

**KNOWLEDGE SHARING: THE SPILLOVER EFFECTS OF  
PROCESS VERSUS OUTCOME ACCOUNTABILITY**

A Dissertation  
Presented to  
The Academic Faculty

by

Suyun Wu

In Partial Fulfillment  
of the Requirements for the Degree  
Doctor of Philosophy in Management in the  
Scheller College of Business

Georgia Institute of Technology  
August 2022

**COPYRIGHT © 2022 BY SUYUN WU**

**KNOWLEDGE SHARING: THE SPILLOVER EFFECTS OF  
PROCESS VERSUS OUTCOME ACCOUNTABILITY**

Approved by:

Dr. Xi (Jason) Kuang, Advisor  
Scheller College of Business  
*Georgia Institute of Technology*

Dr. Kathy Rugar-Wang  
Scheller College of Business  
*Georgia Institute of Technology*

Dr. Nikki MacKenzie  
Scheller College of Business  
*Georgia Institute of Technology*

Dr. Kristy Towry  
Goizueta Business School  
*Emory University*

Dr. Jane Thayer  
Scheller College of Business  
*Georgia Institute of Technology*

Date Approved: June 7, 2022

## ACKNOWLEDGEMENTS

I would like to express my deepest appreciation to my dissertation committee chair Dr. Xi (Jason) Kuang for his continuous support and extreme patience. His invaluable guidance and tremendous help carried me through my Ph.D. program. I would also like to extend my sincere gratitude to my dissertation committee members, Drs. Nikki MacKenzie, Jane Thayer, Kathy Rugar-Wang, and Kristy Towry for their strong support and intellectual contribution to my development as an accounting researcher. I very much appreciate the accounting faculty and fellow Ph.D. students at Georgia Tech, as well as my coauthors. Their kind assistance has made my Ph.D. journey at Georgia Tech a wonderful time.

My deep appreciation goes out to my family for their love, sacrifices, and unconditional support all through my studies. Their trust in me has kept my motivations high during this process. Thanks also to my friends for their friendship and great memories.

I am grateful for the helpful feedback provided by workshop participants at Concordia University, Salisbury University, the University of Manitoba, the University of Texas at El Paso, as well as by discussants, anonymous reviewers, and participants at the 2021 AAA/Deloitte Foundation/J. Michael Cook Doctoral Consortium, 2021 AAA ABO Research Conference, and 2022 MAS Midyear Meeting. Finally, I profoundly appreciate the generous financial support from the Institute of Management Accountants Doctoral Scholars Stage III Grant.

# TABLE OF CONTENTS

<b>ACKNOWLEDGEMENTS</b>	<b>iii</b>
<b>LIST OF TABLES</b>	<b>v</b>
<b>LIST OF FIGURES</b>	<b>vi</b>
<b>SUMMARY</b>	<b>vii</b>
<b>CHAPTER 1. Introduction</b>	<b>1</b>
<b>CHAPTER 2. Background and Hypotheses Development</b>	<b>6</b>
2.1 Knowledge Sharing	6
2.2 Process versus Outcome Accountability	8
2.3 Knowledge Sharing under Different Accountability and Output Levels	10
2.4 Effect of Knowledge Sharing on Coworkers' Productivity	14
<b>CHAPTER 3. Method</b>	<b>16</b>
3.1 Research design	16
3.2 Task	17
3.3 Procedures	18
3.3.1 Sender-participants	19
3.3.2 Receiver-participants	22
<b>CHAPTER 4. Results</b>	<b>23</b>
4.1 Sender-participants	23
4.2 Main Variables	23
4.3 Tests of Hypotheses	24
4.4 Mediation Analysis	27
4.5 Supplemental Analyses	30
4.6 Tests of the Research Question	34
<b>CHAPTER 5. Conclusion</b>	<b>38</b>
<b>APPENDIX A. Experimental Instrument</b>	<b>41</b>
A.1 Role 1: Knowledge Senders	41
A.2 Role 2: Knowledge Receivers	49
<b>REFERENCES</b>	<b>56</b>

## LIST OF TABLES

Table 1 – Test of the Hypotheses.....	26
Table 2 – Supplemental Analysis: Exploration .....	31
Table 3 – Supplemental Analysis: Exploration2 .....	33
Table 4 – Tests of the Research Question.....	36

## LIST OF FIGURES

Figure 1 – The Predicted Pattern of Results. ....	14
Figure 2 – Experimental Procedures.....	20
Figure 3 – The Actual Pattern of Results.....	24
Figure 4 – Mediation Analysis.....	29

## SUMMARY

Whereas prior literature has examined how process and outcome accountability affect task performance, in this paper, I experimentally investigate the spillover effects of these accountability requirements on employees' knowledge-sharing behavior. Because outcome accountability draws attention to task output, employees who produce higher output may be more confident in their performance and, therefore, are more willing to share task-specific knowledge. In contrast, process accountability focuses attention on exploring new task strategies, which may negatively affect short-term output. As a result, employees who engage more in exploration may produce lower output, yet these employees may be more confident in their performance and more willing to share knowledge. As predicted, experimental results show that employees with higher output are more willing to share their knowledge under outcome accountability but are less willing to share knowledge under process accountability. Mediation analysis confirms that employees' confidence in performance underlies these results. The influences of knowledge sharing on the productivity of coworkers who receive the shared knowledge are also examined.

## CHAPTER 1. INTRODUCTION

In today's business environment, knowledge is the key to improving organizational productivity (Staats and Gino 2012; Panopto 2018). Employees may acquire knowledge through experiential learning; that is, as employees work on assigned tasks, they obtain task-specific knowledge, including expertise, relevant information, ideas, and suggestions (Bartol and Srivastava 2002). This knowledge, if shared with coworkers, can speed up their learning process and contribute to organizational success. Therefore, employees' knowledge sharing is critical for companies to maintain and develop their competitive advantages (Argote and Ingram 2000; Deloitte 2020). Prior research has examined how various control mechanisms can be used to stimulate knowledge sharing (e.g., Kelly 2010; Haesebrouck, Cools, and Van den Abbeele 2018; Sandvik, Saouma, Seegert, and Stanton 2020). Extending this research, in this paper, I investigate the spillover effects of a control mechanism – the accountability system – on employees' willingness to share task-specific knowledge with coworkers.

Accountability is a key element in management control systems (Merchant and Otley 2006; Chang, Cheng, and Trotman 2013; Dalla Via, Perego, and van Rinsum 2019). Two types of accountability are widely implemented in organizational practices: process accountability, which holds employees accountable for decision procedures, and outcome accountability, which holds employees accountable for decision outcomes (Simonson and Staw 1992; Siegel-Jacobs and Yates 1996). Prior research has investigated how process and outcome accountability affect employees' motivation and effort (Benjamin 2008; Chang et al. 2013; Patil, Vieider, and Tetlock 2014). Drawing on

psychological theories, I examine how these two types of accountability differentially influence employees' confidence in their task performance<sup>1</sup> and, in turn, their willingness to share task-specific knowledge.

Specifically, *outcome* accountability directs employees to focus on task output as a performance indicator. Hence, employees who produced higher output may perceive their task knowledge as more useful and are more willing to share it with coworkers. In contrast, *process* accountability leads employees to focus on how to justify their decision process, prompting them to explore better task strategies. As a result, employees focus on the level of exploration as a performance indicator. However, exploring new alternatives can negatively affect short-term output because experimenting with different strategies may increase the frequency of adopting inferior strategies. Therefore, under process accountability, employees who engage more in exploration may produce lower short-term output, but despite the lower output, these employees may be more confident in their performance and more willing to share task knowledge. Overall, from the firm's management control perspective, employees' willingness to share knowledge may be associated with a feasibly observable accounting variable, the output level, and the nature of this association may depend on the accountability type. Specifically, I hypothesize that employees' level of output is positively associated with knowledge sharing under outcome accountability, but negatively associated with knowledge sharing under process accountability. In addition, I empirically test the research question regarding how

---

<sup>1</sup> In this paper, employees' performance is defined differently depending on companies' evaluation method. Under outcome accountability, employees' performance is determined by the level of output they achieve. Under process accountability, employees' performance is determined by how well they justify decision procedures.

employees' knowledge sharing influences the productivity of coworkers who receive the shared knowledge.

To test the hypotheses and the research question, I conduct an experiment on Prolific, an online research platform widely used for behavioral studies. In the experiment, participants are assigned one of the two roles: knowledge senders and knowledge receivers. The experiment consists of two stages. Stage one is for knowledge senders only. In stage one, sender-participants are tasked with making a series of design choices for an artistic product, with each choice having a different impact on the profitability of the product. In stage one, I use a 2 (accountability type)  $\times$  2 (the level of output) between-subjects design. I manipulate accountability type by varying whether sender-participants' bonus depends on how well they justify their decision procedures (process accountability) or depends on the cumulative profit of the product (outcome accountability). I measure the level of output (high vs. low) using a median split of the sender-participant's cumulative profit. After completing the product-design task, sender-participants summarize task-specific knowledge by answering six questions. Then, sender-participants decide how many of the six answers they want to share with a randomly paired Prolific worker, who will perform the same task in a later session. I measure knowledge sharing using the number of answers that sender-participants share with the paired worker. Stage two is for knowledge receivers only. In stage two, receiver-participants perform the same task as that of stage one under an output-based incentive scheme. If the paired sender in stage one chooses to share knowledge, the receiver-participant will learn the shared knowledge before performing the task.

Consistent with my hypotheses, the results of stage one show that, under *outcome* accountability, sender-participants who achieve high output share *more* knowledge than sender-participants who achieve low output. I find an opposite pattern under *process* accountability, where sender-participants who achieve high output share *less* knowledge than those who achieve low output. Further analysis reveals that these findings are mediated by sender-participants' confidence in their performance. With respect to the research question, the results of stage two show that, when outcome accountability is imposed on knowledge senders, knowledge receivers' productivity is higher when they are paired with a high-output sender than with a low-output sender. However, when process accountability is imposed on knowledge senders, knowledge receivers' productivity is not affected by whether they are paired with a high-output sender or a low-output sender because, compared to high-output senders, low-output senders share more knowledge items but the quality (i.e., accuracy) of these items is lower. Therefore, while knowledge sharing is often believed to be beneficial for improving coworkers' productivity, its specific effect may be influenced by the nature of the shared knowledge.

This paper has several theoretical and practical implications. First, it contributes to the growing literature on management control and knowledge sharing. Prior research identifies incentives, performance evaluation, and corporate culture as important determinants of employees' willingness to share knowledge (Taylor and Wright 2004; Wolfe and Loraas 2008; Haesebrouck et al. 2018). Extending this stream of literature, I find that accountability requirements, a control mechanism commonly used in the phase of knowledge acquisition, have a profound impact on employees' subsequent knowledge sharing.

Second, this paper extends the accountability literature by investigating the externalities of accountability requirements on employee behavior (Chang et al. 2013; Phang and Fargher 2018; Dalla Via et al. 2019). Companies often impose accountability to improve job performance. This paper documents that accountability requirements have unintended consequences on employees' prosocial behavior. Furthermore, prior research suggests that process accountability provides benefits to companies, including improving managerial decision quality and encouraging the exploration of new alternatives (Siegel-Jacobs and Yates 1996; Verwaeren, Buyens, and Baeten 2016). However, this paper shows that process accountability can hinder knowledge sharing among employees with high output. Therefore, these findings shed light on the boundary condition for when process accountability will be beneficial or costly for the firm.

Third, this paper has important practical implications. Firms should be aware that accountability requirements that are not designed for knowledge management may nonetheless affect knowledge sharing, and this effect varies among different employees. Since employees with high output may be less willing to share knowledge under process accountability, firms may adopt alternative approaches to stimulate knowledge sharing. By holistically designing management control systems, firms can align employees' motivation with organizational goals and thereby maximize the overall control effectiveness.

The remainder of the paper is organized as follows: chapter 2 explains the background, theory, and hypotheses, chapter 3 illustrates the method, chapter 4 reports the results, and chapter 5 concludes.

## **CHAPTER 2. BACKGROUND AND HYPOTHESES**

### **DEVELOPMENT**

#### **2.1 Knowledge Sharing**

Knowledge sharing allows employees to capitalize on knowledge-based resources and convert them to firms' competitive advantages (Argote and Ingram 2000; Deloitte 2020). A recent survey by Deloitte shows that 75 percent of the surveyed organizations believe that knowledge management is important or very important for organizational success (Deloitte 2020; Volini et al. 2020). Prior research documents that knowledge sharing improves employee performance and retention (e.g., Haas and Hansen 2007; Reychav and Weisberg 2009), enhances team performance (Mesmer-Magnus and DeChurch 2009), lowers corporate production costs (Arthur and Huntley 2005), and increases sales revenue from new products and services (Collins and Smith 2006). More importantly, knowledge sharing enables firms to enhance innovation capability, improving organizational innovation climate and innovation performance (e.g., Lin 2007a; Hurmelinna-Laukkanen 2011; Zhou and Li 2012).

