



# Work Fragmentation, Task Management Practices and Productivity in Individual Knowledge Work

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**Abstract.** The study examined the nature of task management practices, their prevalence and relations to experiences of work fragmentation and productivity among Finnish state governmental organization employees, all of them knowledge workers. In the descriptive analysis it was found out, that knowledge workers experience most often work fragmentation as experiences of extreme hurry and forgetfulness. When considering productivity, respondents were more often satisfied with the quality of work they were able to fulfil, but less often to the amount of work they were able to finish. Less than half of the respondents collect and list all of their tasks into one place regularly. Every fifth of respondents newer plan or write down work duties and goals for the beginning work week, and every fourth of respondents never decide the start and due date for their single work tasks. Nearly every fifth never utilised any digital tool to support any personal task management activity. The correlation analysis revealed that negative correlation between the experiences of work fragmentation and productivity was statistically significant. Experiences of effectiveness of task management was negatively correlated with work fragmentation. Finally, maturity of applied task management practices was positively correlated with effectiveness of task management.

**Keywords:** Work fragmentation · Task management · Productivity · Knowledge work

## 1 Introduction

Maintaining sense of coherence and satisfying levels of personal productivity in a daily basis is a challenge in hectic contemporary knowledge work life. Maintenance of smooth work flow and ability to concentrate fully in the work duties is hard. Experiences of performance losses caused by the fragmentation of work are common in contemporary knowledge work settings. Task execution and getting tasks fulfilled is hampered by both external and internal interruptions, creating a workflow containing constant and rapid task switching (Czerwinski et al. 2004; Iqbal and Horvitz 2007). Considerable share of external distractions originate from digital work environment (Franssila et al. 2014). Conventional approach to support knowledge workers to maintain more productive workflow and avoid work fragmentation has concentrated on

different ways interface design and application settings can protect task execution from external distractions (e.g. Iqbal and Horvitz 2007; Lindlbauer et al. 2016). However, a considerable share of interruptions are self-generated (Dabbish et al. 2011; Adler and Benbunan-Fich 2013). Instead, very little is known about daily task management and task execution planning practices of knowledge workers.

In order to better understand conditions and consequences of task management and task planning in individual knowledge work, this study examined the nature of task management practices, their prevalence and relations to experiences of work fragmentation and productivity among Finnish state governmental organization knowledge workers. The research questions of this study were:

- (1) What is the nature of work fragmentation experiences in knowledge work settings?
- (2) How work fragmentation is related to the experiences of task management effectiveness and personal productivity?
- (3) What is the nature and prevalence of task management practices applied by knowledge workers?
- (4) How the maturity of task management practices and experiences of task management effectiveness are related?
- (5) How the maturity of task management practices and experiences of work fragmentation and personal productivity are related?

## 2 Background

Despite widespread experiences of hurry, work fragmentation and interruptions in knowledge work settings, surprisingly small amount of academic research has empirically observed knowledge worker task management and task execution planning practices (Haraty et al. 2016). In the academic literature, concepts of task management, task planning, activity planning and time management have been applied somewhat interchangeably, referring to broad categories of activities related to task planning and task scheduling (see Claessens et al. 2009a). Several studies examine the complicated and overloaded role email often plays in practical task management of knowledge workers (Bellotti et al. 2005; Whittaker et al. 2007). In an interview and video-diary study observing academic professionals it was found out, that the main task management activities applied were planning, prioritization and list-making. Task management and task execution contained various challenges. In particular in task management, several difficulties were experienced: integrating different media, rearranging tasks, determining appropriate tasks, identifying reasonable timeframes, generating flexible schedules, managing long term goals, estimating task duration and differentiating the nature of different tasks. Considering actual task performance, another set of difficulties were identified: accomplishing competing tasks, undertaking planned tasks, undertaking long term goals, undertaking tasks that do not involve other people, remembering small tasks, retaining self-motivation and assessing previous achievements (Kamsin 2014). However, it was left unclear, how actively and regularly academics

executed different task management activities. In another diary and survey study actual task completion of R&D engineers was monitored. In the multi level analysis it was found out, that the tasks with higher priority, urgency and lower importance were more likely to be completed. The time management training received recently was one of the individual level explainers of the task completion rate, alongside with the personality trait of conscientiousness and emotional stability. However, self-reported inclination to planning was not related to higher rate of actual task completion (Claessens et al. 2009b). On the other hand, time management training does not always guarantee actual application of learned strategies into daily work. In a study observing impact of time management training into perceived stress, perceived control of time and performance at work, large differences in the actual application of learned strategies were found (Häfner and Stock 2010).

