35
- 36-45
- 46-55
- 56-65
- 66-75
- Older than 75

2. **Gender:**

- Male
- Female
- Other
- Prefer not to say

3. **Marital Status**

- Single
- Partnered

4. **Have children under 18 years old?**

- No
- 1 child under 18

- 2-4 children under 18
- More than 4 children under 18

5. **Do you live with one or more persons who is not a child but mostly dependent on you (e.g. disabled offspring over 18, disabled spouse, senior parent, etc.)?**

*If you are a caregiver and this is part of your job, please choose 'No'.*

- No
- Yes, 1 person
- Yes, more than one person

6. **Education**

- High school degree
- Undergraduate degree (like bachelor or any degree higher than high school)
- Graduate degree (like master's, PhD, etc.)

7. **Country of Residence:**

Afghanistan	▲
Albania	
Algeria	
Andorra	
Angola	
Antigua & Barbuda	
Argentina	
Armenia	
Australia	
Austria	▼

8. **Employment status (check all that apply)**

- Unemployed
- Homemaker
- Part-time student
- Full-time student
- Employee

Entrepreneur / Business owner / Self-employed / Free lancer

### 9. Primary work environment

- Not applicable
- Work from home
- Work at an organization

### 10. Job seniority level:

- Not applicable
- Entry level
- Junior
- Senior / Team lead
- Manager
- Executive

### 11. Job sector

- |  |  |
|--|--|
| <input type="checkbox"/> Not applicable                              | <input type="checkbox"/> Accountancy, banking and finance  |
| <input type="checkbox"/> Business, consulting and management         | <input type="checkbox"/> Charity and voluntary work        |
| <input type="checkbox"/> Creative arts and design                    | <input type="checkbox"/> Energy and utilities              |
| <input type="checkbox"/> Engineering and manufacturing               | <input type="checkbox"/> Environment and agriculture       |
| <input type="checkbox"/> Healthcare                                  | <input type="checkbox"/> Hospitality and events management |
| <input type="checkbox"/> Information technology                      | <input type="checkbox"/> Law                               |
| <input type="checkbox"/> Law enforcement and security                | <input type="checkbox"/> Leisure, sports and tourism       |
| <input type="checkbox"/> Marketing, advertising and public relations | <input type="checkbox"/> Media and internet                |
| <input type="checkbox"/> Military                                    | <input type="checkbox"/> Property and construction         |
| <input type="checkbox"/> Public services and administration          | <input type="checkbox"/> Recruitment and HR                |
| <input type="checkbox"/> Retail                                      | <input type="checkbox"/> Sales                             |
| <input type="checkbox"/> Science and pharmaceuticals                 | <input type="checkbox"/> Social care                       |
| <input type="checkbox"/> Transport and logistics                     | <input type="checkbox"/> Other, please specify below       |

[Go to Part 2](#)

Part 2 of 3

## Existing Task Management Tools

\*All fields required

12. **Do you use software task management tools to manage your tasks and responsibilities?**

**Examples for these tools are to-do lists, calendars, email clients, budget managers, notes, alarms, etc.**

- Yes, for most or all of my responsibilities
- Yes, for some of my responsibilities
- Rarely
- Never

[Next](#)

***If participant selected 'Rarely' or 'Never':***

13a. **Why do you prefer not to use such tools?**

- I prefer not to use software apps for that, I use hard-copy planners, physical notes, and calendars
- I couldn't find a software tool that I'm satisfied with so far
- I don't like to use either software tools or hardware tools, I organize my tasks in my mind

Other, please explain

Go to Part 3

**If participant selected 'Yes':**

Part 2 of 3

**13b. What type of device do you use the task management tools on?  
Check all that apply.**

- Smart phone
- Tablet
- Dedicated assistant (like PDA)
- Laptop computer
- Desktop computer

**14. Which task management tools do you use to manage and organize your tasks? Please list the commercial names of all the tools/applications you use, separated with commas.**

**15. What types of tasks do you manage using the listed tools?**

- Personal life related responsibilities
- Job/business responsibilities
- Both personal and job tasks



16. **Do you think that these tools complement each other?**

Yes

No

17. **Do you think that these tools are integrated in any way?**

Yes

No

18. **How efficient are the tools that you use in helping you manage your tasks and responsibilities?**

