

# Empowered or engaged employees? A fuzzy set analysis on knowledge transfer professionals

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## Abstract

**Purpose** – This paper combines the literature on knowledge transfer and that on organizational behavior to analyze how perceived empowerment and perceived engagement affect knowledge transfer offices' (KTOs') performance, measured in terms of the number of license agreements.

**Design/methodology/approach** – The authors measured the cognitions which constitute perceived empowerment and perceived engagement through a survey sent to Italian KTOs' professionals. The authors performed "fuzzy set qualitative analysis" to investigate if this cognition, together or in isolation, may influence KTOs' management performance, measured by the number of license agreements.

**Findings** – The results highlight the role of individual cognitions in influencing KTOs' performance. Furthermore, an important finding from the analysis of the main configurations is that the co-presence of perceived engagement and perceived empowerment leads to more license agreements only in the presence of specific individual cognitions. More precisely, the level of organizational citizenship behavior, the degree to which an individual influences results at work (degree of impact) and the value of a work goal (degree of meaning) are the cognitions which lead to a higher number of license agreements.

**Originality/value** – Despite the growing interest in the investigation of the determinants of KTOs' performance, a relevant research gap still concerns the explanation of KTOs' performance considering individual cognitions such as attitudes, norms, perceived behavioral control and intentions. This study looks at the combined effect of the individual cognition of perceived engagement and perceived empowerment on KTOs' performances.

**Keywords** fsQCA, Knowledge transfer offices, Knowledge transfer professionals, Perceived empowerment, Perceived engagement

**Paper type** Research paper

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## 1. Introduction

The relevance of knowledge transfer from university to industry is widely recognized as an important area of knowledge management (Bekkers and Freitas, 2008; Goh, 2002; Grimpe and Hussinger, 2013; Kumar and Ganesh, 2009; Santoro and Bierly, 2006). Knowledge transfer offices (KTOs) are organizational units that support the activities of a university or a public research center (Romano *et al.*, 2014) and are involved not only in consolidated tasks such as invention disclosure, patenting, licensing, support to entrepreneurship, etc. (Carlsson and Fridh, 2002; Wolson, 2007) but also in the so called "third mission" activities, aiming to generate positive socio-economic impact on society (Cesaroni and Piccaluga, 2016). These offices have been named in many different ways in the literature – technology transfer offices (TTOs), industrial liaison offices, offices of technology licensing and university TTOs (Brescia *et al.*, 2016; Campbell *et al.*, 2020) – but in this paper we will only use the term KTOs, as their activities do not differ significantly in relation to the definition used.

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An abundant literature states that KTOs perform a prominent role in the knowledge transfer process (Bigliardi *et al.*, 2015; Romano *et al.*, 2014; Sellenthin, 2009; Fai *et al.*, 2018), as they encourage and support relations between industry and university (Algieri *et al.*, 2013; Baines and Lawton Smith, 2020; Fernández-López *et al.*, 2018; Grimpe and Hussinger, 2013). For this reason, many scholars have investigated the main drivers influencing KTOs' performance, which seems to depend on the organizational elements, among which the quantity and quality of the personnel employed (Phan and Siegel, 2006; Shane and Stuart, 2002). Within this vein, several authors have focused on organizational issues, exploring KTOs' organizational structures and linking them to performance (Bercovitz *et al.*, 2001; Siegel *et al.*, 2003; Lafuente and Berbegal-Mirabent, 2019). Siegel *et al.* (2003) showed that the main organizational elements which influence KTO productivity are departments' incentive systems, the presence of employees with a management background and the absence of cultural walls around research organizations. Chapple *et al.* (2005) also observed that KTOs' effectiveness is connected to the quality of the department, the specialization on specific subjects and the existence of a school of medicine or an academic hospital. Bercovitz and Feldman (2008) highlighted the consequences of the various KTO organizational systems regarding the ability to coordinate incentives. However, despite the growing interest in the investigation of the determinants of KTOs' performance (Chapple *et al.*, 2005; Lafuente and Berbegal-Mirabent, 2019; Siegel *et al.*, 2007), a relevant research gap still concerns the explanation of KTOs' performance considering individual cognitions such as attitudes, norms, perceived behavioral control and intentions.

Individual cognitions translate into behaviors which play a significant role in organizations, particularly when decisions have to be taken (Gioia and Manz, 1985; Gregory *et al.*, 2010). Such individual cognitions have been recognized as crucial for the performance of employees within organizations (Soane *et al.*, 2012; Spreitzer, 1995; Hao *et al.*, 2018), but previous scholars have neglected to investigate them as a driver for KTOs' performance. To fill this gap, we explore the following research question: "Is there a relationship between the interaction of individual cognitions of perceived empowerment and perceived engagement and KTOs' performance?"