Despite the importance of knowledge sharing, employees may not want to share knowledge for various reasons. Employees are discouraged to share knowledge when they are not provided with economic incentives and/or they do not perceive any reciprocal benefits from colleagues (Chennamaneni, Teng, and Raja 2012; Sandvik et al. 2020). Employees also are less likely to engage in knowledge sharing if companies adopt an incentive scheme that induces competition among employees (e.g. tournaments) or

provides employees with relative performance information (Berger, Fiolleau, and MacTavish 2019; Sandvik et al. 2020).<sup>2</sup> In addition to incentives and competition, employees' intention to exchange knowledge is negatively affected by their career concerns (e.g., job insecurity), time pressure, lack of trust toward coworkers, and a sense of psychological ownership toward their knowledge (Serenko and Bontis 2016; Aljawarneh and Atan 2018; Škerlavaj, Connelly, Cerne, and Dysvik 2018).

Prior research has explored how organizations can tailor management control mechanisms to foster internal knowledge flows. One stream of literature investigates the role of performance evaluation and incentives (Bartol and Srivastava 2002; Kankanhalli, Tan, and Wei 2005; Wang, Noe, and Wang 2014). Other research examines how incentives tied with collective or coworkers' productivity influence employee knowledge sharing. For example, company-wide profit-sharing plans can increase employees' willingness to share knowledge (Gupta and Govindarajan 2000; Bartol and Srivastava 2002). Group-based rewards lead to more knowledge sharing than other types of rewards (e.g., tournaments; flat-rate; piece-rate) because they generate economic incentives for employees to exchange knowledge (Taylor 2006; Fey and Furu 2008; Ortega 2009) and increase the salience of group identity (Kelly 2010). Haesebrouck, Van den Abbeele, and Williamson (2021) document that allowing knowledge recipients to reward knowledge providers increases knowledge sharing by creating a social bond that facilitates trust and reciprocity.

---

<sup>2</sup> Relative performance information refers to the feedback of employees' performance relative to their peers (Frederickson 1992; Tafkov 2013).

In addition to performance measurement and incentives, other control tools also have a profound impact on knowledge sharing. For example, the development of an organizational culture emphasizing trust, reciprocity, and learning increases employees' willingness to share knowledge (Taylor and Wright 2004; Chiu, Hsu, and Wang 2006). A decentralized organizational structure facilitates employee interaction, communication, and job rotation, increasing the flow of knowledge in organizations (Kubo, Saka, and Pan 2001; Connelly and Kelloway 2003; Wang and Noe 2010). Bol and Leiby (2022) find that when sharing information is costly, employees with active status motives incur greater costs to share the information than employees without status motives in order to show their generosity. However, when sharing information is rewarding, employees with active status motives demand higher compensation for sharing it because they perceive the information as more valuable.

Whereas prior research primarily focuses on control systems designed to directly foster knowledge sharing, the current paper extends this literature by examining how control devices designed for other purposes (e.g., increase employee motivation and productivity) may have unintended effects on employees' intention to share task knowledge (Berger et al. 2019; Bedford 2020). As elaborated below, in this paper, I focus on the effects of accountability requirements on employees' knowledge-sharing behavior and how these effects differ among different employees.

## **2.2 Process versus Outcome Accountability**

In recent years, there is a growing demand for firms to improve accountability requirements (Starner 2015; Carucci 2020). When developing accountability systems,

companies need to decide whether to emphasize decision processes or decision outcomes, which leads to different influences on employee behavior (Tetlock, Vieider, Patil, and Grant 2013; Patil et al. 2014). Many companies focus on outcome accountability because outcomes are usually more observable and easier to measure than processes (Hölmstrom 1979; Eisenhardt 1989; Pitesa and Thau 2013). Furthermore, outcome accountability motivates employees to develop new approaches to cope with uncontrollable factors (Patil et al. 2014). For example, sales representatives are often evaluated based on the revenue they generate instead of the sales strategies they apply (Dickinson and Lere 2003; Kumar, Sunder, and Leone 2015; Conerly 2016). Other companies focus on process accountability for employee evaluation, particularly when employees do not have enough control over outcomes. For example, audit firms require auditors to justify how they follow audit procedures and make audit judgments (Kim and Trotman 2015; Phang and Fargher 2018). Companies often require managers to justify how research and development projects are selected (Loch, Pich, Terwiesch, and Urbschat 2001; Tian, Ma, Liang, Kwok, and Liu 2005; Carson, Zivin, Louviere, Sadoff, and Shrader 2020).

Research suggests that, relative to outcome accountability, process accountability leads to better performance on decision tasks. Specifically, when evaluated based on decision procedures, employees spend more effort on information acquisition and processing, which in turn reduces behavioral biases and improves decision quality (Siegel-Jacobs and Yates 1996; Lerner and Tetlock 1999; Pitesa and Thau 2013). For example, process accountability reduces negotiators' fixed-pie bias, improves auditors' professional skepticism, and facilitates strategic performance evaluation (Chang et al. 2013; Kim and Trotman 2015; Dalla Via et al. 2019).

Furthermore, process accountability encourages employees to explore new solutions because it protects employees from the influences of uncontrollable factors and reduces the undue risks in performance evaluation. Therefore, employees may be less concerned about potential failure and may engage more in exploration, which potentially improves future performance (Patil et al. 2014; Verwaeren et al. 2016; Patil, Tetlock, and Mellers 2017). Additionally, to justify their decision procedures, employees need to convert tacit knowledge to codified knowledge to defend their thought processes (Chang, Atanasov, Patil, Mellers, and Tetlock 2017).<sup>3</sup> Such conversion improves the persuasiveness of knowledge and facilitates subsequent knowledge transfer.

As discussed next, in this paper, I posit that process versus outcome accountability not only influence employees' performance on the focal task but also have a spillover effect on employees' willingness to share task-specific knowledge with coworkers. More importantly, this spillover effect is likely to differ between employees who achieve high output at the focal task and employees who achieve low output.

### **2.3 Knowledge Sharing under Different Accountability and Output Levels**

Drawing on psychological theories, I argue that accountability requirements affect employees' confidence in their performance, which ultimately influences their intention to share knowledge. Specifically, holding individuals accountable for a particular dimension of the task increases the salience of contextual cues related to that dimension and directs attention to these contextual cues. To the extent that different types of

---

<sup>3</sup> Tacit knowledge (i.e., implicit knowledge) refers to the knowledge that is difficult to express and transfer. Codified knowledge (i.e., explicit knowledge) refers to the knowledge that can be easily articulated, stored and transferred (Edmondson, Winslow, Bohmer, and Pisano 2003; Hau, Kim, Lee, and Kim 2013).

accountability focus on different dimensions of the task, this may influence what contextual cues become salient to employees. Extant research suggests that processing contextual cues occupies attentional capacity, which is a limited cognitive resource (Kahneman 1973, 1063:9; Posner 1980; Wickens 1991). In the presence of multiple cues, employees selectively attend to the salient cues and give them more weight in decision making, leaving insufficient cognitive resources for other cues (Crump, Vaquero, and Milliken 2008; Miyazaki, Grewal, and Goodstein 2005; Ward, Duke, Gneezy, and Bos 2017).

Outcome accountability directs employees' attention to the short-term output of the task, whereby higher output indicates better performance. As employees focus on output as a performance indicator, those who produce higher output may be more confident in their performance and perceive their task knowledge as more useful. Prior research suggests that individuals who perceive greater knowledge usefulness have a stronger intention to share the knowledge (Siemsen, Roth, Balasubramanian, and Anand 2008; Yu, Lu, and Liu 2010; Lin and Fan 2011). Therefore, employees who achieve higher output may be more willing to share knowledge with coworkers. In contrast, lower output under outcome accountability undermines employees' confidence in performance. As a result, employees who achieve lower output may believe their task knowledge is less useful to coworkers and are less willing to share it. Research has shown that the intention to share knowledge is an important determinant of the actual knowledge-sharing behavior (e.g., Wolfe and Loraas 2008; Wang and Noe 2010; Chennamaneni et al. 2012). Hence, I propose the following hypothesis:

*H1: Under outcome accountability, employees' level of output is positively associated with knowledge sharing.*

Process accountability holds employees responsible for their decision procedures, prompting them to explore new, more effective alternatives (Patil et al. 2014; Verwaeren et al. 2016). Under process accountability, short-term output may not be informative of employees' effort because lower output could be due to uncontrollable environmental factors. In addition, lower output may be caused by employees' exploration of better decisions because such exploration entails unsuccessful trials and failures, which negatively affect short-term outcomes (Webb, Williamson, and Zhang 2013; Ederer and Manso 2013; Choi, Newman, and Tafkov 2016; Callander and Matouschek 2019). Therefore, under process accountability, employees may focus on the level of exploration rather than output as a performance indicator because deeper levels of exploration make their decision procedures more justifiable and more defensible. As a result, employees may be more confident in their performance the more they delve into the search for better decisions, despite the resultant lower output in the short run. Particularly, employees may feel that, while their explorative effort inevitably affects short-term output, the knowledge extrapolated from these trials would be useful for others on similar future tasks (Madsen and Desai 2010; Francis and Zheng 2010; Bledow, Carette, Kühnel, and Bister 2017).

Consequently, employees who engaged more in exploration – and thus produce lower short-term output – may perceive their task knowledge as more useful and are more willing to share it with coworkers. By comparison, employees who engaged less in

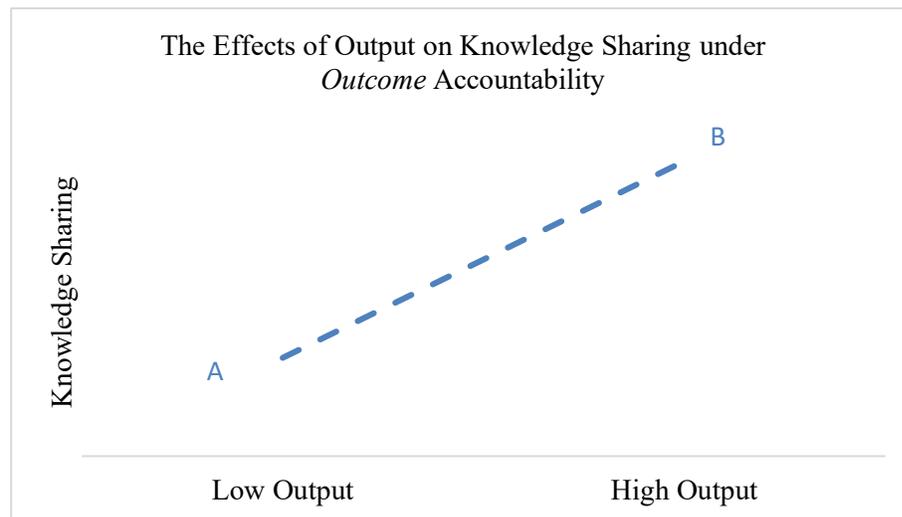
exploration, despite higher short-term output, may be less confident in their performance and less willing to share knowledge.

Compared to exploration, employees' output is typically more observable and more measurable. Furthermore, from the firm's perspective, while higher output is beneficial, it may send a negative signal about employees' prosocial behavior. Studying the relationship between the output level and knowledge sharing has greater practical relevance in terms of facilitating firms' control decisions. Therefore, in this paper, I focus on output as an operational construct for exploration, and I use the level of output associated with exploration as the predictor of employees' willingness to share knowledge. The above arguments lead to the following hypothesis:

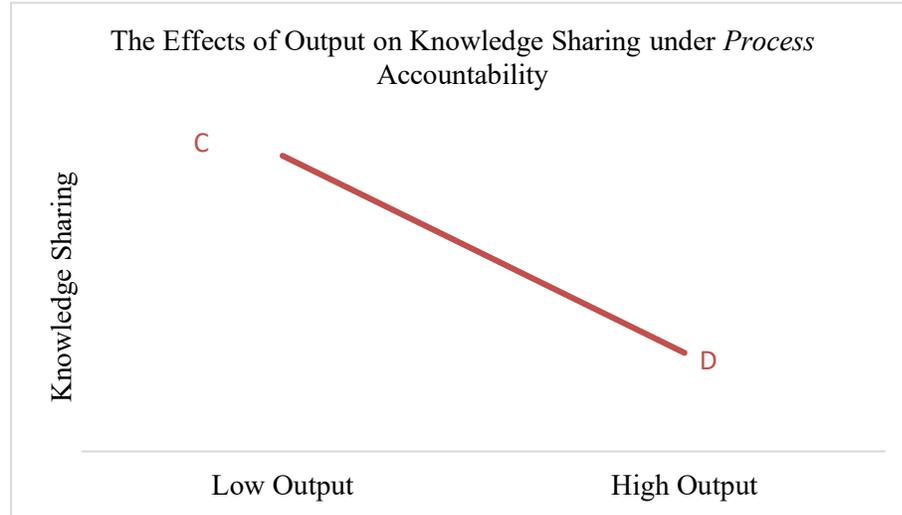
*H2: Under process accountability, employees' level of output is negatively associated with knowledge sharing.*

Figure 1 depicts the predicted pattern of results for H1 and H2.