Very efficient

Somehow efficient

I'm not sure

Not very efficient

Very inefficient

19. **Do you find all the tools you need to manage all the tasks you have, or do you feel that there is a gap that you can't find an application for it?**

I have all the tools I need

I can't find all what I need, I think new apps should be developed to address this gap

20. **Overall, how satisfied are you with the personal task management tools that you use?**

Very satisfied

Somehow satisfied

I'm not sure

Unsatisfied

Very unsatisfied

Go to Part 3

Part 3 of 3

## A New Task Management Tool?

\*All fields required

- 1. Do you prefer to have all your tasks in all areas of your life managed and organized automatically, or do you prefer to have manual control to manage them?**
  - I prefer full automation
  - I prefer a mix of automation and manual control
  - I prefer to fully control them myself
  
- 2. Do you like to have all tasks and responsibilities in all life aspects (social, financial, career, etc.) managed within one big and integrated tool, or do you prefer to have separate tools (like to-do list, budget manager, calendar, etc.)?**
  - I prefer one integrated tool
  - I prefer separate tools
  
- 3. If a newer tool emerges that encompasses all current tools in one place and assuming that you decide it is a better tool for you to use, will you be willing to transfer to it quickly or is the transfer phase difficult for you to decide?**
  - I will transfer as soon as it is available for me
  - I will transfer but I know it will not be an easy transfer

- I will transfer after the majority of my connections start using it
- Even if I believe it is a better tool, I'm not willing to transfer (briefly explain why)

4. **If a newer tool is introduced and you are convinced that it is more efficient, will you be willing to pay to use it? Or will you only use it if it's free?**
- I'm willing to pay to use it
  - I will only use it if it's free
5. **If you are willing to pay to use it, do you prefer to pay a timely subscription (monthly, yearly, etc.) or do you prefer to pay one lump sum payment to own it (in which case it will be a bigger payment)?**
- I'm not willing to pay for it
  - I prefer timely subscription
  - I prefer to pay a bigger payment once and own it
6. **If the new tool is available in the market and received public acceptance, and assuming that the developing company announced that it took serious measures to ensure the privacy and security of users' information, will there still be any privacy or security concerns that might prevent you from using it?**
- Yes, even if they say it's very secure, I will still be hesitant
  - If the developing company was transparent about its privacy and security precautions, I will not have issues about that
7. **If you start using the new integrated all-in-one tool, are you willing to share your information with third party organizations in order to provide more automation to your**

**responsibilities management? For example share some information with your bank to manage your financial budget, or share some needed information with your employer to manage in your job tasks management?**

- Yes, I'm willing to share any amount of information with other third party organizations as long as it is through secure channels
- Yes, I'm willing to share only the needed information to automate tasks
- No, I don't want to share any information with any third parties

**8. If you accept to use a new integrated tool, it will need continuous data entry to efficiently manage your responsibilities. Assuming that data entry takes 15 minutes for one session, how many data entry sessions will be acceptable for you to use the tool?**

- Daily
- 2-4 times a week
- Weekly
- Bi-weekly
- Monthly

Submit & Finish

## Appendix E– Letter of Approval

### Social Sciences & Humanities Research Ethics Board Letter of Approval

January 14, 2019

Ayman ElKhateeb  
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Dear Ayman,

**REB #:** 2018-4507  
**Project Title:** Understanding User Preferences of Productivity Tools on Smart Devices

**Effective Date:** January 14, 2019  
**Expiry Date:** January 14, 2020

The Social Sciences & Humanities Research Ethics Board has reviewed your application for research involving humans and found the proposed research to be in accordance with the Tri-Council Policy Statement on *Ethical Conduct for Research Involving Humans*. This approval will be in effect for 12 months as indicated above. This approval is subject to the conditions listed below which constitute your on-going responsibilities with respect to the ethical conduct of this research.