For our research objective, we draw from the microfoundation literature (Felin and Hesterly, 2007; Felin and Foss, 2005; Abell *et al.*, 2008) and analyze the individual level of knowledge transfer, given its importance to understand how and why knowledge emerges from employees and circulates within organizations and how individuals' characteristics, skills, proclivities, movements, expectations and behaviours (Felin and Foss, 2005) have an impact on organizations' performances (Inés Macho-Stadler *et al.*, 2007; Owen-Smith, 2011). Furthermore, we draw from the literature about perceived organizational support, from which we identified two individual cognitions influencing organizations performance: perceived empowerment (Spreitzer, 1995) and perceived engagement (Soane *et al.*, 2012). In particular, we measured the cognitions which constitute perceived empowerment and perceived engagement through a survey sent to all Italian KTOs' professionals knowledge transfer professionals (KTPs). KTPs are the intermediaries between technology providers and external organizations that refer to KTOs (Colcelli, 2019), and their role is certainly important within KTOs (Volberda *et al.*, 2012; DeVol *et al.*, 2006). We used "fuzzy-set qualitative comparative analysis" (fsQCA) (Ragin and Beck, 1987), together or in isolation, with KTOs' performance, measured by the number of license agreements. Our analysis focuses on Italian KTOs, as they represent a relevant context for analyzing organizational behaviors, where perceived empowerment and perceived engagement are very indicative. Indeed, KTOs are part of the organization of universities and are not independent profit centers (Romano *et al.*, 2014), for this reason, KTOs and KTPs depend on the universities that delegate roles and responsibilities. The use of fsQCA is suited for this study, as it allows us to investigate the combinations of conditions and their relations with an outcome of interest (Cabrilo and Dahms, 2018; Del Sarto *et al.*, 2020; Lowik *et al.*, 2016).

The study demonstrates the role of individual cognitions in influencing KTOs' performance and contributes to the literature about KTOs' performance in three different ways. First, it points out that none of the individual cognitions of perceived empowerment and perceived engagement influences KTOs performance in isolation. Second, it identifies which combinations of individual cognitions are related to a KTO's performance. Third, it highlights that the lack of willingness of knowledge transfer professionals to change their jobs increases the performance of KTOs.

The paper is organized as follows. Section 2 explains the role of KTPs in KTOs, the importance of perceived organizational support in influencing organizations' performance and the definition of perceived empowerment and perceived engagement. Section 3 reports the method and the fsQCA. Section 4 describes our findings. Section 5 includes the conclusion, including limits and future research.

## 2. Theoretical background

### *2.1 Importance of perceived organizational support in influencing organizations' performance*

The individual abilities of KTPs are fundamental for knowledge transfer activities (Markman *et al.*, 2005; Harman and Stone, 2006; Volberda *et al.*, 2012; Cunningham *et al.*, 2020). First, knowledge transfer professionals participate in the construction of innovation, as they contribute to "imagine" the final product in its "usage context" (Miller *et al.*, 2009). Second, they contribute to a dynamic relationship with industry, and they evaluate inventions together with the inventors to manage disclosure and patenting processes (Sandelin, 2003; Cunningham *et al.*, 2020). Third, their role is indispensable to establish a relation of mutual confidence with the licensee (Amidon, 1996; DeGeeter, 2004). As a matter of fact, several authors have studied the role of KTPs in KTOs. Markman *et al.* (2005) and Mom *et al.* (2012) focused on competencies and skills, Lockett and Wright (2005) focused on capabilities, and Hülbeck *et al.* (2013) focused on the division of labor. Alessandrini *et al.* (2013) also emphasized the importance of KTPs in KTOs. Ghoshal and Bartlett (1994) argued that the creation of a positive organizational context plays a role in determining KTOs' performance. Although several authors have also investigated organizational issues (Bercovitz *et al.*, 2001), there is still a need for research in this field and relevant gaps exist. For example, no authors have investigated the motivations or the cognitions of individuals to explain KTOs' productivity.

The literature about perceived organizational support may help explain employees' commitment to their organization (Rhoades *et al.*, 2001; Zhong *et al.*, 2016; Byrne and Hochwarter, 2008; Shanock and Eisenberger, 2006). Indeed, such literature assumes that there is a potential relationship between individual cognition of employees and organizational performance (Jenkins and Johnson, 1997; Wang, 2011). Perceived organizational support may be influenced by various aspects of an employee's management by the organization and would, in turn, influence the employee's interpretation and organizational behavior (Eisenberger *et al.*, 1986; Eisenberger *et al.*, 2002; Shanock and Eisenberger, 2006; Byrne and Hochwarter, 2008).