**Figure 1. A**



**Figure 1. B**



**Figure 1 – The Predicted Pattern of Results.**

This figure depicts the predicted interactive effects of accountability type (Process vs. Outcome) and the level of output (High vs. Low) on knowledge sharing. In Panel A, H1 predicts that *under outcome accountability, employees' level of output is positively associated with knowledge sharing* (i.e.,  $B > A$ ). In Panel B, H2 predicts that *Under process accountability, employees' level of output is negatively associated with knowledge sharing* (i.e.,  $D < C$ ).

#### **2.4 Effect of Knowledge Sharing on Coworkers' Productivity**

Prior research has shown that, while knowledge sharing generally improves coworkers' productivity, its effectiveness in enhancing productivity may be influenced by a number of factors within organizations (Srivastava, Bartol, and Locke 2006; Rohim and Budhiasa 2019). Specifically, the impact of knowledge sharing on radical innovation performance is greater when companies have a broad knowledge base than when they have a deep knowledge base (Zhou and Li 2012). In addition, knowledge sharing is more effective in improving productivity when employees have greater mutual trust (Peralta and Saldanha 2014; Verma and Sinha 2016), higher level of self-set goals (Quigley,

Tesluk, Locke, and Bartol 2007), stronger social skills (Yun and Lee 2017), and lower cross-cultural barriers (Thomas, Cillo, Caggiano, and Vrontis 2020). Moreover, extant studies find that sharing codified knowledge improves work efficiency but does not improve work quality, whereas sharing personal advice improves work quality but does not improve work efficiency (Haas and Hansen 2007).

Along these lines, in the current setting, whether knowledge sharing improves the productivity of coworkers may depend on both the quantity and quality of the knowledge shared (Chang et al. 2017). As discussed above, for knowledge senders, lower output is often associated with more exploration of new alternatives. Although exploration may increase the *quantity* of knowledge items shared, its effect on the *quality* of knowledge is not clear: On the one hand, exploration may increase the quality of knowledge because it helps employees better understand the task and discover more effective task approaches (Høystrup 2010; Callander and Matouschek 2019). On the other hand, exploration may decrease the quality of knowledge if employees superficially experiment with different strategies without deep reflection (Linden, Sonnentag, Frese, and Dyck 2001; van der Linden, Frese, and Sonnentag 2003). Thus, *ex ante*, it is difficult to make a directional prediction regarding how the knowledge shared by high- versus low-output senders under different types of accountability influences the productivity of knowledge receivers. Therefore, I examine this issue via the following research question:

*Research Question: How does the knowledge shared by high- versus low-output senders under outcome and process accountability influence the productivity of coworkers who receive the shared knowledge?*

## CHAPTER 3. METHOD

### 3.1 Research design

I use an experiment on Prolific to test the hypotheses and the research question.<sup>4</sup> Prolific is a widely used online platform for academic research (Murphy, Wynes, Hahn, and Devine 2020; Sherf and Morrison 2020; Stuppy, Mead, and Osselaer 2020). Extant research shows that online participants are similar to laboratory participants in real-effort research tasks (Brandon et al. 2014; Farrell, Grenier, and Leiby 2017). To participate in this experiment, Prolific workers must be at least 18 years old, currently reside in the U.S., have at least 100 total approved submissions and an approval rate of 95% or higher, and have English as their first language. The experiment is programmed using oTree (Chen, Schonger, and Wickens 2016).

There are two roles in the experiment: knowledge senders and knowledge receivers. First, I recruit a group of participants to play the role of knowledge senders. Sender-participants work on a product-design task for eight periods. In each period, they make a product design choice that affects the profitability of the product. The experiment uses a  $2 \times 2$  between-subjects design, with a manipulated variable and a measured variable. The manipulated variable is the type of accountability. In one condition, sender-participants are required to write a report to justify their decision processes and the quality of the report, as rated by an expert panel, determines their bonus (*Process Accountability*). In the other condition, sender-participants earn a bonus that depends on

---

<sup>4</sup> The study was reviewed and approved by the Institutional Review Board of the university where I collected the data.

their cumulative profit over all periods (*Outcome Accountability*). The measured variable is task output, which is defined as high or low based on a median split of sender-participants' cumulative profit under the given type of accountability. Upon finishing the task, sender-participants summarize what they learn from the task by answering six questions, and the answer to each question represents one knowledge item. The dependent variable is the number of knowledge items that they are willing to share with a randomly paired participant in a later session.

After I collect the data of sender-participants, I recruit another group of participants to play the role of knowledge receivers and randomly pair each of them with a sender-participant. Receiver-participants view the knowledge shared by the paired sender (if available) before they perform the same product-design task for eight periods. Receiver-participants are paid via an output-based incentive scheme.

### **3.2 Task**

I use a product-design task similar to that used in Langhe, van Osselaer, and Wierenga (2011). This task mimics the decisions managers typically make in organizations.<sup>5</sup> During the experiment, participants act as a manager who needs to modify the current design of an artistic product to sell to a new market. In each of the eight periods, participants decide what geometric shapes to add to the design of the product. The product will generate a fixed profit of 15 lira (an experimental currency later converted to cash) and an additional variable profit. The variable profit will be

---

<sup>5</sup> Theoretically, companies should implement outcome accountability when outcome is more controllable and process accountability when outcome is less controllable (Merchant and Otley 2006; Patil, Vieider, and Tetlock 2014). As detailed below, this task involves a moderate level of controllability, which allows me to test the effects of both types of accountability.

jointly determined by the geometric shapes participants choose and environmental uncertainty.

Specifically, in each period, participants decide whether to add a square shape, a parallelogram shape, and/or a triangle shape to the design of the product. Adding each geometric shape will change the product's variable profit by a predetermined integer ranging from -10 lira to +10 lira. The integers corresponding to these three geometric shapes are independent of one another and remain unchanged over the eight periods. Although participants do not know the values of these integers, they can infer these values through repeated decisions. If participants choose not to add any geometric shape, there will not be any influence on the profit. Environmental uncertainty, which is out of participants' control, will change the variable profit of the product by an integer that ranges from -1 lira to +1 lira and is randomly drawn each period. Therefore, the actual profit may be different even if participants choose the same set of geometric shapes repeatedly. In summary, the product's total profit is determined by the following formula:

$$\text{Profit} = 15 + b_1\text{Square} + b_2\text{Parallelogram} + b_3\text{Triangle} \\ + \text{Environmental uncertainty}$$

### **3.3 Procedures**

The experiment consists of two stages. One group of participants play the role of knowledge senders in the first stage, and another group of participants play the role of knowledge receivers in the second stage, which is conducted approximately five weeks after the first stage. The two-stage sequential design rules out the confounding effect of

perceived reciprocal benefits on knowledge sharing, as knowledge receivers cannot return the favor to knowledge senders (Lin 2007b; Chennamaneni et al. 2012; Moghavvemi, Sharabati, Paramanathan, and Rahin 2017). Besides, this design alleviates the concern of participant dropout in online experiments with an interactive design (Horton, Rand, and Zeckhauser 2011; Crump, McDonnell, and Gureckis 2013; Arechar, Gächter, and Molleman 2018).

### 3.3.1 *Sender-participants*

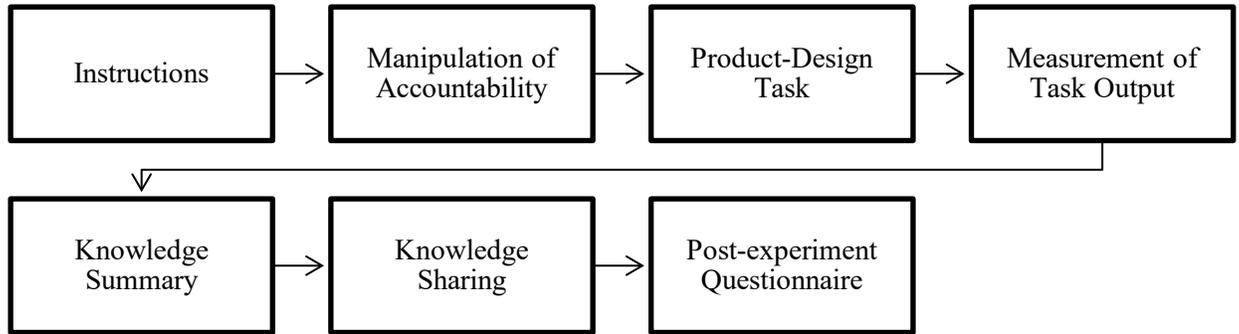
Figure 2 depicts experimental procedures. After the experiment begins, sender-participants read the experimental instructions, which explain the task, procedures, and compensation. In the *Outcome Accountability* condition, sender-participants are informed that they will receive a bonus between 0 and 100 lira, depending on the quintile of their cumulative profit relative to all participants in the same session: 0-20% (0 lira), 20-40% (25 lira), 40-60% (50 lira), 60-80% (75 lira), or 80-100% (100 lira). In the *Process Accountability* condition, sender-participants learn that after completing the task, they need to write a report to justify their decision processes. The report will be rated by an expert panel and sender-participants will receive a bonus between 0 and 100 lira, depending on the quality of the report: very low (0 lira), low (25 lira), median (50 lira), good (75 lira), or very good (100 lira).<sup>6</sup>

### **Figure 2. A**

For sender-participants

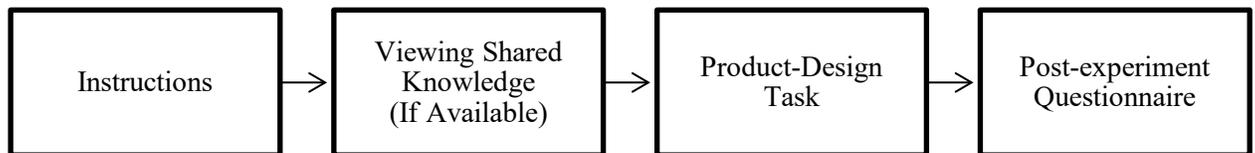
---

<sup>6</sup> Consistent with prior research (e.g., Chang, Atanasov, Patil, Mellers, and Tetlock 2017; Dalla Via, Perego, and van Rinsum 2019), participants in the *Outcome Accountability* condition are not required to write a report in order to create a strong manipulation of accountability type.



**Figure 2. B**

For receiver-participants



**Figure 2 – Experimental Procedures.**

This figure depicts the experimental procedures for sender-participants and receiver-participants respectively.

Next, sender-participants complete a quiz to ensure that they fully understand the instructions; only after they answer all the quiz questions correctly can they proceed to the product-design task. In each period, sender-participants decide which of the three geometric shapes to add to the design of the product, and then view the history of their decisions and the corresponding profits. The provision of decision history facilitates sender-participants’ learning from the task, which is a necessary condition for them to acquire knowledge. After eight periods, in the *Process Accountability* condition, sender-participants write a report to justify their task processes. In the *Outcome Accountability* condition, sender-participants view their cumulative profit and learn that their bonus will be determined after all participants in the same session complete the experiment.

Then, in all conditions, sender-participants summarize what they learn from the task by answering six questions.<sup>7</sup> The answer to each question represents one knowledge item. The first three questions ask whether adding a shape (including a square, parallelogram, and triangle) increases the profit, and participants select “No” or “Yes” to answer these questions. The other three questions ask how adding each shape affects the profit. Participants choose “increases/decreases the profit by 1 to 5 lira” or “increases/decreases the profit by 5 to 10 lira.” At this point, sender-participants do not know that their answers to these questions may be shared with others.<sup>8</sup>

Next, sender-participants learn that another group of Prolific workers will perform the same task in a future session and these workers will be paid based on the profit generated. Sender-participants are also told that they will each be randomly paired with a worker in that future session and will need to decide which of the six knowledge items to share with the paired worker. It is made clear to sender-participants that (1) there is no competition between them and the paired worker, (2) their payoff is independent of the paired worker’s payoff, and (3) their payoff is not affected by how many knowledge items they share with the paired worker. These design choices preclude the effect of potential confounding factors (e.g., economic incentives) on sender-participants’ knowledge-sharing decisions. Additionally, these design choices mimic organizational settings where knowledge sharing is largely an extra-role behavior that is difficult to measure properly (Bryant 2003; Haas and Hansen 2007; Liu and Phillips 2011; Berger et al. 2019).

---

<sup>7</sup> Participants can access past decisions and profits when answering these questions.

<sup>8</sup> A pilot test with 50 participants shows that the average number of correct answers is 4.44 and only 26% of participants answer all six questions correctly. These results show that the degree of learning varies among participants.

After sender-participants make knowledge-sharing decisions, they proceed to the post-experiment questionnaire, which elicits process measures and demographical questions. Finally, they receive the participation fee of \$2.5 and a bonus as soon as their submission is approved. The bonus is converted to cash at the rate of 40 lira = \$1.

### 3.3.2 Receiver-participants

In the second stage, I recruit another 101 participants to play the role of knowledge receivers. As shown in Figure 2, receiver-participants first read the instructions and complete a short quiz. After answering all quiz questions correctly, receiver-participants learn that another group of Prolific workers has previously performed the same task and that they are randomly paired with a worker in that group, who has the option to send a message that describes the task-specific knowledge he/she has obtained. If the paired worker chooses to send a message, receiver-participants will see it before the task begins. Otherwise, they will be informed that the other worker does not send a message.

