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Supported and Unleashed - The Impact of Work Environment on the Creative Performance of Knowledge Workers: An Empirical Study in Saudi Arabia

Mahmoud FALLATAH¹, Hadeel SINDI²

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Abstract

Organizations pursue innovation to improve performance and gain competitive advantage, and knowledge workers represent an integral part of creating knowledge and helping organizations in their innovation efforts. The current paper seeks to examine the impact of the work environment on knowledge workers' creativity. Building on The Investment Theory of Creativity, The Componential Theory of Creativity, the Job Demand-Resource model, and the Resource Based View, we develop and test a model suggesting a relationship between work environment—social support, sufficient resources, organizational freedom, and organizational regulations—and the quantity and quality of the creative performance of knowledge workers. Using a sample of 167 engineers in Saudi Arabia, an emerging but wealthy country with huge innovation inspirations, the results of our Ordinary Least Squares (OLS) regression analysis indicate that all four elements of the work environment included in our study positively impact the quantity and quality of knowledge workers' creative performance. Our paper provides important contributions to the literature on the work environment, creativity, and knowledge management, with an emphasis on creativity in developing countries. Our study highlights the importance of creating a supportive and encouraging work environment for knowledge workers to foster their creativity. The study offers several theoretical and managerial implications, along with suggestions for future research.

Keywords: Creativity, Knowledge Workers, Work Environment, Knowledge Management, Saudi Arabia

JEL Classification Code: I23, L26, M13, O35

1. Introduction

Innovation has been vital for organizations to gain a competitive advantage (Porter, 1985). Thus, since knowledge resides within individuals (Polanyi, 1962, 1966), the role of individuals in the innovation process has been highly discussed in the literature (Davenport, 2005; Henard & McFadyen, 2008). Knowledge workers (KWs), are defined as individuals who depend on knowledge as

their main resource and their tasks include the creation of new knowledge and insights (Davenport et al., 2002, Drucker, 1959; Fallatah, 2020), play an important role in creating knowledge and helping firms in their innovation efforts (Fallatah, 2018; Saulais & Ermaine, 2012). They are the building block of innovation, whether it is a new program or a new product (Amabile et al., 1996). As put by Drucker (1999, p.84) “Continuing innovation has to be part of the work, the task and the responsibility of knowledge workers.” Therefore, it is important for organizations to provide KWs with a context, work environment, and tools to foster KWs' creativity (Carleton, 2011; Gilson et al., 2005; Thompson & Heron, 2005), and to retain them and avoid losing their expertise (Carleton, 2011; Fallatah, 2019; 2020; Gonzalez-Masip et al., 2019, Shujahat et al., 2019).

Previous research studied the impact of several factors on KWs' creativity. For example, Amabile (1989) asserted that KWs' expertise and motivation for creativity are keys to their being innovative. Meanwhile, Tsai (2018) examined the

¹First Author and Corresponding Author. Associate Professor, Department of Business Administration, College of Business, Umm Al-Qura University, Saudi Arabia. [Postal Address: 8XH2+XVP, Mecca 24382, Kingdom of Saudi Arabia]
Email: mifallatah@uqu.edu.sa

²Department of Business Administration, College of Business, Umm Al-Qura University, Saudi Arabia. Email: hfsindi@uqu.edu.sa

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relationship between financial incentives and the innovative behavior of KWs. Studies of social networks have also found empowerment perceptions of employees to be associated with high levels of individual creativity (Adeel et al., 2019). On the other hand, Dul, Ceylan & Jespers (2011) found that creative personality, the social-organizational work environment, and the physical work environment affects creative performance. However, there are many aspects of the work environment that have not been studied in relation to KWs' creativity (Tsai, 2018). Importantly, very few studies have focused on the creativity of KWs in developing countries, which is understandable given that knowledge usually is created in developed countries (Pralhad, 2005). Thus, it is vital to conduct studies of creativity in developing countries, given their different situation, to generalize the findings of studies in developed countries (Fallatah, 2021; Kotabe et al., 2017).