Furthermore, the perceived organizational support emphasizes that different individual cognitions produce different attitudes and behaviors that affect organizational performance (Rhoades *et al.*, 2001; Luthans *et al.*, 2008, 2007). In particular, trust (Whitener, 2001), organizational commitment (Allen *et al.*, 2003) and organizational citizenship behaviors (Organ and Ryan, 1995; Singh and Singh, 2019) positively influence the employees' behavior toward the organization. Also, self-efficacy and equity have been the objects of a great amount of behavioral research (Luthans *et al.*, 2007). In particular, self-efficacy has been studied by several authors, especially with regard to individual cognition that influences the ability to achieve the desired goals (Bandura, 1986; Luthans *et al.*, 2008;

Bandura, 2007); equity has been studied by scholars that have examined relationships between perceptions of equity and job satisfaction, turnover (Dittrich and Carrell, 1979; Saks *et al.*, 1995) and organizational attractiveness (Walker *et al.*, 2007). Furthermore, several individual cognitions such as optimism (Luthans *et al.*, 2008), humility (Owens *et al.*, 2013) and empathy (Clark *et al.*, 2019; Chong *et al.*, 2020) have garnered significant attention because of the development in the field of positive psychology and perceived organizational support (Cameron and Caza, 2002; Luthans, 2002; Von Krogh, 1998; Von Krogh *et al.*, 2000; Morris *et al.*, 2005).

Among several studies about perceived organizational support, two cognitions have received particular attention with regard to the links between employees' motivations and performance: perceived empowerment (Fernandez and Moldogaziev, 2013; Spreitzer *et al.*, 1999; Conger and Kanungo, 1988; Cole, 1995; Seibert *et al.*, 2004) and perceived engagement (Macey and Schneider, 2008; Truss *et al.*, 2013; Markos and Sridevi, 2010; Gruman and Saks, 2011). In this study, we focus on perceived empowerment and engagement because unlike other individual cognitions they are broader and include different aspects. In fact, perceived empowerment (Spreitzer, 1995; Spreitzer *et al.*, 1999) is made up of four individual cognitions (*meaning, competence, self-determination and impact*) while perceived engagement (Soane *et al.*, 2012) is composed of three individual cognitions (*task performance, organizational citizenship behavior and quit*).

In particular, several authors argue that high employee performance is positively related to perceived empowerment (Fernandez and Moldogaziev, 2011; Kirkman and Benson, 1999; Spreitzer, 1995; Fong and Snape, 2015) and more generally to the intrinsic motivation to the task (Robbins *et al.*, 2002; Conger and Kanungo, 1988; Thomas and Velthouse, 1990). Moreover, empowerment has been defined as a transfer of power or authority (Burke and Day, 1986; Kanter, 1983; Bachouche and Sabri, 2019).

Employee engagement is a desirable condition and connotes involvement, commitment, passion, enthusiasm, concentrated effort and energy (Macey and Schneider, 2008; González-Romá *et al.*, 2006; Lofquist *et al.*, 2017). In particular, when people "can use their favorite self in their work that they experience being involved in that job (state commitment) and also performing to their fullest potential (behavioral commitment)" (Kahn, 1990). Engagement emerges as a function of the interaction between the attributes of the person and the work he/she does (Khan, 1992) and for this reason it is one of the cognitions that most influences performance.

Both empowerment and engagement are related to task motivation and commitment in the workplace and both affect performance; for this reason, these two variables lend themselves to be the most pertinent for our study. Therefore, in this study, we focus on the role of perceived empowerment and perceived engagement in Italian KTOs.

## ***2.2 Importance of perceived empowerment and engagement in knowledge transfer offices***

Among other factors, KTOs' performance depends on behavioral organizational variables, and we argue that such variables are influenced by the individual cognitions of KTOs such as perceived empowerment (Spreitzer, 1995; Spreitzer *et al.*, 1999) and perceived engagement (Soane *et al.*, 2012). On this basis, we explore how the cognitions of perceived empowerment and perceived engagement affect knowledge transfer performance.