Sincerely,

Dr. Karen Beazley, Chair

**Appendix F– Term Paper of 2017**

Term Paper for CSCI 6606  
Winter/2017

A Framework of Integrated PTM Tool

Ayman ElKhateeb  
10 April 2017

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## **Abstract**

The realm of software applications that assist humans to achieve their tasks and keep track of their responsibilities is vast. These applications include categories like to-do-lists (also called task organizers), budget managers, alarm clocks, calendars, and other categories. However, until the moment of writing this paper, no software system has been introduced that manages a human's life in a way that integrates all aspects of personal and professional life in one central place. This paper introduces a framework design for a system that manages a human's life in a way that resembles how enterprise resource planning systems manage organizations. We hope –and we will seek– that this framework be adopted and used to implement the desired system by one of the software companies to be published for users worldwide.

## **1. Introduction**

The design of the proposed framework is inspired by the design of enterprise resource planning systems (we will refer to them as “ERP” throughout the paper), hence it is convenient to start with a brief description of these systems. The contents of the subsequent sections will be as follows: Section 2 will discuss the motivation behind introducing the proposed framework design, Section 3 will explain the added value to consumers and market, Section 4 will contain the design of the framework in detail, Section 5 will raise and discuss necessary questions, and Section 6 will provide a conclusion of the paper.

This version of the paper is intended to be a term paper of a graduate course. We intend to produce another version after submitting this one, the newer version is planned to have more in-depth and more comprehensive design of the framework.



## **1.1. What is ERP?**

As Goyal (2011) noted, ERPs are integrated software systems that operate organizations and control their functionalities. An ERP is not like a tailored system designed for a specific company, it is rather a ready-made package that can be implemented in various types of organizations. ERPs are flexible enough in their implementation to adapt to the specific requirements of each organization.

ERPs contain several modules, which are determined by the business need. Common modules in all ERP systems include Financials, Human Capital Management, and Logistics. But the most well-known feature about ERPs, and the one that sets them apart from other software systems is integration. Although ERPs are divided into several modules, these modules are integrated together in a way that allows them to communicate with each other. To simplify this feature to the reader, we can imagine an employee 'A' in a company 'Z' who has a monthly salary of 'X'. When the date that the salary is supposed to be transferred to A's bank account, the ERP's Human Capital Management module will communicate with the Financials module to let it know that the salary of A is due, upon that request, the Financials module will deposit the salary X in A's bank account, and then it will inform the Human Capital Management module that A received his salary, and then both modules will update their records to store this piece of information, and the central database that holds all modules' data will be updated accordingly.

## **1.2. The similarity between ERPs and the proposed framework**

The reader might wonder why we chose to imitate the design of ERP systems in our proposed framework, when these systems are made for organizations and our proposed framework is for a

system for human users. To clarify any possible ambiguity, we state that the proposed framework is for a system that works in a similar way in which ERP systems do, focusing on three main features:

- a) Dividing life areas into several modules.
- b) Integrating these modules together to facilitate the operation of them all.
- c) Collecting all data in one central database.

Needless to say that the obvious differences between humans and organizations will result in a largely different design. In fact, and due to these differences, the only similarity between the proposed framework design and ERP systems' design is the three features that we mentioned earlier, while the design itself will be completely different.

## **2. Motivation**

Before we go further in the design of the proposed framework, we need to justify the need for such system, and the motivation behind its introduction. Until the moment this paper is being written, there have never been introduced an all-in-one system that can operate a human's life with all its aspects together in one place. We could not find a system that manages someone's professional and social life with all their areas and integrating these areas together and allowing them to communicate with each other and make them all report to one database to achieve and operate all tasks related to them. One can argue that some of the existing applications in the categories of task organizers, budget managers, or calendars are competitive and sufficient in achieving users' tasks and organizing their lives, this brings the need to discuss the added value of the proposed system framework.

## **3. Added value**

What is new in our framework, and what makes it unique in its field is that it will encompass all the categories of task organizers, calendars, budget managers, and other categories, all in one place, and will divide life areas into modules, and will integrate all these modules together and make them all report to one database to share system-wide information, therefore it makes sure that all areas are consistent and updated accordingly. As we can see, having integrated modules is what sets our system framework apart from other existing products, and this feature is the same feature that gives ERP systems an advantage over existing software applications that manage organizations, because as Goyal (2011) noted, integration between functional modules highly improves decision making process.