In the current paper, we aim to contribute to the literature on creativity and knowledge management by studying the impact of several factors in the work environment on the creative achievements of KWs, rather than their creativity traits (Eysenck, 1994). Specifically, we focus on organizational social support, the availability of sufficient resources, work freedom, and regulations and examine their impact on the quantity and quality of creative performance of KWs. Additionally, we contribute to the literature on creativity in developing countries, an area of research that is understudied. Our study is conducted in the context of Saudi Arabia, a developing country with huge aspirations toward innovation (Fallatah, 2021) as part of its vision 2030, a comprehensive plan that hopes to diversify the country's oil-based economy with a huge focus on knowledge economy (Vision 2030 of the Kingdom of Saudi Arabia, 2016).

The rest of the paper is structured as follows. In the next section, we discuss the theoretical background of the creative performance of KWs and develop arguments on how it is affected by the work environment. In the following section, we discuss our methodology, explaining our data collection process, measures, and results, followed by the discussion and conclusions sections.

2. Literature Review and Hypotheses

2.1. Knowledge Workers and Creative Performance

The creative performance of KWs is paramount for organizations because they are “the fuel that drives a company's engine of innovation” (Henard & McFadyen, 2008, P. 40). Ample research has discussed creativity, defined as “the production of a novel, useful ideas or problem solutions” (Amabile et al., 2005, p. 368). As

articulated by Eysenck (1994), It is crucial to differentiate between creativity as a trait, a dispositional characteristic of the KW, and creativity as an achievement, which focuses on the creative output of the KW. In this paper, we focus on the output of the KW. We also distinguish between the quantity and quality of the creative performance of KWs, as research finds that organizational factors may affect them differently (Saad et al., 2015; Yeh & Huan, 2017). The quantity of creative performance emphasizes the number of novel ideas produced by the KW, while the quality of creative performance relates to the degree to which the creative output accomplishes its intended purpose (Amabile et al., 1996; Kaufmann & Sternberg, 2010; Laske & Schröder, 2017).

Theories of creativity have discussed factors that stimulate or block creativity. For example, Sternberg and Lubart (1992) introduced The Investment Theory of Creativity, which categorizes the varying approaches to studying creativity into person-centered and context-centered, where the former emphasizes the role of the KWs' internal factor, while the latter involves the way the KW interacts with the external context. Meanwhile, The Componential Theory of Creativity was introduced by Amabile (1983, 2011), in the form of a comprehensive model of social and psychological components that stimulates the creation of creative work. The theory has two main assumptions. First, it assumes that there is a continuum of creativity from low (i.e., routine inventions) to high (i.e., significant inventions). Second, it assumes that there are degrees to the creative output of a single KW, depending on the creativity components available within and around that person at the time of invention.

Similar to The Investment Theory of Creativity (Sternberg & Lubart, 1992), The Componential Theory of Creativity, as conceptualized by Amabile (1983, 2011), asserts that there are three within-individual (equivalent to person-centered investment theory of creativity) components of creativity: domain-relevant skills, defined as expertise in the relevant domain of the individual, creativity-relevant processes, defined as the cognitive and personal traits conducive to novel thinking, and task motivation, which relates to the intrinsic motivation of the individual to in engaging activities out of interest and enjoyment (Vu et al., 2021). The fourth component in theory, according to Amabile (1983, 2011) resides outside the individual and is about the social environment surrounding the individual, which resembles the context-centered approach of the investment theory of creativity.

In this paper, we focus on the social environment (context-centered) factors to examine their impact on the quality and quantity of KWs' creative performance. Specifically, we build on the work of Amabile et al. (1996), the JD-R model (Demerouti et al., 2001), the Resource Based View (Barney,

1991), The Investment Theory of Creativity, and The Componential theory of Creativity to examine the impact of work environment factors on the creativity of KWs. Namely, we study how social support, resource availability, Flexibility, and organizational regulations affect the quantity and quality of the creative outcomes of KWs.