Next, receiver-participants work on the same product-design task for eight periods. Their productivity is measured as the cumulative profit over eight periods. Similar to sender-participants in the *Outcome Accountability* condition, all receiver-participants receive a bonus contingent on the quintile of the cumulative profit relative to all the participants in the same session: 0-20% (0 lira), 20-40% (25 lira), 40-60% (50 lira), 60-80% (75 lira), or 80-100% (100 lira). After finishing the experiment, receiver-participants complete a post-experiment questionnaire and receive the payment after their submission is approved.

## CHAPTER 4. RESULTS

### 4.1 Sender-participants

I use the sample of sender-participants to test the hypotheses. The average age of the sender-participants is 33 years and 56 percent are female. On average, sender-participants have ten years of full-time work experience. The experiment lasted for approximately 15 minutes. Sender-participants receive an average compensation of \$3.87, which is equivalent to an hourly rate of \$15.50.

### 4.2 Main Variables

The independent variables are accountability type and the level of output. The first independent variable, *Accountability*, equals one for the *Process Accountability* condition, and zero for the *Outcome Accountability* condition. Output is calculated as the cumulative profit made by sender-participants over eight periods.<sup>9</sup> I create a dummy variable, labeled *High\_output*, based on a median split under the given type of accountability. Specifically, within the *Outcome Accountability* or *Process Accountability* condition, participants whose profit is higher than the median of the condition are classified as *High Output*. Otherwise, they will be classified as *Low Output*. The average level of output is 170.8 lira for the *High Output* condition, and 123.7 lira for the *Low Output* condition. An untabulated t-test shows that this difference is statistically significant ( $t_{99} = 14.62$ ,  $p < 0.001$ , two-tailed). The dependent variable, labeled *Knowledge\_sharing*, is calculated as the number of knowledge items that a sender-

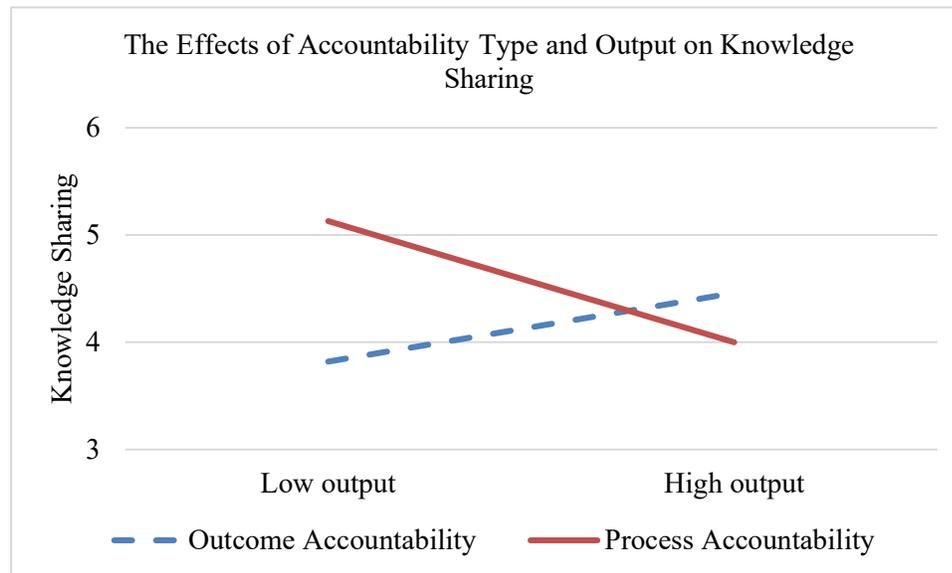
---

<sup>9</sup> An untabulated regression analysis indicates that *Accountability* has no significant effect on sender-participants' output (i.e., the cumulative profit over eight periods) ( $t_{97} = 0.15$ ,  $p = 0.882$ , two-tailed).

participant shares with the paired receiver-participant. It is an integer ranging from zero to six.

### 4.3 Tests of Hypotheses

The two hypotheses predict that high output has a positive association with knowledge sharing under outcome accountability but a negative association under process accountability. Panel A of Table 1 reports the descriptive statistics of *Knowledge\_sharing*, and Figure 3 plots the actual pattern of results across the four experimental conditions. Consistent with H1, under outcome accountability, the average number of knowledge items shared is greater in the *High Output* condition (4.46) than in the *Low Output* condition (3.82). In contrast, under process accountability, the average number of knowledge items shared is lower in the *High Output* condition (4.00) than in the *High Output* condition (5.13).



**Figure 3 – The Actual Pattern of Results.**

This figure depicts the average level of knowledge sharing by condition.

*Accountability* = 1 if sender-participants are in the *Process Accountability* condition and 0 if they are in the *Outcome Accountability* condition.

*High\_output* = 1 for the *High Output* condition and 0 for the *Low Output* condition. Within the *Outcome Accountability* or *Process Accountability* condition, participants whose profit is higher than the median of the condition are classified as *High Output*. Otherwise, they will be classified as *Low Output*.

*Knowledge\_sharing* = the number of knowledge items that a sender-participant share with a paired receiver-participant.

I formally test H1 and H2 by a two-way ANOVA, with *Knowledge\_sharing* as the dependent variable, and *High\_output* and *Accountability* as the independent variables. As reported in Panel B of Table 1, the interaction effect of *High\_output* and *Accountability* is significant ( $F_{1,97} = 6.79$ ,  $p = 0.005$ , one-tailed).<sup>10</sup> Statistical inferences remain robust after controlling for knowledge accuracy, which is measured as the total number of correct knowledge items ( $F_{1,96} = 7.37$ ,  $p = 0.004$ , one-tailed, untabulated). I also repeat the hypothesis test using the participant's output as a continuous rather than a discrete variable. Specifically, I conduct a regression analysis, with *Knowledge\_sharing* as the dependent variable and the participant's cumulative profit and *Accountability* as the independent variables. Untabulated results show that the interaction effect remains significant ( $t_{97} = -1.51$ ,  $p = 0.067$ , one-tailed).<sup>11</sup>

Simple effects analysis in Panel B of Table 1 indicates that, consistent with H1, in the *Outcome Accountability* condition, sender-participants are more willing to share when

---

<sup>10</sup> Statistical inferences remain unchanged after controlling for participants' age, gender, or work experience.

<sup>11</sup> It is possible that compared with process accountability, outcome accountability induces a more competitive mindset and make employees less willing to share knowledge. However, statistical results in Table 1 show that the type of accountability does not have a significant main effect on knowledge sharing ( $F_{1,97} = 1.56$ ,  $p = 0.215$ , two tailed), thus I find no evidence for this alternative explanation.

they achieve high output than when they achieve low output ( $F_{1,97} = 1.91$ ,  $p = 0.085$ , one-tailed). Consistent with H2, in the *Process Accountability* condition sender-participants are less willing to share when they achieve high output than when they achieve low output ( $F_{1,97} = 5.18$ ,  $p = 0.013$ , one-tailed).<sup>12</sup>

**Table 1 – Test of the Hypotheses**

**Panel A: Descriptive statistics: Means and [Standard deviation] of *Knowledge\_sharing***

	Outcome Accountability	Process Accountability	Total
Low Output	3.82 [2.06] N=28	5.13 [1.29] N=23	4.41 [1.86] N=51
High Output	4.46 [1.68] N=26	4.00 [1.62] N=24	4.24 [1.65] N=50
Total	4.13 [1.89] N=54	4.00 [1.56] N=47	4.33 [1.75] N=101

**Panel B: ANOVA (DV = *Knowledge\_sharing*)**

Source of Variation	SS	df	MS	F-statistics	P-value
<i>High_output</i>	1.51	1	1.51	0.52	0.472
<i>Accountability</i>	4.51	1	4.51	1.56	0.215
<i>High_output</i> × <i>Accountability</i>	19.68	1	19.68	6.79	0.005*
<i>Error</i>	281.18	97	2.90		

<sup>12</sup> Statistical inferences are robust if participants whose output equals the median (there is only one such participant) are included in the *High\_output* group or excluded from the analysis.

**Simple Effects (DV = *Knowledge\_sharing*)**

	<b>df</b>	<b>F-statistics</b>	<b>P-value</b>
<i>For Outcome Accountability</i>			
<i>High Output vs. Low Output</i>	1,97	1.91	0.085*
<i>For Process Accountability</i>			
<i>High Output vs. Low Output</i>	1,97	5.18	0.013*
	<b>df</b>	<b>F-statistics</b>	<b>P-value</b>
<i>For Low Output</i>			
<i>Process Accountability vs. Outcome Accountability</i>	1,97	7.46	0.008
<i>For High Output</i>			
<i>Process Accountability vs. Outcome Accountability</i>	1,97	0.92	0.341

*Accountability* = 1 if sender-participants are in the *Process Accountability* condition and 0 if they are in the *Outcome Accountability* condition.

*High\_output* = 1 for the *High Output* condition and 0 for the *Low Output* condition. Within the *Outcome Accountability* or *Process Accountability* condition, participants whose profit is higher than the median of the condition are classified as *High Output*. Otherwise, they will be classified as *Low Output*.

*Knowledge\_sharing* = the number of knowledge items that a sender-participant share with a paired receiver-participant.

An asterisk indicates a one-tailed p-value for a directional prediction.

**4.4 Mediation Analysis**

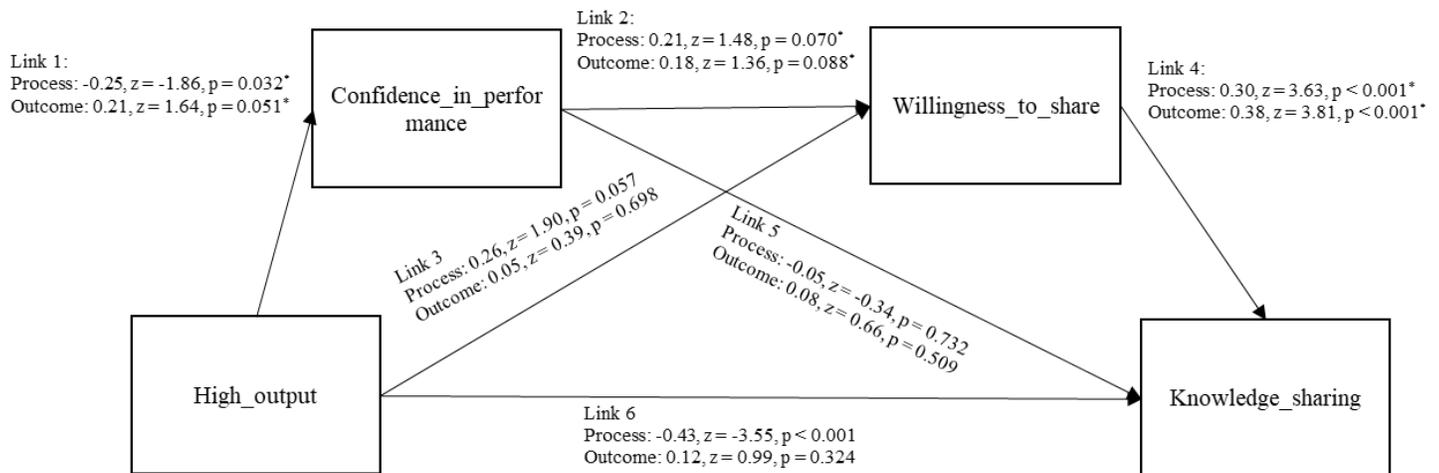
I conduct a structural-equation-modeling-based mediation analysis to shed light on the psychological mechanism underlying the relationship between *High\_output* and *Knowledge\_sharing* under process and outcome accountability. The theory behind H1

and H2 suggests that when held accountable for decision outcomes, sender-participants who achieve higher output have greater confidence in their performance and are more willing to share knowledge. However, the effect is the opposite when sender-participants are held accountable for decision processes. In the post-experiment questionnaire, I measure participants' confidence in performance (*Confidence\_in\_performance*) by asking them to what extent they agree with the following statement on a seven-point Likert scale (1 = "Strongly Disagree" and 7 = "Strongly Agree"): "*I was confident that I performed well on the task.*" Besides, in the post-experiment questionnaire, I measure participants' willingness to share knowledge (*Willingness\_to\_share*), a key driver of the knowledge-sharing behavior (e.g., Wolfe and Loraas 2008; Wang and Noe 2010; Chennamaneni et al. 2012), by asking them the question, "*To what extent were you willing to share the knowledge with the other worker?*" with 1 = "Not at All" and 7 = "Very Much".

As shown in Figure 4, in the *Outcome Accountability* condition, *High\_output* has a significantly positive effect on *Confidence\_in\_performance* (Link 1:  $p = 0.051$ , one-tailed). Furthermore, *Confidence\_in\_performance* has a significantly positive effect on *Willingness\_to\_share* (Link 2:  $p = 0.088$ , one-tailed) and *Knowledge\_sharing* (Link 4:  $p < 0.001$ , one-tailed). The direct effect of *High\_output* on *Knowledge\_sharing* is not significant (Link 6:  $p = 0.324$ , two-tailed), suggesting that *Confidence\_in\_performance* and *Willingness\_to\_share* fully mediate the relationship between *High\_output* and *Knowledge\_sharing* in the *Outcome Accountability* condition.