#### **4. Framework design**

In this section, we provide our vision of the framework of the proposed system. The design will be divided into modules, in which some of them will include sub-modules. Then we discuss how integration will occur between the modules within the system and between the system and other systems. Finally we discuss the question of the best suitable technology platform to hold the system. The design will not dive into the deepest details, as this will increase this paper's size too much, instead, we will provide guidelines and examples that can be generalized.

##### **4.1. Modules**

###### **4.1.1. Financials**

The financials module will take care of all money-related matters of users. Within this module, all income sources and spending fields will be listed. Any amount of money that a person shall gain or spend will be recorded in this module. Some of these amounts will be fixed, like salary and bills, and some of them will happen only once, or with no specific pattern.

This module will also organize users' financials. It can suggest plans for savings, or give advice for users based on their recorded spending habits, and it can predict users' financial situations in the future based on their incoming and outgoing money. It will make analysis reports for users to view their spending history and utilize their spending habits accordingly. This module is a core of the system and will affect and be affected by all other modules.

#### **4.1.2. Career**

This module will be concerned with users' professional careers and educational life. For a job, It will include all tasks and due dates, project plans, meeting minutes, and more work-related tasks. It will give notifications to users with upcoming deadlines, and it will create work procedures and plans to advise users of how to complete work on time. It can help users who hold managerial positions to effectively utilize their teams, and get the best out of employees based on the skills they have (which will be stored in the system).

For an academic degree, it will list all course projects, term papers, and assignments along with their due dates. It will create study plans, and notify of upcoming deadlines. It will track users' performance during study and alarm them if it gets too low.

This module can also suggest improvement plans for users to enhance their work skills and gain more skills, based on the work needs and the market needs.

### **4.1.3. Social**

The social module will store all data related to users' social life. An idea worth studying is including built-in chatting feature in this module. All social media online accounts can be stored and managed here. The categories below will be included in this module.

#### **4.1.3.1. Family**

The family sub-module will include a user's family members, with all their data. This includes spouses and children. All important dates and occasions will be recorded and the user will be notified of them in advance. All data related to children's needs, schools, and development will be stored here and users will be notified of them.

#### **4.1.3.2. Friends and relatives**

Personal and contact information of users' friends and relatives, along with important dates and events will be stored in this sub-module. It can categorize them into close and regular friends or relatives. It will remind users if it has been too long since they contacted them. It will notify them of their upcoming occasions. It can

store information like their preferences and likes, so for example if a user wants to buy a gift for someone, they can choose a suitable gift.

#### **4.1.3.3. Colleagues**

All people known by users within work or education environment will be listed here, along with all of their information. Users can choose later to transfer them to the friends sub-module if they wish.

#### **4.1.3.4. Social life-improvement**

This sub-module will take care of users' self-improvement in their life. It can record their habits and hobbies, and recommend steps to follow to increase users' knowledge or skills in their chosen hobbies. Moreover, users can track their personality issues and try to improve them in this sub-module, they can record incidents and see progress in their personality over time.

### **4.1.4. Household**

This module is concerned with all aspects related to the living place and owned vehicles. Categories are below.

#### **4.1.4.1. Residence places**

Here, all residence places of a user will be stored with their information. Users can track all aspects related to their residence using this sub-module. This includes bills to be paid, fixes and enhancements to be made. Information of realtors or previous owners can also be stored. Market value of residences can be tracked, and

expected changes in the future depending on the market will be communicated with users to be aware of the residences value.

#### **4.1.4.2. Supplies**

The supplies sub-module will keep record of users' consumption of supplies like food. It will record the consumption rate and money spent on supplies. It will notify users when it is time to buy a given supply based on calculated consumption rate.

#### **4.1.5. Vehicles**

All vehicles owned by users will be listed here, along with their maintenance information and their market values. Notifications will be made when fixes or regular maintenances are needed. All vehicles conditions will be tracked here. Fuel consumption can also be recorded. Installments and payments will be tracked, and all receipts of purchases related to vehicles will be recorded.

#### **4.1.6. Legal**

All legal matters of users will be stored and managed here. This includes all government issued documents (and their scanned copies), any marriage, divorce, or adoption matters. A person's criminal record should be kept here, to allow the person to be aware of (whether the record is clean or not). All legal transactions related to the ownership of any property will be stored. All legal cases will be managed.