2.2. Social Support

The impact of organizational culture and work environment on employee performance, in general, is much discussed in the literature (e.g. Amabile, 1988, 1996; Menguc et al., 2013; Scott & Bruce, 1994). When it comes to creativity, studies have shown that creative performance is usually the result of a work environment where creativity is encouraged (e.g. Amabile et al., 1996; Yeh & Huan, 2017; Yu & Frenkel, 2013). Research on Perceived Organization Support (POS) (Eisenberger et al., 1986) also suggests that employees produce more creative outputs when they are organizationally supported (Madjar et al., 2002; Oldham & Cummings, 1996). The JD-R model (Demerouti et al., 2001) emphasizes the role of job resources, defined as physical, social, or organizational aspects of the job that may help a KW achieve his/her work goals, in the success of KWs (Agustina et al., 2020). One of the major resources in that regard is social support, which includes support from the organization, supervisor, and co-workers (Agustina et al., 2020; Demerouti et al., 2001; Lee & Ashforth, 1996; Menguc et al., 2013; Schaufeli & Taris, 2014). This is further emphasized when it comes to employees' creativity, as elaborated by Amabile and colleagues (1996). At the organization level, organizations could show support for creativity by setting a culture and work environment that encourages activities related to the generation of new ideas (Amabile et al., 1996, 1997; Füller et al., 2011; Madjar et al., 2002; Oldham & Cummings, 1996).

Meanwhile, at the supervisory level, research asserts that supervisor and their leadership style affect the creativity of their subordinates (Hughes et al., 2018; Kahai et al., 2003; Zhou et al., 2018). Research has also studied different supervisory behaviors and their role in encouraging subordinates' creativity, such as supervisory support (Madjar et al., 2002), supervisory expectations for creativity (Carmeli & Schaubroeck, 2007; Tierney & Farmer, 2004), and supervisory empowerment behaviors (Zhang & Bartol, 2010), among others (see Anderson et al., 2014; Tierney, 2008).

Likewise, research finds that co-workers play a significant role in influencing the creativity of their colleagues. To explain, the social cognitive theory asserts that individuals tend to exhibit the same type of behaviors that they observe others exhibiting (Bandura, 1989). Thus, KWs who observe

creative co-workers in their work environment learn from their co-workers and are more likely to be creative themselves. Additionally, since most creative work is collaborative (Adler & Chen, 2011), KWs usually need to work in a team, which requires the presence of co-workers who are willing to share their expertise (Hon, 2011; Hussain et al., 2017), and to motivate their colleagues to commit to creativity (George, 2007).

Based on the above arguments, we hypothesize that organizational support, at all three levels, is essential to KWs' creativity. Thus:

H1a: Organizational social support has a positive relationship with the quantity of knowledge workers' creative performance.

H1b: Organizational social support has a positive relationship with the quality of knowledge workers' creative performance.

2.3. Sufficient Resources

The RBV theory (Barney, 1991) suggests that resources are crucial for organizations to achieve competitive advantage. In the Strategic Human Resources Management (SHRM) literature, RBV has been the main theory that linked strategy and HR (Wright et al., 2001). It emphasizes that the resources that an organization possesses, including human resources, are essential to organizational performance (Wright & McMahan, 1992). Thus, it is inferred that for organizations to be innovative, talented, and creative individuals should be hired (Anderson et al., 1992). Such talented individuals should also be supported by sufficient and adequate resources that enable them to generate novel ideas (Amabile et al., 1988; Amabile, 1996). According to the JD-R model described above (Demerouti et al., 2001), individuals need physical, social, or organizational resources to perform and achieve their goals (i.e. creativity). While organizational social support includes the culture and support from supervisors and co-workers as explained earlier, physical resources include facilities and devices that enable KWs to perform activities that could lead to the generation of new ideas (Amabile et al., 1996; Yeh & Huan, 2017). They also include resources such as time and financial resources (Blomberg et al., 2017). Importantly, knowledge as an integral organizational resource (Grant, 1996) should be created, shared, and disseminated throughout the organization for KWs to utilize. Research contends that two types of knowledge and skills are necessary for creativity: domain-related and creativity-related (Amabile, 1988). Thus, we assert that in organizations where resources are available, KWs are more likely to produce creative outcomes. Thus:

H2a: *The availability of sufficient resources has a positive relationship with the quantity of knowledge workers' creative performance.*