By contrast, in the *Process Accountability* condition, *High\_output* has a significantly negative effect on *Confidence\_in\_performance* (Link 1:  $p = 0.032$ , one-

tailed), and *Confidence\_in\_performance* has a positive effect on *Willingness\_to\_share* (Link 2:  $p = 0.070$ , one-tailed) and *Knowledge\_sharing* (Link 4:  $p < 0.001$ , one-tailed). The direct effect of *High\_output* on *Knowledge\_sharing* is significant (Link 6:  $p < 0.001$ , two-tailed), showing that *Confidence\_in\_performance* and *Willingness\_to\_share* partially mediate the relationship between *High\_output* and *Knowledge\_sharing*. In conclusion, these results support the theory that participants' confidence in performance is the psychological mechanism underlying the relationship between accountability type, task output and knowledge sharing.



**Figure 4 – Mediation Analysis.**

This model uses structural equation modeling to simultaneously tests the relationships among major variables. The p-value with an asterisk indicates a one-tailed test due to a directional prediction. The coefficients are standardized.

The number of observations is 101. The goodness of fit is confirmed with a Tucker-Lewis index (1.089), a Chi-square test ( $p = 0.363$ ), a root mean squared error of approximation (RMSEA) (0.000), and a comparative fit index (1.000).

*Accountability* = 1 if sender-participants are in the *Process Accountability* condition and 0 if they are in the *Outcome Accountability* condition.

*High\_output* = 1 for the *High Output* condition and 0 for the *Low Output* condition. Within the *Outcome Accountability* or *Process Accountability* condition, participants whose profit is higher than the median of the condition are classified as *High Output*. Otherwise, they will be classified as *Low Output*.

*Confidence in performance* is measured by asking participants to what extent they agree with the following statement on a seven-point Likert scale, with 1 = "Strongly Disagree" and 7 = "Strongly Agree": *I was confident that I performed well on the task.*

*Willingness to share* is measured by asking participants the following question: *To what extent were you willing to share the knowledge with the other worker?*, with 1 = "Not at All" and 7 = "Very Much"

*Knowledge sharing* = the number of knowledge items that a sender-participant share with a paired receiver-participant.

#### **4.5 Supplemental Analyses**

The rationale behind H2 is that exploration of new alternatives involves failure and potentially lowers short-term task output. I conduct further analyses to test whether lower output is associated with more exploration. The level of exploration is measured using the number of unique product-design decisions sender-participants make over all periods (labeled *Exploration*). In Panel A of Table 2, descriptive statistics demonstrate that the level of exploration is generally higher in the *Low Output* condition than the *High Output* condition. In Panel B of Table 2, ANOVA results show a significant negative effect of *High\_output* on *Exploration*, suggesting that lower output is associated with more exploration ( $F_{1,97} = 6.45$ ,  $p = 0.006$ , one-tailed). In addition, process accountability has a positive effect on exploration, showing that employees explore more under process accountability than under outcome accountability ( $F_{1,97} = 2.52$ ,  $p = 0.058$ , one-tailed).

Furthermore, although more exploration leads to lower short-term output, it may benefit employees in the long term. I conduct further tests to examine whether exploration in the first four periods (*Exploration1\_4*) is positively associated with cumulative output in the last four periods (*Output5\_8*). In Panel C of Table 2, regression results show a significant positive effect of *Exploration1\_4* on *Output5\_8*, suggesting that

more exploration in the early stages leads to higher future output ( $t = 2.10$ ,  $p = 0.019$ , one-tailed). Besides, this positive effect remains the same between the *Outcome Accountability* ( $t = 1.39$ ,  $p = 0.085$ , one-tailed) and *Process Accountability* condition ( $t = 1.40$ ,  $p = 0.084$ , one-tailed). In summary, these results are consistent with the theory.

**Table 2 – Supplemental Analysis: Exploration**

**Panel A: Descriptive statistics: Means and [Standard deviation] of *Exploration***

	Outcome Accountability	Process Accountability	Total
Low Output	3.96	4.61	4.25
	[1.71]	[1.64]	[1.70]
	N=28	N=23	N=51
High Output	3.50	3.71	3.60
	[0.91]	[0.86]	[0.88]
	N=26	N=24	N=50
Total	3.74	4.15	3.93
	[1.39]	[1.37]	[1.39]
	N=54	N=47	N=101

**Panel B: ANOVA (DV = *Exploration*)**

Source of Variation	SS	df	MS	F-statistics	P-value
<i>High_output</i>	11.69	1	11.69	6.45	0.006*
<i>Accountability</i>	4.56	1	4.56	2.52	0.058*
<i>High_output</i> × <i>Accountability</i>	1.19	1	1.19	0.66	0.210*
<i>Error</i>	175.90	97	1.81		

**Panel C: Regression (DV = *Output5\_8*)**

	(1)	(2)	(3)
	Full Sample	Outcome Accountability	Process Accountability
<i>Intercept</i>	67.46 (10.19) p < 0.001	66.14 (6.73) p < 0.001	70.13 (7.62) p < 0.001
<i>Exploration1_4</i>	4.33* (2.10) p = 0.019	4.44* (1.39) p = 0.085	3.86* (1.40) p = 0.084
adj. $R^2$	0.033	0.017	0.021
<i>N</i>	101	54	47

*Accountability* = 1 if sender-participants are in the *Process Accountability* condition and 0 if they are in the *Outcome Accountability* condition.

*High\_output* = 1 for the *High Output* condition and 0 for the *Low Output* condition. Within the *Outcome Accountability* or *Process Accountability* condition, participants whose profit is higher than the median of the condition are classified as *High Output*. Otherwise, they will be classified as *Low Output*.

*Exploration* = The number of unique decisions a sender-participant makes over eight periods.

*Output5\_8* = The cumulative profit over the last four periods of a sender-participant.

*Exploration1\_4* = The number of unique decisions a sender-participant makes over the first four periods.

An asterisk indicates a one-tailed p-value for a directional prediction.

In addition, if participants spend more time experimenting with different decisions before they reach a stable decision, their decisions should be more unstable across periods. The uncertainty of decisions, labeled *Exploration2*, is calculated using estimate entropy, i.e.,  $Exploration2 = - \sum_{i=1}^n f(x_i) \log_2 \left( \frac{f(x_i)}{8} \right)$ , where  $x_1, \dots, x_n$  are possible outcomes that occur with frequency  $f(x_1), \dots, f(x_n)$ .<sup>13</sup>

<sup>13</sup> In my study, *Exploration2* ranges from 0 (when participants repeat one decision) to 3 (when participants experiment with eight different choices). Compared with *Exploration* (i.e., the number of unique decisions), *Exploration2* takes into the consideration the frequency of participants' decisions. For example, assume that participant A's decision set is {x1, x2, x3, x1, x1, x1, x1, x1}, and participant B's decision set

Consistent with the theory, Panel A of Table 3 shows that *Exploration2* is greater in the *Low Output* condition (1.73) than in the *High Output* condition (1.41). It is also greater in the *Process Accountability* (1.67) condition than in the *Outcome Accountability* condition (1.49). As reported in Panel B of Table 3, ANOVA results indicate that *High\_output* has a significantly negative effect on *Exploration2* ( $F_{1,97} = 7.11, p = 0.005$ , one-tailed), which supports that employees who produce lower output have engaged in more exploration. In summary, these results lend additional support to the theory.

**Table 3 – Supplemental Analysis: Exploration2**

**Panel A: Descriptive statistics: Means and [Standard deviation] of *Exploration2***

	Outcome Accountability	Process Accountability	Total
Low Output	1.62	1.87	1.73
	[0.80]	[0.74]	[0.78]
	N=28	N=23	N=51
High Output	1.35	1.47	1.41
	[0.44]	[0.42]	[0.43]
	N=26	N=24	N=50
Total	1.49	1.67	1.57
	[0.66]	[0.63]	[0.65]
	N=54	N=47	N=101

---

is {x1, x2, x3, x3, x1, x1, x1}. *Exploration* is both 3 for both participants, but *Exploration2* is 1.06 for participant A, and 1.30 For participant B, suggesting participant B has a higher level of exploration.

**Panel B: ANOVA (DV = *Exploration2*)**

Source of Variation	SS	df	MS	F-statistics	P-value
<i>High_output</i>	2.82	1	2.82	7.11	0.005*
<i>Process_accountability</i>	0.87	1	0.87	2.20	0.070*
<i>High_output</i> × <i>Process_accountability</i>	0.12	1	0.12	0.30	0.292*
<i>Error</i>	38.47	97	0.40		

*Accountability* = 1 if sender-participants are in the *Process Accountability* condition and 0 if they are in the *Outcome Accountability* condition.

*High\_output* = 1 for the *High Output* condition and 0 for the *Low Output* condition. Within the *Outcome Accountability* or *Process Accountability* condition, participants whose profit is higher than the median of the condition are classified as *High Output*. Otherwise, they will be classified as *Low Output*.

*Exploration2* is calculated using estimate entropy, i.e.,  $Exploration2 = - \sum_{i=1}^n f(x_i) \log_2 \left( \frac{f(x_i)}{8} \right)$ , where  $x_1, \dots, x_n$  are possible decisions that occur with frequency  $f(x_1), \dots, f(x_n)$ .

An asterisk indicates a one-tailed p-value for a directional prediction.

#### 4.6 Tests of the Research Question

I use the sample of knowledge receivers to test the research question regarding how the type of accountability and task output of sender-participants affect the productivity of receiver-participants. The average age of receiver-participants is 35 years and 59 percent are female. They have an average of 14 years' full-time work experience. Receiver-participants complete the experiment in around 13 minutes and receive an average compensation of \$3.73, equivalent to an hourly rate of \$14.90.

I measure receivers' productivity (*Receiver\_productivity*) as the cumulative profit that receiver-participants achieve over eight periods. In addition to *Knowledge\_sharing*, I measure the accuracy of the knowledge shared (*Accurate\_sharing*) using the number of

accurate knowledge items that sender-participants share with paired receiver-participants. The descriptive statistics in Panel A of Table 4 report that the average profit of receiver-participants is 155.2 lira, higher than the average profit of sender-participants (147.0 lira) ( $t_{100} = 2.39$ ,  $p = 0.019$ , two-tailed, untabulated). This result provides preliminary evidence that knowledge receivers generally perform better than knowledge senders. To further examine whether it is knowledge sharing that increases receivers' productivity, I regress *Receiver\_productivity* on *Knowledge\_sharing*. An untabulated test shows that *Knowledge\_sharing* does not significantly affect *Receiver\_productivity* ( $t_{99} = 0.21$ ,  $p = 0.835$ , two-tailed). Then, to test whether the sharing of accurate knowledge improves receivers' productivity, I regress *Receiver\_productivity* on *Accurate\_sharing*. I find that *Accurate\_sharing* has a significantly positive effect on *Receiver\_productivity* ( $t_{99} = 3.35$ ,  $p = 0.001$ , two-tailed, untabulated), suggesting that only accurate knowledge shared increases the productivity of receiver-participants.

To test the research question, I conduct a two-way ANOVA, with *Receiver\_productivity* as the dependent variable and *High\_output* and *Accountability* of knowledge senders as the independent variables. As indicated in Panel B of Table 4, there is a significant interaction effect of *High\_output* and *Accountability* ( $F_{1,97} = 2.96$ ,  $p = 0.088$ , two-tailed). Simple effect analysis reveals that in the *Outcome Accountability* condition, receivers' productivity is significantly higher when paired with a high-output sender than with a low-output sender ( $F_{1,97} = 8.47$ ,  $p = 0.005$ , two-tailed). On the other hand, under process accountability, receivers' productivity does not differ between the *High\_output* condition and the *Low\_output* condition ( $F_{1,97} = 0.13$ ,  $p = 0.718$ , two-tailed), suggesting that even though low-output senders share more knowledge, their knowledge

fail to improve receivers' productivity. An untabulated simple-effect analysis reveals that knowledge accuracy is lower for low-output senders than for high-output senders under process accountability ( $F_{1,97} = 4.50$ ,  $p = 0.037$ , two-tailed). That is, while knowledge sharing is generally beneficial for organizations, the actual impact of the shared knowledge on receivers' productivity is likely influenced by specific task attributes such as the overall quality of the knowledge developed from experiences.