#### **4.2. To-do list**

This module will act as an inclusive to-do-list of all modules. Tasks from all modules will exist here and will be managed by the system. The system can prioritize them, create due dates, and notify users of them. It can create plans to finish them, and follow up with users to track their performance in finishing their tasks.

### **4.3. Modules integration**

The main added value of this system is integration between modules. Paths of integration are too many to be included here, so we will provide examples of the way they will communicate.

When the supplies module is updated with new supplies, their prices will affect the financial module, which will be updated accordingly. Records of amounts and prices will be kept for future use.

When the legal module is updated with users' marital status when they get married, the family module will be updated automatically to include the new spouse and all his or her information. Or if a user wins a case of property ownership, the property information will be stored in the household module.

### **4.4. Integration with other systems**

If the proposed system becomes popular and widely used, it will be an extremely helpful feature if other service systems integrate with it. This means that retail store systems, work managements systems, social media websites, banking institutions, and



other types of organizations can feed the system with data automatically, which brings a whole new level of convenience to users.

#### **4.5. Platforms**

We think of the platform that the proposed system should be built on, and whether it would be a desktop, a smartphone, or a web application, or should it have many versions, or even become a separate operating system for hand-held devices? Many factors come to contribute to this decision, and we discuss some of them below.

Users are expected to interact with the system many times a day, and sometimes they might not have access to computers, which means that users need to have access to the system through their smartphones, which are the devices that are most likely to be within reach all the time. Therefore, regardless of the platform that will be chosen, it must be available for access by smartphones.

Some users might be more comfortable using devices with bigger screens, so we think that having a version of the system that is accessible by desktops might be necessary to serve this group of users. Some tasks in the system can take time to finish them and doing that on devices with small screen can be cumbersome.

### **5. Discussion**

When introducing such system framework, some major questions arise and are expected to occur to the readers of this paper, therefore it is important to highlight and discuss those questions. In this section, we will discuss three questions: expected implementation challenges, targeted user population, and measures of success of the system. We will try to provide as many feasible answers and solutions as possible.

## **5.1. Expected challenges in system implementation**

The system of our framework will be a huge one, because the contained modules will be like sub-applications, and they are several modules. A system with this size brings many challenges if we think of its implementation. We list below the most critical challenges and their possible solutions. We will only suggest high-level solutions and guidelines for the mentioned issues. Complete and detailed solutions can only be introduced during the actual implementation of the system.

### **5.1.1. Data entry**

As we have seen in the framework design section, the system will cover all areas of a user's life, and will store all related data in the system's database. This size of data is enormous, and will need to be fed to the system continuously and accurately. At the same time, users will not be comfortable interrupting their daily primary tasks and spending so much time feeding the system with the required data, this forces us to face the question of how can we facilitate data entry without consistently interrupting users.

We categorize data entry of the proposed system into two stages. The first stage is when the system is being used for the first time, all existing user information prior to that point needs to be entered to the system to function properly. This resembles when an organization is migrating from an old software system (or from using no technology systems at all) to a new ERP system. This stage is inevitable and is expected to take some time, but its advantage is that it will happen only once in a life-time. The system developers will need to provide a specific set of steps to help users pass this stage, and to encourage them to start using the system in the first place.

The second stage of data entry is when users are actually using the system, meaning that this stage will be existing all the time since the first-time use of the new system and until a user completely stops using it for any reason. Here, we suggest some ideas that might help overcome this issue. As noted in subsection 4.4, if we assume that the system becomes widely used by a large population of people, many service organizations are expected to be willing to integrate their services with this system. A good example for this is when users go shopping at a retail store, the store can automatically add the items purchased by users to their account in the proposed system, and the system's financial module will be updated accordingly, and the purchased items can be added in their respective modules in the system, and any tasks that are built on these items can be generated automatically. Another good example is when an employee joins a new company, the company can add all work-related data to the new employee's account in the proposed system. This includes all work tasks and responsibilities, deadlines, the employees' hierarchy and their work managers, and any useful information regarding the company's policies and procedures. The examples of applying this solution are so many, but they all depend on the case that the proposed

system is so widely used that many organizations are willing to integrate with it to provide better service to their customers or to enhance the performance of their employees.