H2b: *The availability of sufficient resources has a positive relationship with the quality of knowledge workers' creative performance.*

2.4. Organizational Freedom

Several theoretical perspectives support the idea that freedom is necessary for individual creativity. For example, the componential model of creativity Amabile (1988) refers to freedom as a motivating factor that increases an individual's creativity in organizations. Likewise, the Self-Determination Theory (Ryan & Deci, 2000) maintains that employees tend to be more creative in the presence of an autonomy-supportive environment, in which employees' perspectives are considered and controlling demand is minimized. In other words, individuals are more likely to generate novel ideas when they have an acceptable level of ownership and control over their work (Amabile & Gitomer, 1984; Bailyn, 1985; King & West, 1987). Indeed, ample research has tested and found that autonomy is necessary for individuals to be creative (Paolillo & Brown, 1978; Spelthann & Haunschild, 2011). This is further supported by Oldham and Cummings (1996), who found that job autonomy and supportive supervision, rather than control, have a positive influence on the creative performance of individuals. Therefore, building on earlier research, we suggest that KWs with more freedom in their work are more likely to be creative than those with less freedom.

H3a: *Organizational Freedom has a positive relationship with the quantity of knowledge workers' creative performance.*

H3b: *Organizational Freedom has a positive relationship with the quality of knowledge workers' creative performance.*

2.5. Organizational Regulations

The word “regulation”, also referred to as “control” or “formalization”, defined here as written rules and procedures that govern KWs' behavior in the workplace, has mainly been viewed negatively in the literature on creativity (Cardinal, 2001; Zhou & George, 2003). However, this view represents only one type of regulation, called *coercive regulation* (Adler & Borys, 1996), which has been related to employee dissatisfaction, absences, and less creativity and innovation (Rousseau, 1978). Other research argues that there is another type of regulation referred to as *enabling regulation* (Adler & Borys, 1996) that could be beneficial to organizations' creative efforts (Adler & Chen, 2011; Jelinek & Schoonhoven, 1990). Not to be confused with the term “freedom” we

discussed earlier, by regulation here we refer to the criteria and demands that organizations use to regulate the work of KWs. In other words, we focus on the type of regulations that inform KWs of their responsibilities, objectives, and key performance indicators (KPIs). For example, to increase and enhance the creative outputs of KWs, organizations could set certain criteria that ensure creative outputs are consistent and of high quality (March, 1991). Organizations could also demand that specific approvals should be taken before KWs could start a project. While such requirements might seem controlling, they actually work to regulate and systemize creativity-related activities, but they do not tell KWs how to exactly go about their work. Importantly, as emphasized in the SHRM (Wright & McMahan, 1992), the presence of rational regulating control ensures alignment between KWs' behavior and organizational strategy (Spekle et al., 2017).

H4a: *Organizational Enabling regulations have a positive relationship with the quantity of knowledge workers' creative performance.*

H4b: *Organizational Enabling regulations have a positive relationship with the quality of knowledge workers' creative performance.*

Figure 1 shows the hypothesized relationships.

3. Research Methods and Materials

3.1. Data

To collect data on the creative outputs of KWs, our sample should focus on employees who depend on knowledge as their main resource, and whose job requirements included some creative outputs. Engineers have been studied as a clear example of KWs (e.g. Davenport, 2005; May et al., 2002; Shujahat et al., 2019) Thus, we sought to target engineers in Saudi Arabia as our main population. We followed a snowball sampling approach to collect data (Shepherd et al., 2020). Engineers were identified through the authors' personal networks of certified engineers who are members of the Saudi Council of Engineers (SCE).

We collected data through surveys. The survey was translated from English to Arabic by a Saudi working professional fluent in both languages. Then, both authors, fluent in both languages, back-translated the survey individually to make sure there were no changes in the meanings of the questions (Brislin, 1986). Due to WhatsApp being the number one communication mode and because it is ubiquitously used for doing business in Saudi Arabia (Saudi Arabia Social Media Statistics, 2020), we sent a link to the online survey to engineers via email or a WhatsApp text, a common practice in research in Saudi Arabia (Hoda & Fallatah, 2022; Pérez-Nordtvedt & Fallatah, 2022).