According to the theory of implementation intention and goal attainment (Gollwitzer and Oettingen 2016), when one has explicitly specified when, where and with which sub-steps one is going to fulfil a task goal, it has tendency to become fulfilled. The basic script of specifying implementation intentions resembles the main elements of task management and task planning – deriving sub-goals and concrete task from main goals, estimating time required to complete different tasks, understanding temporal interdependencies between tasks, putting various task into order of execution, scheduling both long and short term task execution and monitoring the rate of task accomplishment. It can be hypothesized, that in knowledge work settings which are filled with variety of goals and variety of possibilities to organize one's duties, specifying implementation intentions and "scripting" one's goal attainment may enhance sense of coherence and personal productivity, and finally even eliminate the stressful experiences of work fragmentation. On the other hand, can the nature and maturity level (or lack) of task management methods and practices applied explain at least a share of concurrent experiences of work fragmentation? While several studies have evaluated and given design recommendation for specific digital tool functionalities to support task management, the overall understanding of core processes and applied practices of task management in the real world among knowledge workers has remained vague. This study provides description of the task management practices applied in knowledge work settings and provides preliminary evidence that development and deployment of task management skills can enhance knowledge worker productivity.

### 3 Methodology

The data of the study was collected with an online survey distributed to knowledge workers ( $n = 59$ ) employed in a governmental organization in autumn 2018. The survey was delivered to a group of volunteer participants in the organization. Variable amount of expert, management and support duties were included into the work roles of the survey participants. Most of the participants (95%) had expert duties, 24% of participants had managerial duties and 22% had support duties in their task profile.

The survey contained measures to assess as dependent variables daily experiences of work fragmentation and personal productivity developed in Franssila et al. (2016). Respondents were asked to indicate their experiences in overall during the last five working days. As independent variables were measures of qualitative nature and effectiveness of applied task management practices. Measures for task management practices were designed for the purpose of this study, operationalizing the theories of implementation intention and goal striving (Gollwitzer and Oettingen 2016).

Measures of work fragmentation, productivity and task management effectiveness were composed of item statements, and respondents were asked to assess the item statements on 5-point rating scale, from “I strongly disagree” (=1) to “I strongly agree” (=5) (see Table 1). The final measures of work fragmentation, task management effectiveness and productivity were calculated by summing the scores of item variables according to Table 1. The reliabilities of measures were evaluated with Cronbach’s alpha, and they were the following: work fragmentation ( $\alpha = 0,75$ ), task management effectiveness ( $\alpha = 0,88$ ) and productivity ( $\alpha = 0,49$ ).

**Table 1.** Description of the survey measures – work fragmentation, task management effectiveness and productivity.

Measure	Items in the measure (rating scale: 1 = I strongly disagree–5 = I strongly agree.)
	Considering my personal work performance during the last five work days, I was experiencing
Work fragmentation	Intensive hurry Forgetfulness Too frequent disruptive interruptions Difficulties to concentrate to tasks at hand Difficulties to complete tasks which I believed I could complete today
Task management effectiveness	Ease of prioritization of my daily work Ease of deciding the task execution order in my daily work
Productivity	Satisfaction with the quality of completed work Satisfaction with the amount of completed work

Measure of task management practices was composed of item statements considering application of various task management practices, and respondents were asked to assess the item statements on 3-point rating scale, with scores “I apply this practice regularly” (=1), “I apply this practice time to time” (=2), and “I never apply this practice” (=3) (see Table 2). The final measure of task management practices was calculated by summing the scores of item variables according Table 2. The reliability of the measure of task management practices was evaluated with Cronbach’s alpha, and the score was  $\alpha = 0,75$ .