We must also consider types of data that do not fall under the previous solution. For example, there is data related to household as noted in subsection 4.1.4, this type of data cannot be entered using the previous solution. In this matter, we think that virtual assistants might be of help. Apple's Siri, Google Assistant, and Cortana of Microsoft are good examples. These are voice-activated assistants that exist on mobile devices, which can help users just by hearing their human voice commands. There can be two cases in this solution: the first is that these virtual assistants integrate with the proposed system and be used directly to enter the required data based on the user's voice commands, in that case, virtual assistants must be very efficient in their voice-recognition capabilities, because if they interpret user commands to the wrong text, they will insert false data into the system. They should also let users confirm the interpreted text before proceeding. The second case is that they stay separate but be used to open the respective system interface and the users enter the data themselves. It is obvious that we favor the first case, but again, we think it is only possible if the proposed system is so widely used.

One critical matter in data entry that can be of great help, is that the system interface be implemented in a very simple way, with as few steps as possible required to reach the needed form in which users enter the data. In fact, this matter is not only necessary for the sake of easy data entry, but it is also vital to the success of the whole system. According to Galitz (2002) "The interface must be clear in visual appearance, concept, and wording. Visual elements should be understandable, relating to the user's real-world concepts and functions. Metaphors, or

analogies, should be realistic and simple. Interface words and text should be simple, unambiguous, and free of computer jargon” (p. 42). System implementers must ensure the maximum simplicity of interface design.

### **5.1.2. User acceptance**

Any software company that decides to adopt the proposed framework and implement the system will have to make sure that the system will be welcomed by the targeted user population. Otherwise, huge efforts and costs will have been done in vein, and the loss will be huge. To ensure users’ acceptance, we propose some steps to consider when implementing the system.

Surveys can be conducted among communities which are expected to be of need to the system. The surveys can contain questions of multiple levels, starting from the mere idea of having such system, and to the level of which modules they suggest to be included, and whether they are willing to pay for that system or not, and if they are, then how much. Many useful questions can be included in the surveys to help implementers make the most accepted version of the system. The design of these questions can be researched separately, and it is out of the scope of this paper.

Early marketing efforts help save time on the long run (Wooldridge & Schneider, 2011). An efficient marketing campaign for the system is a good way to ensure that the targeted users are informed of the system’s existence. Such campaign must show the most useful features of the system, and let users be aware of the benefits they will gain if they use the system, and what they will miss if they do not use it. It is very important that this campaign be directed to the right people

who are most likely to benefit from the system. We discuss the characteristics of the targeted user population in subsection 5.2.

Another possible way is to use referrals. The developing company can give offers, or pay money for users who refer other users to the system and convince them to use it. This will encourage existing users to get more users of the system, and the referred users are more likely to be convinced to use the system by someone they trust. Also the referring users can be informed of the benefits that the whole user community will gain by increasing the number of the system users, in which we discussed in subsection 5.1.1.

### **5.1.3. Privacy and security**

To function properly and in an integral way, the system that will be built on our framework will contain every single detail of a user's data. This includes every piece of information a person might have in life. We believe that the vast majority of this information will be of private nature, and it should be kept private, and to be accessed only and exclusively by its owner or someone the owner authorizes to access. It goes without saying that a system with this design will attract hackers to invade privacy and misuse information of users, and the results can be costly (see Acquisto & Friedman, 2006).

Considering the fact that people are often not aware of privacy issues and risks (Pitkänen & Tuunainen, 2012), the developers of the system must ensure the privacy and security of users' data in every possible way and with multiple layers of security. Various security techniques can be used, including –but not limited to– using extremely strong data encryption methods, which prevent

anyone from viewing the data without having a specific key that only the data owner can have, so even if hackers have access to the data, they will see it only as scrambled bits of zeros and ones, and they cannot make sense of it. Many reliable technologies are specialized in protecting information, and we will not discuss them here, but we emphasize that the system must have full and complete protection for the data within before being published to users.

#### **5.1.4. User training**

The expected complexity and size of the proposed system raise the issue of user training. Incorrect data causes software systems to perform incorrectly and give false results. According to Norman (1983), ambiguity can lead to errors by users. As in ERP system implementations, employees of the organization receive training sessions on how to use the system correctly, we must also think of alternative ways to train users how to use our proposed system correctly. We list here some possible ways.