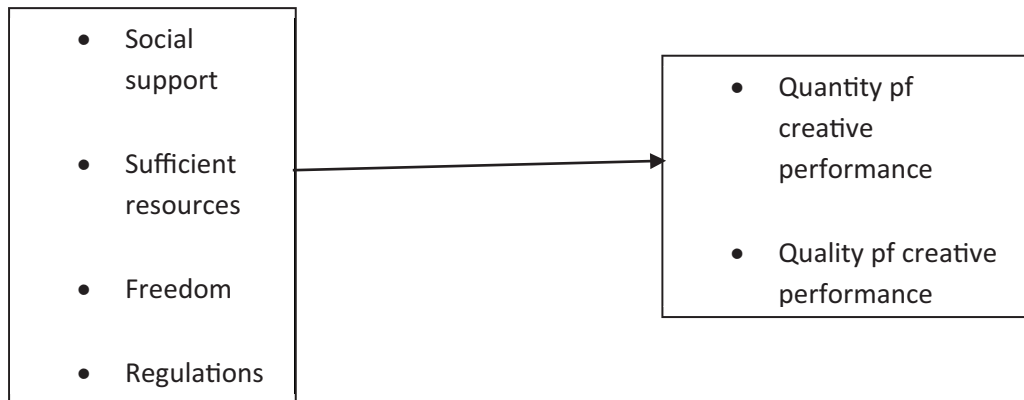


Figure 1: The Impact of Work Environment on Creative Performance

The survey was sent to 420 engineers, of which 241 were returned, indicating a 57.4 percent response rate. The total number of surveys that were complete and usable was 167. Due to the scarcity of engineering schools for females in Saudi Arabia (there are only three young engineering schools, including one that just started accepting female students in 2021), our sample consisted of only male engineers. Of our sampled engineers, about 43% were between 25 and 35 years of age, about 39% were between 35 and 45 years of age, and the rest were either above 45 years (11%) or under 25 years (2.6%). Further, 53% of our sample have more than 10 years of experience, and 55% work in the public sector. Also, 64% of our sample have bachelor's degrees only (the rest have graduate degrees in engineering) and 73.5% of them received their degrees from Saudi Arabia. Geographically, our sampled engineers worked in the western (66.3 percent), Central (15.3 percent), Eastern (7.1 percent), Southern (6.6 percent), and Northern (4.1 percent) regions of Saudi Arabia.

3.2. Measures

3.2.1. Dependent Variable

To measure our dependent and independent variables, we used an adapted version of the scale developed and validated by (Amabile et al., 1995) and later adapted commonly in the literature (e.g., Yeh & Huan, 2017). In the extant paper, our dependent variable is the *creative outputs* of KWs. To capture the whole picture of creativity, we included the quantity and quality of KWs' creative outputs. The measure of the number of creative outputs consisted of three items (Cronbach's $\alpha = 0.76$). Using a 5-level Likert scale, KWs were asked to evaluate the level of their agreeableness with several statements, such as: "I regularly produce creative outputs". Likewise, the measure of the quality of creative outputs consisted of three items (Cronbach's $\alpha = 0.62$),

in which KWs were asked to evaluate the level of their agreeableness with several statements, such as: "My creative outputs usually receive praise from my supervisor".

3.2.2. Independent Variables

All independent variables were measured using an adapted version of the scale developed by (Amabile et al., 1995). The measure of *social support* consisted of six items (Cronbach's $\alpha = 0.91$), in which respondents were asked to evaluate the level of their agreeableness with statements such as: "My organization rewards creative outputs" and "I receive supervisory support for my creative outputs".

To measure the availability of *sufficient resources*, we provided respondents with six items (Cronbach's $\alpha = 0.94$), where they had to evaluate the level of their agreeableness with statements such as: "My organization possesses the required facilities that support the generation of creative outputs" and "My organization possesses the required budget that supports the generation of creative outputs".