**Table 4 – Tests of the Research Question**

**Panel A: Descriptive statistics: Means and [Standard deviation] of Receiver productivity**

	Outcome Accountability	Process Accountability	Total
Low Output	142.79	154.48	148.06
	[33.44]	[30.78]	[32.48]
	N=28	N=23	N=51
High Output	167.00	157.71	162.54
	[26.17]	[31.18]	[28.77]
	N=26	N=24	N=50
Total	154.44	156.13	155.23
	[32.28]	[30.69]	[31.40]
	N=54	N=47	N=101

**Panel B: ANOVA (DV = Receiver productivity)**

Source of Variation	SS	df	MS	F-statistics	P-value
<i>High_output</i>	4,727.52	1	4,727.52	5.07	0.027
<i>Accountability</i>	36.18	1	36.18	0.04	0.844

<i>High_output</i> × <i>Accountability</i>	2,763.84	1	2,763.84	2.96	0.088
<i>Error</i>	90,511.41	97	933.11		

**Simple Effects (DV = *Receiver\_productivity*)**

	df	F-statistics	P-value
<i>For Outcome Accountability</i>			
<i>High Output vs. Low Output</i>	1,97	8.47	0.005
<i>For Process Accountability</i>			
<i>High Output vs. Low Output</i>	1,97	0.13	0.718
	df	F-statistics	P-value
<i>For Low Output</i>			
<i>Process Accountability vs. Outcome Accountability</i>	1,97	1.85	0.177
<i>For High Output</i>			
<i>Process Accountability vs. Outcome Accountability</i>	1,97	1.15	0.285

*Accountability* = 1 if sender-participants are in the *Process Accountability* condition and 0 if they are in the *Outcome Accountability* condition.

*High\_output* = 1 for the *High Output* condition and 0 for the *Low Output* condition. Within the *Outcome Accountability* or *Process Accountability* condition, participants whose profit is higher than the median of the condition are classified as *High Output*. Otherwise, they will be classified as *Low Output*.

*Knowledge\_sharing* = the number of knowledge items that a sender-participant shares with the paired receiver-participant.

*Accurate\_sharing* = the number of accurate knowledge items that a sender-participant share with the paired receiver-participant.

*Receiver\_productivity* = the cumulative profit that a receiver-participant achieves over eight periods.

*t* statistics in parentheses.

## CHAPTER 5. CONCLUSION

In this paper, I examine how accountability requirements influence whether employees attend to task output or task exploration and, thereby, differentially influence the knowledge-sharing behavior of employees with high output and employees with low output. Under outcome accountability, employees primarily attend to task output; therefore, those who achieve higher output at the focal task have greater confidence in performance and are more willing to share knowledge with coworkers. By comparison, under process accountability, employees focus on the exploration of new alternatives, which may reduce their short-term output. As a result, those who engage in more exploration (and thus have low output) are more confident in the performance and tend to share more knowledge. Therefore, I predict that under outcome (process) accountability, there is a positive (negative) association between employees' output and their willingness to share knowledge.

As predicted, experimental results show that participants who achieve higher output share *more* knowledge under *outcome* accountability, but share *less* knowledge under *process* accountability. Further analysis reveals that participants' confidence in performance mediates these results. In addition, under *outcome* accountability, receivers' productivity is higher when their paired senders have higher output. However, under *process* accountability, receivers' productivity does not vary with senders' output, suggesting that the ultimate effect of knowledge sharing on coworkers' productivity can be influenced by task characteristics including the quality of the shared knowledge.

This paper makes several contributions to research and practice. It adds to the emerging research on management control systems and knowledge sharing by documenting a spillover effect of accountability requirements on employees' intention to share knowledge. Furthermore, this paper extends accounting research on accountability. While extant studies focus on the effect of accountability requirements on employee in-role performance, I investigate its effect on extra-role behavior. Finally, this paper has important practical implications. When designing management control systems, companies should take into consideration the unintended consequences of accountability requirements to improve overall control effectiveness.

The limitations of this paper provide opportunities for future research. First, I focus on organizational settings where employees are not incentivized to share knowledge. It is interesting to investigate whether the current results will change when they are provided with rewards or punishment tied with knowledge sharing (Bol and Leiby 2022). Second, in order to rule out the potential confounding effect of reciprocity on knowledge sharing, I use a setting where receiver-participants cannot interact with sender-participants. Future research can examine a more dynamic setting where knowledge receivers can reciprocate to knowledge senders (Cho, Li, and Su 2007; Zhang, Chen, Vogel, and Guo 2009; Hau, Kim, Lee, and Kim 2013).

Besides, future studies can explore whether the current findings will diminish over a longer time horizon, which may induce a ceiling effect by increasing participants' confidence in performance in all conditions. Finally, in the experiment, participants answer several predetermined questions to summarize task knowledge. Future research

can investigate whether providing participants with discretion over knowledge coding influences their intention to share knowledge with coworkers.

## APPENDIX A. EXPERIMENTAL INSTRUMENT

### A.1 Role 1: Knowledge Senders

#### INSTRUCTIONS

##### Decision Making in Organizational Settings

###### General

You are about to participate in a study of decision making. Please read these instructions carefully and use computers to complete the experiment. It is important that you understand all the instructions, because your compensation will depend on your performance in the study. There will be a quiz after you read the instructions, and you will start the task only after you pass the quiz.

You will be assigned a unique participant number. During or after the experiment, you will be identified only by this number. Nobody, including the researcher, will be able to link your participant number to you at any time. Therefore, your decisions will remain completely anonymous.

You will receive \$2.5 for participation, and a bonus depending on your performance in the experiment. Your bonus will be exchanged into cash at the end of the experiment at a rate of 40 lira = \$1. Your participation fee and a bonus will be paid to you through Prolific after your submission is approved. During the experiment, please do not refresh the browser or tap the “Forward” or “Back” icon on the browser.

## Task

Assume that you are a manager in a company. Your task is to modify the current design of an artistic product to sell to a new market, where the preferences of consumers are unknown.

The experiment will consist of eight periods. In each period, you will decide which geometric shapes, out of a given range, to add to the product. The product will generate a fixed profit of 15 lira and an additional variable profit. The variable profit will be jointly determined by the geometric shapes you choose and environmental uncertainty, as explained in detail in the next section.

### Geometric shapes

In each period, you need to decide which of the following geometric shapes, square, parallelogram, and triangle, should be added to the product. Each geometric shape will either increase or decrease the profit of the product. Specifically, when a geometric shape is added to the product, a predetermined integer from the range between -10 lira and +10 lira will be added to the profit. The integers corresponding to these geometric shapes are independent of one another.

You will not know the values of the integers. However, the integer for each geometric shape will remain unchanged over all eight periods, so you may infer their values through repeated decision making processes. If you choose not to add a geometric shape, then it will not influence the profit.

# Decision

## Period 1

Please make your decision.

1. Do you want to add a square?

No  Yes

2. Do you want to add a parallelogram?

No  Yes

3. Do you want to add a triangle?

No  Yes

Next

## Environmental Uncertainty

Environmental uncertainty reflects the environmental impacts on the profit of the product that are out of your control. Environmental uncertainty is represented by adding to the profit an integer between -1 lira and +1 lira. The environmental uncertainty (i.e., the integer to add to the profit) changes every period. Therefore, the profit may change if you chose the same set of geometric shapes again.

[Example 1] Assume that the impacts of geometric shapes on the profit are as follows:

Geometric Shape	Symbol	Impact on profit (lira)
Square		-5
Parallelogram		+3
Triangle		+8

Besides, assume that environmental uncertainty is -1 lira. If you choose to add a square and a triangle, the total profit in this period is 17 lira [fixed profit of  $15 + (-5 + 0 + 8) - 1 = 17$ ].

[Example 2] Assume that you make a decision in Period 1 and the profit is 17 lira if environmental uncertainty is -1 lira. If you make the same decision in Period 2 and the environmental uncertainty is +1 lira, the profit in Period 2 is 19 lira.

After you choose the geometric shapes, your choices and environmental uncertainty will jointly determine the profit for the period. The profit will show on the computer screen. Then another period will begin and the same procedure will repeat. Each of the eight periods will be independent of all other periods. That is, the decisions that you make in one period will not affect anything in any other period.

## **Compensation**

### ***[Process Accountability Condition]***

*After you finish the task, please write a short report to justify your decision processes. For example, you may explain what strategies you used and why these strategies might help increase product profitability. Your report will be evaluated by an independent expert/researcher after the experiment ends. Please note that the evaluation will not be based on the profit you make, but rather will be based on the quality of your report. The expert will rate your report at one of five levels from “very low” to “very good”, as shown below. You will receive a bonus between 0 and 100 lira, depending on*

the quality of your report: very low (0 lira), low (25 lira), median (50 lira), good (75 lira), or very good (100 lira).

<i>Performance level</i>	<i>Bonus (lira)</i>
<i>Very low</i>	<i>0</i>
<i>Low</i>	<i>25</i>
<i>Median</i>	<i>50</i>
<i>Good</i>	<i>75</i>
<i>Very good</i>	<i>100</i>

*[Example]* Assume that your report is graded as “good”. You will receive a bonus of 75 lira, which will be converted to \$1.875 (40 lira = \$1). Therefore, your total compensation is \$4.375 (\$2.5 participation fee + \$1.875 bonus).

***[Outcome Accountability Condition]***

After you finish the task, the cumulative profit (over all eight periods) made by participants in today’s session will be ranked from high to low. You will receive a bonus between 0 and 100 lira, depending on the quintile of your cumulative profit: 0-20% (0 lira), 20-40% (25 lira), 40-60% (50 lira), 60-80% (75 lira), or 80-100% (100 lira).

<i>The quintile of your cumulative profit</i>	<i>Performance level</i>	<i>Bonus (lira)</i>
<i>0-20%</i>	<i>Very low</i>	<i>0</i>

20-40%	<i>Low</i>	25
40-60%	<i>Median</i>	50
60-80%	<i>Good</i>	75
80-100%	<i>Very good</i>	100

*[Example]* Assume that you make a cumulative profit of 180 lira over 8 periods, and the percentile rank of your cumulative profit is 78%. As a result, your performance level is “good”. You will receive a bonus of 75 lira, which will be converted to \$1.875 (40 lira = \$1). Therefore, your total compensation is \$4.375 (\$2.5 participation fee + \$1.875 bonus).

## Summary

- The profit is determined by several geometric shapes and environmental uncertainty.
- In each period, you need to decide which of the geometric shapes should be added to the product.
- The impact of adding a geometric shape on profits is an integer between -10 lira and +10 lira.
- The impact of adding a geometric shape on profits remains unchanged over eight periods.
- Environmental uncertainty is an integer between -1 lira and +1 lira.
- Environmental uncertainty varies across periods.
- *[Process Accountability Condition]* The higher the quality of your report, the higher your bonus.

*[Outcome Accountability Condition] The higher the cumulative profit you make, the higher your bonus.*

## **Quiz**

*The correct answer is in boldface type.*

Please complete the quiz below. The purpose of the quiz is to make sure that you fully understand the instructions.

1. The impact of adding a geometric shape on profits is an integer between 0 lira and +10 lira. **T / F**

*Explanation: The impact of adding a geometric shape on profits is an integer between -10 lira and +10 lira.*

2. The impact of adding a geometric shape on profits changes every period. **T / F**

*Explanation: The impact of adding a geometric shape on profits remains unchanged over 8 periods.*

3. You will receive the same profit if you make the same decision every time. **T / F**

*Explanation: Environmental uncertainties vary across periods. If you make the same decision twice, you may receive two different profits.*

4. In each period, environmental uncertainty can be any integer between -1 lira and +1 lira. **T / F**

*Explanation: In each period, environmental uncertainty can be any integer between -1 lira and +1 lira.*

5. Your bonus depends on the cumulative profit you make over 8 periods.

**[Process Accountability Condition] T / F**

*Explanation: You will receive a bonus between 0 and 100 lira depending on the quality of your decision process report.*

**[Outcome Accountability Condition] T / F**

*Explanation: You will receive a bonus between 0 and 100 lira depending on the cumulative profit you make over 8 periods.*

## A.2 Role 2: Knowledge Receivers

### INSTRUCTIONS

#### Decision Making in Organizational Settings

##### General

You are about to participate in a study of decision making. Please read these instructions carefully and use computers to complete the experiment. It is important that you understand all the instructions, because your compensation will depend on your performance in the study. There will be a quiz after you read the instructions, and you will start the task only after you pass the quiz.

You will be assigned a unique participant number. During or after the experiment, you will be identified only by this number. Nobody, including the researcher, will be able to link your participant number to you at any time. Therefore, your decisions will remain completely anonymous.

You will receive \$2.5 for participation, and a bonus depending on your performance in the experiment. Your bonus will be exchanged into cash at the end of the experiment at a rate of 40 lira = \$1. Your participation fee and a bonus will be paid to you through Prolific after your submission is approved. During the experiment, please do not refresh the browser or tap the “Forward” or “Back” icon on the browser.

##### Task

Assume that you are a manager in a company. Your task is to modify the current design of an artistic product to sell to a new market, where the preferences of consumers are unknown.

The experiment will consist of eight periods. In each period, you will decide which geometric shapes, out of a given range, to add to the product. The product will generate a fixed profit of 15 lira and an additional variable profit. The variable profit will be jointly determined by the geometric shapes you choose and environmental uncertainty, as explained in detail in the next section.

### Geometric shapes

In each period, you need to decide which of the following geometric shapes, square, parallelogram, and triangle, should be added to the product. Each geometric shape will either increase or decrease the profit of the product. Specifically, when a geometric shape is added to the product, a predetermined integer from the range between -10 lira and +10 lira will be added to the profit. The integers corresponding to these geometric shapes are independent of one another.

You will not know the values of the integers. However, the integer for each geometric shape will remain unchanged over all eight periods, so you may infer their values through repeated decision making processes. If you choose not to add a geometric shape, then it will not influence the profit.