We believe that the most effective way (and most important) is to provide a complete user manual for the system, which should contain step-by-step guides for users to teach them how to use the system properly. Shand (1994) states that user manuals have proved successful in that respect. Contents of such manual should include chapters like first-time setup, system configurations and settings, user account management, and separate thorough chapters for each of data entry and system customization. Such user manual should act as a reference for users to consult when they need help, and also as a guide for the early stages in using the system. The user manual should also include a list of frequently asked questions and their detailed answers.

Another possible way is to provide video tutorials conducted by the developing company to train users achieve specific tasks in the system. Video tutorials can be very effective in teaching users how to achieve specific tasks in the system. Results of a study done by H. v. d. Meij and J. v. d. Meij (2014) show that users favor video tutorials over paper-based tutorials. These videos should be categorized according to respective modules and sub-modules. We recommend that they have a short duration, to encourage more users to watch them.

It should be noted that not all users are expected to use all training materials provided, but each training material type will be used by certain group of users who find this type convenient to them. Therefore, we recommend producing as much training materials with different types as possible, to cover all user groups.

### **5.1.5. Competition**

We mentioned that the proposed system has no rivals, because it is the first of its kind. But we want to think of competition in terms of having more than one company adopting our framework and implementing competing versions of similar systems. We believe that competition between companies to produce the best possible version of the system is necessary. Having only one product with no rivals in the market can have undesired consequences, like the lack of interest from the developing company to continually improve the system when there are no competitors in the market. We hope that our framework will find more than one sponsoring company to implement it, which we think results in better consumer experience.



It is critical to say that if many products appear in the market that are built upon our framework, they should all be able to have some sort of cooperation. As noted in subsection 4.1, users of the system can integrate their account with other users' accounts, and have some kind of communication and data transfer between them (like in the case of a husband and wife living together and having shared financial pools). When this happens and both users do not use the same product, here comes the benefit of cooperation and communication between different products that serve the same purpose. We think that this feature is critical for the success of the proposed system.

#### **5.1.6. Implementation cost and revenue**

One of the biggest challenges any company adopting the framework will face is how to produce the system in the best possible form, with the least possible costs, to achieve the biggest possible user-base. This matter is complicated and is affected by various factors that will only be known at the production phase, but we want to think of it in regards of the question: how much money should a user have to pay in order to use the system? This question is one of the main factors that will affect the success and wide-spreading of the system. We will discuss several models of cost from two perspectives: pricing methods and price amounts. The latter will not be discussed in numbers.

One pricing method is to produce one version of the system that has a fixed price. This model uses a one-size-fits-all strategy, and has possible drawbacks. People might not wish to have all the features provided by the system, or they might simply not need all of them. This will put them in a situation where either they must get all or lose all. If

this model is applied, the price of the system should be in the range that most regular users can afford, otherwise we do not believe it will succeed.

Another method is to produce two versions of the system, one is free and the other is paid. The free version would have basic features, and the paid version would have full features and capabilities. In that case, the price of the full version can be relatively high, because users who cannot afford it still have the chance to get the free version. This method can also be applied by making two paid versions, one of them is significantly cheaper than the other.

The last method is the one that we highly prefer, and it is the same method of pricing ERP systems for organizations. We recommend that the system should not be completely free or significantly cheap, because this can only be achieved by compromising quality. The system will have several modules, features, and capabilities. Each one of them can have a separate price, and customers can choose which ones they want, and which they do not want. Discounts can be made for customers who purchase more than a certain number of features, as this will encourage them to purchase more. This method is the most dynamic one, and it solves the equation of quality versus cost, and it also helps give customers a tailored system.

## **5.2. Targeted user population**

It is critical to define the general characteristics of the targeted user population of the proposed system, to produce a product that is expected to be highly accepted among the targeted population. We discuss some general characteristics that we think should exist in the targeted users.