To measure the level of *organizational freedom* that KWs have, we provided respondents with five items (Cronbach's $\alpha = 0.84$) to evaluate the level of their agreeableness with statements such as: "I have control over the schedule of my creative outputs" and "I use my leisure time to think about my creative outputs".

Finally, *organizational regulations* were measured via five items (Cronbach's $\alpha = 0.62$) and included statements such as "My organization requires a set number of creative outputs that I have to produce" and "My organization has specific criteria to evaluate my creative outputs".

3.3. Analysis

To account for potential multicollinearity problems, variance inflation factors (VIFs) were examined for all of

the independent variables appearing in the models and were found to be well below the rule-of-thumb cutoff of ten (Neter et al., 1985). Additionally, we examined the correlation matrix to check if any variables were highly correlated. Except for the correlation between *age* and *experience*, the matrix did not show a significant problem that would affect the results, even when omitting *age*, *experience*, or any other variable from the analysis. We also ran our analysis with one independent variable at a time and the results did not show changes in signs or significance level. These analyses suggest that multicollinearity was not an issue that affected the results of this study. Next, we tested our hypothesis using ordinary least squares (OLS) regression.

4. Results

Table 1 presents the mean, standard deviations, and correlations for the variables included in the models. Table 2 shows the models and the results of the analysis. Model (1) represents the base model, in which only the control variables and the dependent variable are included. Results for hypotheses a1, 2a, 3a, and 4a appear in the model (2). Our results support hypothesis 1a, which suggests a positive relationship between social support and the quantity of KWs' creative outputs ($\beta = 0.56, p < 0.05$). Also, the results show support for hypothesis 2a, which predicts a positive relationship between the availability of sufficient resources

Table 1: Descriptive and Correlations

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
Quant. Creative P	3.42	0.83	1	0.48	0.18	0.22	0.21	0.29	-0.07	0.02	0.19	0.02	0.03	-0.13
Qual. Creative P	3.08	0.86	0.48	1	0.34	0.39	0.29	0.32	-0.02	0.13	0.07	0.02	-0.06	-0.05
Social Support	2.86	0.99	0.18	0.34	1	0.81	0.66	0.67	0.01	0.29	0.02	0.05	-0.09	-0.01
Suff. Resources	2.50	1.04	0.22	0.39	0.81	1	0.70	0.71	-0.05	0.25	0.02	0.05	-0.05	-0.04
Freedom	3.29	0.85	0.21	0.29	0.6	0.70	1	0.55	-0.04	0.25	0.02	0.05	0.01	0.01
Regulations	2.70	0.98	0.28	0.32	0.67	0.70	0.55	1	-0.01	0.29	-0.04	0.06	-0.02	0.01
Age	27.7	0.86	-0.08	-0.02	0.01	-0.05	-0.04	-0.01	1	0.01	0.22	0.24	0.10	0.59
Region	4.25	1.19	0.02	0.13	0.29	0.25	0.25	0.29	0.01	1	-0.11	0.01	-0.20	0.20
Education	1.42	0.61	0.09	0.07	0.02	0.02	0.02	-0.04	0.22	-0.11	1	0.51	0.16	0.07
Education Country	1.56	1.07	0.02	0.02	0.05	0.05	0.05	0.06	0.24	0.01	0.51	1	-0.04	0.02
Industry type	1.55	.50	0.03	-0.06	-0.09	-0.05	0.01	-0.02	0.10	-0.20	0.16	-0.04	1	0.14
Experience	3.31	0.88	-0.13	-0.05	-0.01	-0.04	0.01	0.01	0.60	0.20	0.07	0.02	0.14	1