# Decision

## Period 1

Please make your decision.

1. Do you want to add a square?

No  Yes

2. Do you want to add a parallelogram?

No  Yes

3. Do you want to add a triangle?

No  Yes

Next

## Environmental Uncertainty

Environmental uncertainty reflects the environmental impacts on the profit of the product that are out of your control. Environmental uncertainty is represented by adding to the profit an integer between -1 lira and +1 lira. The environmental uncertainty (i.e., the integer to add to the profit) changes every period. Therefore, the profit may change if you chose the same set of geometric shapes again.

[Example 1] Assume that the impacts of geometric shapes on the profit are as follows:

Geometric Shape	Symbol	Impact on profit (lira)
Square		-5
Parallelogram		+3
Triangle		+8

Besides, assume that environmental uncertainty is -1 lira. If you choose to add a square and a triangle, the total profit in this period is 17 lira [fixed profit of 15 + (-5 + 0 + 8) - 1 = 17].

[Example 2] Assume that you make a decision in Period 1 and the profit is 17 lira if environmental uncertainty is -1 lira. If you make the same decision in Period 2 and the environmental uncertainty is +1 lira, the profit in Period 2 is 19 lira.

After you choose the geometric shapes, your choices and environmental uncertainty will jointly determine the profit for the period. The profit will show on the computer screen. Then another period will begin and the same procedure will repeat. Each of the eight periods will be independent of all other periods. That is, the decisions that you make in one period will not affect anything in any other period.

Another group of Prolific workers has previously performed the same task. We randomly paired you with a worker in that group, and asked this worker whether he or she would like to send you a message about the task. You will see the message before you start working on the task if he/she sent one to you.

### **Compensation**

After you finish the task, the cumulative profit (over all eight periods) made by participants in today's session will be ranked from high to low. You will receive a bonus between 0 and 100 lira, depending on the quintile of your cumulative profit: 0-20% (0 lira), 20-40% (25 lira), 40-60% (50 lira), 60-80% (75 lira), or 80-100% (100 lira).

The quintile of your cumulative profit	Performance level	Bonus (lira)
0-20%	Very low	0
20-40%	Low	25
40-60%	Median	50
60-80%	Good	75
80-100%	Very good	100

[Example] Assume that you make a cumulative profit of 180 lira over 8 periods, and the percentile rank of your cumulative profit is 78%. As a result, your performance level is “good”. You will receive a bonus of 75 lira, which will be converted to \$1.875 (40 lira = \$1). Therefore, your total compensation is \$4.375 (\$2.5 participation fee + \$1.875 bonus).

### Summary

- The profit is determined by several geometric shapes and environmental uncertainty.
- In each period, you need to decide which of the geometric shapes should be added to the product.
- The impact of adding a geometric shape on profits is an integer between -10 lira and +10 lira.
- The impact of adding a geometric shape on profits remains unchanged over eight periods.
- Environmental uncertainty is an integer between -1 lira and +1 lira.

- Environmental uncertainty varies across periods.
- The higher the cumulative profit you make, the higher your bonus.

## Quiz

*The correct answer is in boldface type.*

Please complete the quiz below. The purpose of the quiz is to make sure that you fully understand the instructions.

1. The impact of adding a geometric shape on profits is an integer between 0 lira and +10 lira. **T / F**

*Explanation: The impact of adding a geometric shape on profits is an integer between -10 lira and +10 lira.*

2. The impact of adding a geometric shape on profits changes every period. **T / F**

*Explanation: The impact of adding a geometric shape on profits remains unchanged over 8 periods.*

3. You will receive the same profit if you make the same decision every time. **T / F**

*Explanation: Environmental uncertainties vary across periods. If you make the same decision twice, you may receive two different profits*

4. In each period, environmental uncertainty can be any integer between -1 lira and +1 lira. **T / F**

*Explanation: In each period, environmental uncertainty can be any integer between -1 lira and +1 lira.*

5. Your bonus depends on the cumulative profit you make over 8 periods. **T / F**

*Explanation: You will receive a bonus between 0 and 100 lira depending on the cumulative profit you make over 8 periods.*

## REFERENCES

- Aljawarneh, N. M. S., and T. Atan. 2018. Linking Tolerance to Workplace Incivility, Service Innovative, Knowledge Hiding, and Job Search Behavior: The Mediating Role of Employee Cynicism. *Negotiation and Conflict Management Research* 11 (4): 298–320.
- Arechar, A. A., S. Gächter, and L. Molleman. 2018. Conducting interactive experiments online. *Experimental Economics* 21 (1): 99–131.
- Argote, L., and P. Ingram. 2000. Knowledge Transfer: A Basis for Competitive Advantage in Firms. *Organizational Behavior and Human Decision Processes* 82 (1): 150–169.
- Arthur, J. B., and C. L. Huntley. 2005. Ramping up the Organizational Learning Curve: Assessing the Impact of Deliberate Learning on Organizational Performance Under Gainsharing. *Academy of Management Journal* 48 (6): 1159–1170.
- Bartol, K. M., and A. Srivastava. 2002. Encouraging Knowledge Sharing: The Role of Organizational Reward Systems. *Journal of Leadership & Organizational Studies* 9 (1): 64–76.
- Bedford, D. S. 2020. Conceptual and empirical issues in understanding management control combinations. *Accounting, Organizations and Society* 86: 101–187.
- Benjamin, L. M. 2008. Bearing More Risk for Results: Performance Accountability and Nonprofit Relational Work. *Administration & Society* 39 (8): 959–983.
- Berger, L., K. Fiolleau, and C. MacTavish. 2019. I Know Something You Don't Know: The Effect of Relative Performance Information and Individual Performance Incentives on Knowledge Sharing. *Journal of Management Accounting Research* 31 (2): 19–35.
- Bledow, R., B. Carette, J. Kühnel, and D. Bister. 2017. Learning From Others' Failures: The Effectiveness of Failure Stories for Managerial Learning. *Academy of Management Learning & Education* 16 (1): 39–53.
- Bol, J. C., and J. Leiby. 2022. Status Motives and Agent-to-Agent Information Sharing: How Evolutionary Psychology Shapes Agents' Responses to Control System Design. *Review of Accounting Studies* 27 (1): 122–147.
- Brandon, D. M., J. H. Long, T. M. Loraas, J. Mueller-Phillips, and B. Vansant. 2014. Online Instrument Delivery and Participant Recruitment Services: Emerging Opportunities for Behavioral Accounting Research. *Behavioral Research in Accounting* 26 (1): 1–23.

- Bryant, S. E. 2003. The Role of Transformational and Transactional Leadership in Creating, Sharing and Exploiting Organizational Knowledge. *Journal of Leadership & Organizational Studies* 9 (4): 32–44.
- Callander, S., and N. Matouschek. 2019. The Risk of Failure: Trial and Error Learning and Long-Run Performance. *American Economic Journal: Microeconomics* 11 (1): 44–78.
- Carson, R., J. S. G. Zivin, J. Louviere, S. Sadoff, and J. Shrader Jeffrey G. 2020. *The Risk of Caution: Evidence from an R&D Experiment*. Working Paper. Working Paper Series. National Bureau of Economic Research.
- Carucci, R. 2020. How to Actually Encourage Employee Accountability. *Harvard Business Review*. <https://hbr.org/2020/11/how-to-actually-encourage-employee-accountability>.
- Chang, L. J., M. M. Cheng, and K. T. Trotman. 2013. The Effect of Outcome and Process Accountability on Customer-Supplier Negotiations. *Accounting, Organizations and Society* 38 (2): 93–107.
- Chang, W., P. Atanasov, S. Patil, B. A. Mellers, and P. E. Tetlock. 2017. Accountability and adaptive performance under uncertainty: A long-term view. *Judgment & Decision Making* 12 (6).
- Chen, D. L., M. Schonger, and C. Wickens. 2016. oTree—An open-source platform for laboratory, online, and field experiments. *Journal of Behavioral and Experimental Finance* 9: 88–97.
- Chennamaneni, A., J. T. C. Teng, and M. K. Raja. 2012. A unified model of knowledge sharing behaviours: theoretical development and empirical test. *Behaviour & Information Technology* 31 (11): 1097–1115.
- Chiu, C.-M., M.-H. Hsu, and E. T. G. Wang. 2006. Understanding knowledge sharing in virtual communities: An integration of social capital and social cognitive theories. *Decision Support Systems* 42 (3): 1872–1888.
- Cho, N., G. zheng Li, and C.-J. Su. 2007. An Empirical Study on the Effect of Individual Factors on Knowledge Sharing by Knowledge Type. *Journal of Global Business & Technology* 3 (2): 1–15.
- Choi, J. (Willie), A. H. Newman, and I. D. Tafkov. 2016. A Marathon, a Series of Sprints, or Both? Tournament Horizon and Dynamic Task Complexity in Multi-Period Settings. *The Accounting Review* 91 (5): 1391–1410.
- Collins, C. J., and K. G. Smith. 2006. Knowledge Exchange and Combination: The Role of Human Resource Practices in the Performance of High-Technology Firms. *Academy of Management Journal* 49 (3): 544–560.

- Conerly, B. 2016. Flexibility In Sales and Marketing. *Forbes*.  
<https://www.forbes.com/sites/billconerly/2016/08/22/flexibility-in-sales-and-marketing/>.
- Connelly, C. E., and E. K. Kelloway. 2003. Predictors of employees' perceptions of knowledge sharing cultures. *Leadership & Organization Development Journal* 24 (5): 294–301.
- Crump, M. J. C., J. V. McDonnell, and T. M. Gureckis. 2013. Evaluating Amazon's Mechanical Turk as a Tool for Experimental Behavioral Research. *PLOS ONE* 8 (3): e57410.
- Crump, M. J. C., J. M. M. Vaquero, and B. Milliken. 2008. Context-specific learning and control: The roles of awareness, task relevance, and relative salience. *Consciousness and Cognition* 17 (1): 22–36.
- Dalla Via, N., P. Perego, and M. van Rinsum. 2019. How accountability type influences information search processes and decision quality. *Accounting, Organizations and Society* 75: 79–91.
- Deloitte. 2020. 2020 Global Human Capital Trends Report. <https://www2.deloitte.com/cn/en/pages/human-capital/articles/global-human-capital-trends-2020.html>.
- Dickinson, V., and J. C. Lere. 2003. Problems evaluating sales representative performance?: Try activity-based costing. *Industrial Marketing Management* 32 (4): 301–307.
- Ederer, F., and G. Manso. 2013. Is pay for performance detrimental to innovation? *Management Science* 59 (7): 1496–1513.
- Edmondson, A. C., A. B. Winslow, R. M. J. Bohmer, and G. P. Pisano. 2003. Learning How and Learning What: Effects of Tacit and Codified Knowledge on Performance Improvement Following Technology Adoption. *Decision Sciences* 34 (2): 197–224.
- Eisenhardt, K. M. 1989. Agency Theory: An Assessment and Review. *Academy of Management Review* 14 (1): 57–74.
- Farrell, A. M., J. H. Grenier, and J. Leiby. 2017. Scoundrels or Stars? Theory and Evidence on the Quality of Workers in Online Labor Markets. *The Accounting Review* 92 (1): 93–114.
- Fey, C. F., and P. Furu. 2008. Top management incentive compensation and knowledge sharing in multinational corporations. *Strategic Management Journal* 29 (12): 1301–1323.

- Francis, J., and C. Zheng. 2010. Learning Vicariously From Failure: The Case of Major League Soccer and the Collapse of the North American Soccer League. *Group & Organization Management* 35 (5): 542–571.
- Frederickson, J. R. 1992. Relative Performance Information: The Effects of Common Uncertainty and Contract Type on Agent Effort. *The Accounting Review; Sarasota* 67 (4): 647.
- Gupta, A. K., and V. Govindarajan. 2000. Knowledge flows within multinational corporations. *Strategic Management Journal* 21 (4): 473–496.
- Haas, M. R., and M. T. Hansen. 2007. Different knowledge, different benefits: toward a productivity perspective on knowledge sharing in organizations. *Strategic Management Journal* 28 (11): 1133–1153.
- Haesebrouck, K., M. Cools, and A. Van den Abbeele. 2018. Status Differences and Knowledge Transfer: The Effect of Incentives. *The Accounting Review* 93 (1): 213–234.
- Haesebrouck, K., A. G. H. L. Van den Abbeele, and M. G. Williamson. 2021. Building Trust through Knowledge Sharing: Implications for Incentive System Design. *Accounting, Organizations and Society* 93: 102141.
- Hau, Y. S., B. Kim, H. Lee, and Y.-G. Kim. 2013. The effects of individual motivations and social capital on employees' tacit and explicit knowledge sharing intentions. *International Journal of Information Management* 33 (2): 356–366.
- Hölmstrom, B. 1979. Moral hazard and observability. *The Bell Journal of Economics*: 74–91.
- Horton, J. J., D. G. Rand, and R. J. Zeckhauser. 2011. The online laboratory: Conducting experiments in a real labor market. *Experimental Economics* 14 (3): 399–425.
- Høyrup, S. 2010. Employee-driven innovation and workplace learning: basic concepts, approaches and themes. *Transfer: European Review of Labour and Research* 16 (2): 143–154.
- Hurmelinna-Laukkanen, P. 2011. Enabling collaborative innovation – knowledge protection for knowledge sharing. *European Journal of Innovation Management* 14 (3): 303–321.
- Kahneman, D. 1973. *Attention and Effort*. Vol. 1063. Englewood Cliffs, NJ: Prentice-Hall.
- Kankanhalli, A., B. C. Y. Tan, and K.-K. Wei. 2005. Contributing Knowledge to Electronic Knowledge Repositories: An Empirical Investigation. *MIS Quarterly* 29 (1): 113–143.