### **5.2.1. Educational background**

Normally, our proposed system should be directed to users with a level of educational background, which we can define as the one that gives users the ability to efficiently read, write, and understand given messages and system information. This can differ between countries as educational systems are different. Rogers, Cabrera, Walker, Gilbert, and Fisk reported that users who use technology are significantly more educated than other users who do not use it (as cited in Ellis & Allaire, 2016, p. 2). It might seem irrelevant to mention this characteristic when public education in many countries is free and a basic right to every resident, but this is not the case in the whole world. There are countries that do not provide free education, and there are countries that provide it, but its level is so low that it is not efficient. Unless users have this characteristic, it will be very difficult for them to interact with the system.

### **5.2.2. Income class**

According to study by Junco, Merson, and Salter (2010), students with low income are much less likely to own a cell phone than students of high income. We discussed that if the system is free or too cheap, the quality is most likely to be compromised, and this means that an important characteristic of the targeted user population is to be able to afford the proposed system. Depending on the pricing models we discussed in subsection 5.1.6, we think that the system should be directed to users who meet the conditions of being at least in the middle-class.

### **5.2.3. Age group**

Age can be an important contributing factor to the targeted user population. Hubona et al. list age among other factors that impact use of technology (as cited in Baker, Al-Gahtani, & Hubona, 2007, p. 5). Therefore, the system should be implemented with this fact in minds of the system developers. Depending on the features that the actual system will have after implementation, the developing company will need to study this matter and determine the best age group that is more likely to use the system.

We discuss here an important feature of the system, and that is when users add their family information to the system, they can add their children's information too, and when the children grow up and want to purchase their own copy of the system, they can transfer their data from their parents' accounts. This is very helpful in saving the step of first-time setup and migration to the system for the next generation of users.

## **5.3. Measures of success**

There are a number of measures of success that we can study after the publishing of the proposed system, to get an accurate figure of how successful the system is. But the developing company must also consider these factors during implementation phase, and put them as targets to achieve the success of the system. We discuss some of these measures below.

### **5.3.1. Performance**

The proposed system is assumed to accompany users during every detail of their daily life, and they are expected to interact with it continually, therefore it is important to ensure its fast performance in every transaction it makes. If the system is not fast enough, users will become too annoyed of using it, and they might eventually disregard it. We believe that if the system's performance is not ramble-free, it might not be successful at all.

### **5.3.2. Usability**

The system must be easy and simple to use as much as possible, and it should be browsed in a logical and easy to understand way. It should also use familiar designs that are already used in other software systems (like menu and back buttons) to ease the process of learning for the users.

### **5.3.3. Error handling**

We do not expect the system to be completely error free. However, we expect the developing company to apply as many error-handling strategies as possible, to avoid system crash and loss of data. Errors can be caused by users input or transactions, and can be caused by system bugs. Both cases must have error-handling techniques provided by the system and error reports to be sent to the developing company (with user consent). Some errors however might not be discovered and fixed in a timely manner, research by Chou, Yang, Chelf, Hallem, and Engler (2001) shows that a bug might exist in a system for more than two years before being fixed.

#### **5.3.4. Privacy and security**

We discussed privacy and security earlier in the expected implementation challenges subsection, and here we state that achieving the complete privacy and security of users' data is a critical success measure. Any leak of users' information from the system will be considered a major failure for the system. However, this measure of success will need time to be evaluated and to make sure that the system is immune to hacker attacks.

#### **5.3.5. Sales**

The final measure we discuss is the sales numbers of the proposed system. It is natural that if it achieves high amounts of sales in the targeted user population, then we can be sure that the system is successful. However, this measure –like the previous one– needs time to be estimated. It is possible that large number of users purchase the system at the beginning of its publishing, because they might have been waiting for it after seeing the prior marketing campaigns, and after they use it for a while they recognize that it does not satisfy them, or is not efficient enough in doing its required tasks, therefore they stop using it or referring other users to purchase it. This scenario needs time to take place, so observers will have to wait and see.

### **6. Conclusion**

We introduced a framework of a system that was not created before. We provided a brief introduction including a description of ERP systems design which inspired the design of our system, followed by the motivation behind introducing the framework

design, and the value that the proposed system will add to consumers. The framework design was provided, and discussion of the most significant questions that are expected to arise when reading the paper.

We will do as much efforts as we can to seek a software company that is willing to adopt the implementation of the proposed system, and eventually publishing it to the targeted user population, which we think will be a great step toward helping people to organize their lives and achieve their tasks and responsibilities in the right time.

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