Table 2: Results of the Multiple Regression

Variables	DV: Quantity of CP		DV: Quality of CP	
	Model 1	Model 2	Model 3	Model 4
Age	0.01 (0.10)	0.01 (0.10)	0.02 (0.10)	0.03 (0.10)
Region	0.05 (0.06)	-0.02 (0.06)	0.11 (0.06)	0.02 (0.06)
Education	0.15 (0.13)	0.14 (0.12)	0.17 (0.13)	0.02 (0.02)
Education Country	-0.02 (0.07)	-0.03 (0.07)	-0.04 (0.07)	-0.05 (0.07)
Industry type	0.08 (0.14)	0.07 (0.13)	-0.07 (0.14)	-0.09 (0.13)
Experience	-0.17 (0.10)	-0.13 (0.10)	-0.10 (0.11)	-0.06 (0.10)
Social Support		0.56* (0.70)		0.28** (0.07)
Suff. Resources		0.17** (0.06)		0.30** (0.06)
Freedom		0.44** (0.07)		0.36** (0.07)
Regulations		0.26** (0.07)		0.28** (0.07)
Adjusted R ²	0.03	0.09	0.03	0.12
F-Value	0.91	3.33	0.96	4.98

N = 167. Estimates are unstandardized. *p < 0.05, **p < 0.01.

and the quantity of KWs' creative outputs ($\beta = 0.17, p < 0.01$). Hypothesis 3a suggests that organizational freedom provided to KWs will positively impact the quantity of their creative outputs, while hypothesis 4a predicts that the quantity of KWs' creative outputs would be positively impacted by the organization's regulations that set specific standards for creative outputs. Hypothesis 3a ($\beta = 0.44, p < 0.01$) and hypothesis 4a ($\beta = 0.26, p < 0.01$) are both supported.

Model (3) shows the results for hypotheses 1b, 2b, 3b, and 4b. Our results support hypothesis 1b, which suggests a positive relationship between social support and the quality of KWs' creative outputs ($\beta = 0.28, p < 0.01$). Likewise, hypothesis 2b, which predicts a positive relationship between the availability of sufficient resources and the quantity of KWs' creative outputs, is supported ($\beta = 0.30, p < 0.01$). Support is also found for hypothesis 3b, which predicts a positive relationship between the freedom provided by the organization to KWs and the quantity of the KWs' creative outputs ($\beta = 0.36, p < 0.01$). Finally, hypothesis 4b suggests the quality of KWs' creative output would increase in the presence of regulations that govern their output. Our results show support for the hypothesis ($\beta = 0.28, p < 0.01$).

5. Discussion and Contributions

KWs are essential in creating knowledge and helping firms to be more innovative (Saulais & Ermaine, 2012). Thus, organizations strive to provide KWs with a positive work environment to increase their creativity (Carleton, 2011; Davenport, 2005; Gilson et al., 2005; Thompson & Heron, 2005). In the extant paper, we examined the impact of the work environment on the creativity of KWs. Specifically, we studied how organizational social support, the availability of sufficient resources, organizational freedom provided for KWs, and the organizational regulations impact the quantity and quality of KWs' creative outputs. Our results indicated that all four variables, indeed, have a significant and positive effect on the quantity and quality of the creative outputs of KWs.

Our findings on the impact of organizational social support on KWs' creativity complement those of previous studies (e.g. Amabile et al., 1996; Yeh & Huan, 2017; Yu & Frenkel, 2013). Building on The Investment Theory of Creativity (Sternberg & Lubart, 1992), which highlights the context-centered creativity that depends on how KWs interact with their environment, we found that the various types of social support KWs receive would directly and positively impact their creative outputs. In other words, KWs thrive in a work environment where their organization, supervisors, and co-workers provide the necessary support that increases the quantity and quality of their creative outputs (Demerouti et al., 2001, Lee & Ashfort, 1996; Schaufeli & Taris, 2014).

Similarly, our findings reveal that when sufficient resources are available, KWs tend to produce more creative outputs, and those outputs are likely to be of higher quality. Those findings support previous findings that highlighted the importance of having physical resources such as facilities and tools (Amabile et al., 1996; Yeh & Huan, 2017), time and financial resources (Blomberg et al., 2017), as well as required knowledge and skills (Amabile et al., 1996; Grant, 1996). While previous research has found a positive relationship between the availability of sufficient resources and the quantity of creative outputs only (Yeh & Huan, 2017), our results indicate that sufficient resources are actually essential for the quality of creative outputs as well as their quantity.