**Table 2.** Description of the survey measures – task management practices.

Measure	Items in the measure (rating scale: “I apply this practice regularly” (=1), “I apply this practice time to time” (=2), and “I never apply this practice” (=3)
Task management practices	<p>I collect and list all my tasks into one place</p> <p>I “take an inventory” of my tasks regularly by checking with tasks are completed and which are uncompleted</p> <p>I organize and split goals of my work role and tasks into concrete subtasks</p> <p>I classify my tasks according to which goals and responsibility areas of my work role they serve</p> <p>I examine my work task load as a whole in order to see how different goal areas of my work role are represented there</p> <p>I classify my tasks according importance</p> <p>I classify my tasks according attractiveness</p> <p>I classify my tasks according urgency</p> <p>I budget (= estimate and book) time for different tasks and for different responsibility areas of my work role</p> <p>I plan and record tasks and goals for the beginning work week</p> <p>I plan and record tasks and goals for the beginning work day</p> <p>I decide when I start and complete certain work task</p> <p>I schedule all my tasks (not only meetings and appointments) to be completed in certain time</p>

In addition, open ended questions were included into the survey. In open ended questions, respondents were able to describe in their own words, what kind of digital tools and practices they applied in their daily task management, if any. In particular, the tools and practices applied in listing, evaluating, screening and organizing their tasks and managing time were asked to be described in the responses. From qualitative, written responses the amount of mentions of different applications and tools were recorded.

In the analysis of survey data, first, descriptive statistics of measures were calculated. Next, correlation analysis to study relations between dependent and independent variables was executed. Correlations between work fragmentation, productivity experiences and the maturity level of task management practices were statistically tested.

## 4 Results

In the descriptive analysis it was found out, that knowledge workers experience most often work fragmentation as experiences of extreme hurry and forgetfulness, but a bit less often difficulties to complete the duties they has planned for the day (Table 3). When considering productivity, respondents were more often satisfied with the quality of work they were able to fulfil, but less often to the amount of work they were able to finish (Table 4). Prioritization and planning the execution order of the tasks were equally challenging task management activities (Table 5).

**Table 3.** Descriptive statistics of items of work fragmentation measure (n = 59).

Items (scale: 1 = I strongly disagree–5 = I strongly agree.)	Mean	SD
Intensive hurry	3,66	0,93
Forgetfulness	3,59	1,00
Too frequent disruptive interruptions	3,37	1,05
Difficulties to concentrate to tasks at hand	3,36	0,99
Difficulties to complete tasks which I believed I could complete today	3,11	1,19

**Table 4.** Descriptive statistics of items of productivity measure (n = 59).

Items (scale: 1 = I strongly disagree–5 = I strongly agree.)	Mean	SD
Satisfaction with the quality of completed work	3,83	0,56
Satisfaction with the amount of completed work	3,07	0,96

**Table 5.** Descriptive statistics of items of task management effectiveness measure (n = 59).

Items (scale: 1 = I strongly disagree–5 = I strongly agree.)	Mean	SD
Ease of prioritization of my daily work	3,19	0,86
Ease of deciding the task execution order in my daily work	3,14	0,86

Analysis of responses to open ended questions revealed, that variety of distinct digital applications and functionalities were utilized in one or several distinct task management activities. Wide variety of applications were utilized in note-taking related to the task management. Tools supporting paper-mimicking note-taking and reminders (MS Onenote and Sticky Notes) were rather actively applied. Also a share (15%) of respondents utilized the specific, integrated task management tool Outlook Tasks (Table 6).

**Table 6.** Variety of digital applications utilized in task management based on open responses.

Tool/application	% of users
MS Outlook (in general)	66
MS Outlook Calendar	53
MS Onenote (in personal use)	34
MS Sticky Notes	24
MS Outlook Tasks	15
Project management application	12
MS Excel	9
Categories in MS Outlook	7
Trello	5
MS Outlook Email	5
MS Word	5
Kanbanflow	5

(continued)

**Table 6.** (continued)

Tool/application	% of users
MS Planner	3
MS Onenote (in collaborative use)	2
MS Sharepoint collaboration site	2
Reminders in MS Outlook	2
Notepad	2
Windows Resource Manager	2

Nearly every fifth never utilised any digital tool to support any personal task management activity. Some of the participants utilized both paper-based and digital means to manage their tasks. In overall, it was not possible to determine, what other than digital tools were actually applied in recording and scheduling tasks. In addition, when respondent mentioned “Outlook” as an application they utilized, it is impossible to determine, which tool/tools of Outlook they were actually using.