- Kelly, K. 2010. The Effects of Incentives on Information Exchange and Decision Quality in Groups. *Behavioral Research in Accounting* 22 (1): 43–65.
- Kim, S., and K. T. Trotman. 2015. The comparative effect of process and outcome accountability in enhancing professional scepticism. *Accounting & Finance* 55 (4): 1015–1040.
- Kubo, I., A. Saka, and S. L. Pan. 2001. Behind the scenes of knowledge sharing in a Japanese bank. *Human Resource Development International* 4 (4): 465–485.
- Kumar, V., S. Sunder, and R. P. Leone. 2015. Who’s your most valuable salesperson? *Harvard Business Review* 93 (4): 17.
- Langhe, B. de, S. M. J. van Osselaer, and B. Wierenga. 2011. The effects of process and outcome accountability on judgment process and performance. *Organizational Behavior and Human Decision Processes* 115 (2): 238–252.
- Lerner, J. S., and P. E. Tetlock. 1999. Accounting for the effects of accountability. *Psychological Bulletin* 125 (2): 255–275.
- Lin, H. 2007a. Knowledge sharing and firm innovation capability: an empirical study. Ed. I. Svetlik and E. Stavrou-Costea. *International Journal of Manpower* 28 (3/4): 315–332.
- Lin, H., and W. Fan. 2011. Leveraging Organizational Knowledge through Electronic Knowledge Repositories in Public Accounting Firms: An Empirical Investigation. *Behavioral Research in Accounting* 23 (2): 147–167.
- Lin, H.-F. 2007b. Effects of extrinsic and intrinsic motivation on employee knowledge sharing intentions. *Journal of Information Science* 33 (2): 135–149.
- Linden, D. V. D., S. Sonnentag, M. Frese, and C. V. Dyck. 2001. Exploration strategies, performance, and error consequences when learning a complex computer task. *Behaviour & Information Technology* 20 (3): 189–198.
- van der Linden, D., M. Frese, and S. Sonnentag. 2003. The Impact of Mental Fatigue on Exploration in a Complex Computer Task: Rigidity and Loss of Systematic Strategies. *Human Factors* 45 (3): 483–494.
- Liu, Y., and J. S. Phillips. 2011. Examining the antecedents of knowledge sharing in facilitating team innovativeness from a multilevel perspective. *International Journal of Information Management* 31 (1): 44–52.
- Loch, C. H., M. T. Pich, C. Terwiesch, and M. Urbchat. 2001. Selecting R&D projects at BMW: a case study of adopting mathematical programming models. *IEEE Transactions on Engineering Management* 48 (1): 70–80.

- Madsen, P. M., and V. Desai. 2010. Failing to Learn? The Effects of Failure and Success on Organizational Learning in the Global Orbital Launch Vehicle Industry. *Academy of Management Journal* 53 (3): 451–476.
- Merchant, K. A., and D. T. Otley. 2006. A Review of the Literature on Control and Accountability. In *Handbooks of Management Accounting Research*, edited by C. S. Chapman, A. G. Hopwood, and M. D. Shields, 2:785–802. Elsevier.
- Mesmer-Magnus, J. R., and L. A. DeChurch. 2009. Information sharing and team performance: A meta-analysis. *Journal of Applied Psychology* 94 (2): 535.
- Miyazaki, A. D., D. Grewal, and R. C. Goodstein. 2005. The Effect of Multiple Extrinsic Cues on Quality Perceptions: A Matter of Consistency. *Journal of Consumer Research* 32 (1): 146–153.
- Moghavvemi, S., M. Sharabati, T. Paramanathan, and N. M. Rahin. 2017. The impact of perceived enjoyment, perceived reciprocal benefits and knowledge power on students' knowledge sharing through Facebook. *The International Journal of Management Education* 15 (1): 1–12.
- Murphy, P. R., M. Wynes, T.-A. Hahn, and P. G. Devine. 2020. Why Are People Honest? Internal and External Motivations to Report Honestly. *Contemporary Accounting Research* 37 (2): 945–981.
- Ortega, J. 2009. Employee Discretion and Performance Pay. *The Accounting Review* 84 (2): 589–612.
- Panopto. 2018. Inefficient Knowledge Sharing Costs Large Businesses \$47 Million Per Year. <https://www.prnewswire.com/news-releases/inefficient-knowledge-sharing-costs-large-businesses-47-million-per-year-300681971.html>.
- Patil, S. V., P. E. Tetlock, and B. A. Mellers. 2017. Accountability Systems and Group Norms: Balancing the Risks of Mindless Conformity and Reckless Deviation. *Journal of Behavioral Decision Making* 30 (2): 282–303.
- Patil, S. V., F. Vieider, and P. E. Tetlock. 2014. Process versus outcome accountability. *The Oxford Handbook of Public Accountability*: 69–89.
- Peralta, C. F., and M. F. Saldanha. 2014. Knowledge-centered culture and knowledge sharing: the moderator role of trust propensity. *Journal of Knowledge Management* 18 (3): 538–550.
- Phang, S.-Y., and N. L. Fargher. 2018. Auditors' Evaluation of Subsequent Events: The Effects of Prior Commitment and Type of Accountability. *Auditing: A Journal of Practice & Theory* 38 (3): 167–182.

- Pitesa, M., and S. Thau. 2013. Masters of the universe: How power and accountability influence self-serving decisions under moral hazard. *Journal of Applied Psychology* 98 (3): 550–558.
- Posner, M. I. 1980. Orienting of attention. *The Quarterly Journal of Experimental psychology* 32 (1): 3–25.
- Quigley, N. R., P. E. Tesluk, E. A. Locke, and K. M. Bartol. 2007. A Multilevel Investigation of the Motivational Mechanisms Underlying Knowledge Sharing and Performance. *Organization Science* 18 (1): 71–88.
- Reychav, I., and J. Weisberg. 2009. Good for workers, good for companies: How knowledge sharing benefits individual employees. *Knowledge and Process Management* 16 (4): 186–197.
- Rohim, A., and I. G. S. Budhiasa. 2019. Organizational culture as moderator in the relationship between organizational reward on knowledge sharing and employee performance. *Journal of Management Development* 38 (7): 538–560.
- Sandvik, J., R. Saouma, N. Seegert, and C. Stanton. 2020. Workplace Knowledge Flows. *The Quarterly Journal of Economics* 135 (3): 1635–1680.
- Serenko, A., and N. Bontis. 2016. Understanding counterproductive knowledge behavior: antecedents and consequences of intra-organizational knowledge hiding. *Journal of Knowledge Management* 20 (6): 1199–1224.
- Sherf, E. N., and E. W. Morrison. 2020. I do not need feedback! Or do I? Self-efficacy, perspective taking, and feedback seeking. *Journal of Applied Psychology* 105 (2): 146–165.
- Siegel-Jacobs, K., and J. F. Yates. 1996. Effects of Procedural and Outcome Accountability on Judgment Quality. *Organizational Behavior and Human Decision Processes* 65 (1): 1–17.
- Siemsen, E., A. V. Roth, S. Balasubramanian, and G. Anand. 2008. The Influence of Psychological Safety and Confidence in Knowledge on Employee Knowledge Sharing. *Manufacturing & Service Operations Management* 11 (3): 429–447.
- Simonson, I., and B. M. Staw. 1992. Deescalation strategies: A comparison of techniques for reducing commitment to losing courses of action. *Journal of Applied Psychology* 77 (4): 419.
- Škerlavaj, M., C. E. Connelly, M. Cerne, and A. Dysvik. 2018. Tell me if you can: time pressure, prosocial motivation, perspective taking, and knowledge hiding. *Journal of Knowledge Management* 22 (7): 1489–1509.

- Srivastava, A., K. M. Bartol, and E. A. Locke. 2006. Empowering Leadership in Management Teams: Effects on Knowledge Sharing, Efficacy, and Performance. *The Academy of Management Journal* 49 (6): 1239–1251.
- Staats, B. R., and F. Gino. 2012. Specialization and Variety in Repetitive Tasks: Evidence from a Japanese Bank. *Management Science* 58 (6): 1141–1159.
- Starner, T. 2015. Study: Workplace accountability requires a specific strategy. *HR Dive*. <https://www.hrdiver.com/news/study-workplace-accountability-requires-a-specific-strategy/400130/>.
- Stuppy, A., N. L. Mead, and S. M. J. V. Osselaer. 2020. I Am, Therefore I Buy: Low Self-Esteem and the Pursuit of Self-Verifying Consumption. *Journal of Consumer Research* 46 (5): 956–973.
- Tafkov, I. D. 2013. Private and Public Relative Performance Information under Different Compensation Contracts. *The Accounting Review* 88 (1): 327–350.
- Taylor, E. Z. 2006. The Effect of Incentives on Knowledge Sharing in Computer-Mediated Communication: An Experimental Investigation. *Journal of Information Systems* 20 (1): 103–116.
- Taylor, W. A., and G. H. Wright. 2004. Organizational Readiness for Successful Knowledge Sharing: Challenges for Public Sector Managers. *Information Resources Management Journal* 17 (2): 22–37.
- Tetlock, P. E., F. M. Vieider, S. V. Patil, and A. M. Grant. 2013. Accountability and ideology: When left looks right and right looks left. *Organizational Behavior and Human Decision Processes* 122 (1): 22–35.
- Thomas, A., V. Cillo, V. Caggiano, and D. Vrontis. 2020. Drivers of social capital in enhancing team knowledge sharing and team performance: moderator role of manager's cultural intelligence. *International Journal of Managerial and Financial Accounting* 12 (3–4): 284–303.
- Tian, Q., J. Ma, J. Liang, R. C. W. Kwok, and O. Liu. 2005. An organizational decision support system for effective R&D project selection. *Decision Support Systems* 39 (3): 403–413.
- Verma, J., and A. Sinha. 2016. Knowledge Sharing in Cross-Functional Teams and its Antecedents: Role of Mutual Trust as a Moderator. *Journal of Information & Knowledge Management* 15 (03): 1650033.
- Verwaeren, B., D. Buyens, and X. Baeten. 2016. The Effect of Process and Outcome Accountability on Individual Exploration. *Academy of Management Proceedings* 2016 (1): 15851.

- Volini, E., J. Schwartz, B. Denny, D. Mallon, Yves Van Durme, M. Hauptmann, R. Yan, and S. Poynton. 2020. Knowledge management strategy: Creating context for a connected world. <https://www2.deloitte.com/us/en/insights/focus/human-capital-trends/2020/knowledge-management-strategy.html>.
- Wang, S., and R. A. Noe. 2010. Knowledge sharing: A review and directions for future research. *Human Resource Management Review* 20 (2): 115–131.
- Wang, S., R. A. Noe, and Z.-M. Wang. 2014. Motivating Knowledge Sharing in Knowledge Management Systems: A Quasi-Field Experiment. *Journal of Management* 40 (4): 978–1009.
- Ward, A. F., K. Duke, A. Gneezy, and M. W. Bos. 2017. Brain Drain: The Mere Presence of One's Own Smartphone Reduces Available Cognitive Capacity. *Journal of the Association for Consumer Research* 2 (2): 140–154.
- Webb, R. A., M. G. Williamson, and Y. M. Zhang. 2013. Productivity-target difficulty, target-based pay, and outside-the-box thinking. *The Accounting Review* 88 (4): 1433–1457.
- Wickens, C. D. 1991. Processing resources and attention. *Multiple-task performance* 1991: 3–34.
- Wolfe, C., and T. Loraas. 2008. Knowledge Sharing: The Effects of Incentives, Environment, and Person. *Journal of Information Systems* 22 (2): 53–76.
- Yu, T.-K., L.-C. Lu, and T.-F. Liu. 2010. Exploring factors that influence knowledge sharing behavior via weblogs. *Computers in Human Behavior* 26 (1): 32–41.
- Yun, Y.-J., and K.-J. Lee. 2017. Social skills as a moderator between R&D personnel's knowledge sharing and job performance. *Journal of Managerial Psychology* 32 (5): 387–400.
- Zhang, X., Z. Chen, D. Vogel, and C. Guo. 2009. Exchange Ideology as a moderator of Knowledge Sharing in virtual teams: a social exchange theory perspective. *International Journal of Internet and Enterprise Management* 6 (2): 143–163.
- Zhou, K. Z., and C. B. Li. 2012. How knowledge affects radical innovation: Knowledge base, market knowledge acquisition, and internal knowledge sharing. *Strategic Management Journal* 33 (9): 1090–1102.