Additionally, supporting the arguments of the Self-Determination Theory (Ryan & Deci, 2000), we found evidence that organizational freedom is vital for KWs to produce more creative outputs of high quality. Those findings support those of previous research that highlighted how creativity requires having ownership and control over one's work (e.g., Amabile & Gitomer, 1984; Bailyn, 1985; King & West, 1987) and some autonomy on how one goes about their work (Paolillo & Brown, 1978; Spelthann & Haunschild, 2011).

Finally, while some argue that having regulations might restrict the creativity of KWs (e.g. Cardinal, 2001; Rousseau, 1978; Zhou & George, 2003), our findings illustrate that some sort of regulations on the criteria and standards of creative outputs is actually beneficial. To explain, research asserts that there are two different types of regulations in the workplace-- coercive regulations and enabling regulations (Adler & Borys, 1996). Thus, our results contend that the right type of regulations (i.e. enabling regulations) positively impact the quantity and quality of KWs' creative outputs, a conclusion that confirms that of other studies (e.g. Adler & Chen, 2011; Jelinek & Schoonhoven, 1990; Yeh & Huan, 2017).

5.1. Theoretical Contributions

Our study provides some theoretical contributions to the literature on creativity, knowledge management, and human resource management. First, we contribute to the creativity literature by examining elements of the work environment that affects the creativity of KWs, providing evidence consistent with earlier studies (Amabile et al., 1996). Importantly, we capture the whole picture of creativity achievement (Eysenck, 1994) by breaking down creativity outputs into quantity and quality, since each type is usually motivated by different factors (Saad et al., 2015; Yeh & Huan, 2017). Additionally, by conducting our study in the context of Saudi Arabia, a developing country where creativity is at the forefront of the government's

agenda (Fallatah, 2021), we explore the phenomenon in a country with different characteristics and a different work environment. When it comes to creativity, research asserts that novel ideas usually come from KWs in developed countries (Pralhad, 2005).

While our study provides key theoretical contributions, some limitations are worth mentioning. First, as typical with cross-sectional studies, our study could suffer from common method variance (CMV). Future studies should conduct similar studies using panel data. Second, as explained earlier, our sample consisted of male KWs only due to the infancy of engineering schools for females in Saudi Arabia. Thus, due to differences in personality and the way each gender responds to external factors (Eysenck & Eysenck, 1978), future studies should aim to have a sample that includes male and female KWs. Lastly, despite efforts on our part, our sample was relatively small, which limits the power of our tests. That being said, we are confident that our data is of high quality since we only used responses by KWs who passed the attention check we implemented in our survey (Perez-Norvedt & Fallatah, 2022). Survey data collection approaches in similar studies should use attention-check questions to improve data quality and confidence in results in creativity research. Additionally, we found support for our hypotheses, although the odds of having significant relationships with such a small sample were not in our favor (Tversky & Kahneman, 1971). Future research with a larger sample and greater power could find a greater effect size than ours.

5.2. Managerial Implications

Our findings are also meaningful for managers. First, confirming previous studies (Amabile et al., 1996), our study suggests that KWs should work in an environment where co-workers, supervisors, and the whole organization are supportive. KWs produce more creative outputs of high quality in such contexts. Also, managers should insist on having sufficient resources, whether they are financial or physical, to help KWs be creatively productive. Our study also emphasizes the importance of giving KWs some freedom and control over their tasks, which has been proven to increase KWs' creativity (Amabile et al., 1996; Ryan & Deci, 2000). While ample research highlights the negative side of regulating the work of KWs (Cardinal, 2001; Zhou & George, 2003), our study encourages organizations to have some regulating criteria to better motivate and standardize the creative outputs of their KWs.

6. Conclusion

As holders and creators of knowledge, KWs are a huge asset for organizations. Thus, it is paramount for organizations to offer them a motivating work environment that fosters

their creativity. The importance of having a creativity-supporting work environment is even more necessary for KWs in developing countries where knowledge creation is substantially lower than that in developed countries. Our extant study on the work environment provided to KWs in Saudi Arabia provides evidence that social support, sufficient resources, organizational freedom, and regulations are key factors that increase the quantity and quality of KWs' creative outputs. More studies are needed to better understand the contextual antecedent of creativity in developing countries.

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