Less than half of the respondents collect and list all of their tasks into one place regularly. Nearly every fifth of respondent newer plan or write down work duties and goals for the beginning workweek, and every fourth of respondents never decide the start and due date for their single work tasks (Table 7).

**Table 7.** Descriptive statistics of items of task management practices measure (n = 59).

Item	% respondents who <i>never</i> apply the practice	% respondents who <i>from time to time</i> apply the practice	% respondents who <i>regularly</i> apply the practice
I collect and list all my tasks into one place	7	47	46
I “take an inventory” of my tasks regularly by checking with tasks are completed and which are uncompleted	7	61	32
I organize and split goals of my work role and tasks into concrete subtasks	20	58	22
I classify my tasks according to which goals and responsibility areas of my work role they serve	64	28	9
I examine my work task load as a whole in order to see how different goal areas of my work role are represented there	53	44	3
I classify my tasks according importance	5	39	3

(continued)

**Table 7.** (continued)

I classify my tasks according to attractiveness	55	41	56
I classify my tasks according to urgency	0	29	3
I budget (=estimate and book) time for different tasks and for different responsibility areas of my work role	12	61	71
I plan and record tasks and goals for the beginning work week	21	53	26
I plan and record tasks and goals for the beginning work day	15	58	27
I decide when I start and complete certain work task	27	56	17
I schedule all my tasks (not only meetings and appointments) to be completed in certain time	14	66	20

In the correlation analysis of measures of work fragmentation, productivity, task management effectiveness and task management practices applied it was found out, that negative correlation between the experiences of work fragmentation and productivity was statistically significant ( $r = -0,430$ ,  $p = 0,001$ ). Experiences of effectiveness of task management was negatively correlated with work fragmentation ( $r = -0,451$ ,  $p = 0,000$ ). Finally, maturity of applied task management practices was positively correlated with effectiveness of task management ( $r = 0,299$ ,  $p = 0,022$ ).

## 5 Discussion

This study was one of the first academic examinations of prevalence of task management and task planning activities in real life knowledge work context. The results of the study show, that negative experiences of work fragmentation, loss of control over task execution and lost productivity are less common among knowledge workers who proactively manage their task load, and organize and plan their task execution. When considering countermeasures to hinder productivity losses related to interruption-prone contemporary work environments, more emphasis should be put into the development of task management practices and their training and implementation among knowledge workers. When most of the knowledge work assignments are both delivered and executed in digital work environment, the skills and practices of efficient digital task management and task execution planning are critical to enhance productivity and to mitigate stress and negative mental workload created by work fragmentation.



## 6 Limitations

Because the empirical data collected in this study was based on subjective assessments on frequency of task management activities, certain bias compared to the actual practices applied may exist. Another limitation of the study is the small size of the survey data and the inclusion of only one organization into analysis.

## 7 Conclusions

Despite widespread experiences of hurry, work fragmentation and interruptions in knowledge work settings, surprisingly small amount of academic research has empirically observed knowledge worker task management and task execution planning practices (Haraty et al. 2016). The results of this study show, that the more comprehensive the repertoire of task management practices actually applied in everyday work, the higher the experience of task management effectiveness. Further, the experience of effectiveness of task management was related to experiences of lower work fragmentation. Experiences of work fragmentation and personal productivity were related – the higher the experiences of fragmentation, the lower the experiences of personal productivity. While several studies have evaluated and given design recommendation for specific digital tool functionalities to support task management, the overall understanding of core processes and applied practices of task management in the real world among knowledge workers has remained vague. This study provided description of the task management practices applied in knowledge work settings and provides preliminary evidence that development and deployment of task management skills can enhance knowledge worker productivity.

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