With regard to the combination of perceived empowerment and perceived engagement, a previous study of 607 executives in India shows how the perception of greater empowerment is linked to active engagement (Bhatnagar, 2005). However, only a few other studies investigate the co-presence of the two elements (Saks, 2006; Vigoda-Gadot *et al.*, 2013). Building on this literature, we decided to combine the two concepts with regard to knowledge transfer professionals, and we explored the main configurations of perceived engagement and perceived empowerment on license agreements.

2.2.1 *Perceived empowerment*. Several authors argue that high perceived empowerment is positively correlated with employees' performance (Bowen and Lawler, 1992; Chamberlin *et al.*, 2018; Conger and Kanungo, 1988; Fernandez and Moldogaziev, 2011; Kirkman and Benson, 1999). In particular, some studies highlight a favorable link between employee empowerment and company effort (Patterson *et al.*, 2004), organizational commitment (Guthrie, 1998; Kirkman and Benson, 1999; Spreitzer, 2007), employee attitudes (Fernandez and Moldogaziev, 2013), involvement at work (Cotton *et al.*, 1988), leadership (Dust *et al.*, 2014), job satisfaction (Ugboro and Obeng, 2000) and knowledge management (Akbari and Ghaffari, 2017; Yahya and Goh, 2002). Furthermore, some authors argue that perceived empowerment is the mechanism by which employees perceive the organizational support linked to positive behavior in the workplace (Lamm *et al.*, 2015). Other studies highlight the importance of perceived empowerment on organizational commitment, quality of service, job satisfaction and innovative effectiveness and behavior (Bhatnagar, 2005; Joo and Shim, 2010; Seibert *et al.*, 2004).

Perceived empowerment also causes indirect effects. Fernandez and Moldogaziev (2013) highlight how employee empowerment has a direct consequence on performance and an indirect consequence on job satisfaction and innovation. Conger and Kanungo (1988) link perceived empowerment to a motivational construct connected to self-evaluation. However, empowerment is a multi-faceted concept that includes several elements. Spreitzer (1995) and Thomas and Velthouse (1990) have outlined empowerment as "the manifestation of an increased intrinsic motivation within four constructs" that show the attitude of an individual to his/her working role. Following Spreitzer (1995), we define perceived empowerment as a higher motivation of the knowledge transfer professionals to carry out their work (Perceived Empowerment Scale). Mainly, we define perceived empowerment as "a motivational construct expressed in four cognitions: meaning, competence, self-determination and impact" (Spreitzer, 1995). This scale will be used in this study to evaluate employee empowerment (Spreitzer, 1995).

Perceived empowerment scale (Spreitzer, 1995):

1. MEANING:

- The work I do is very important to me (Meaning 1).
- My job activities are personally meaningful to me (Meaning 2).
- The work I do is meaningful to me (Meaning 3).

2. COMPETENCE:

- I am confident about my ability to do my job (Competence 1).
- I am self-assured about my capabilities to perform my work activities (Competence 2).
- I have mastered the skills necessary for my job (Competence 3).

3. SELF-DETERMINATION:

- I have significant autonomy in determining how I do my job (Self-determination 1).
- I can decide on my own how to go about doing my work (Self-determination 2).
- I have considerable opportunities for independence and freedom in how I do my job (Self-determination 3).

4. IMPACT:

- The impact of my work on what happens in my department is significant (Impact 1).
- I have a great deal of control over what happens in my department (Impact 2).
- I have significant influence over what happens in my department (Impact 3).

The knowledge transfer literature analyses the empowerment phenomenon mainly from the academics' point of view, as in the case of [Perkmann et al. \(2013\)](#), who discuss "academic engagement" in knowledge transfer activities. Instead, in this study, we focus on KTPs. In particular, following [Spreitzer \(1995\)](#), we focus on KTPs' perceptions, and we hypothesize that perceived empowerment is related to license agreements. We hypothesize that every cognition which constitutes the perceived empowerment construct is related to license agreements. In particular, *meaning* is the significance (in terms of symbolic value) of achieving a job task in relation to the beliefs of the individual ([Thomas and Velthouse, 1990](#)) and it is an expression of the relationship between job role and sentiments, values and behaviors ([Brief et al., 1995](#)). The result of *meaning* cognitions is a considerable concentration of energy and a high commitment on the job ([Kanter, 1983](#)). As a consequence, the value of the work goal and more generally the knowledge of the value of the work goal influences individual performance in workplace. This leads the way to the first proposition regarding knowledge transfer professionals:

*P1.* The value of a job task or purpose is related to license agreements.

*Competence* or self-efficacy is an individual's mental belief about being able to perform specific activities with his/her abilities ([Gist, 1987](#)). Competence is an expression of personal mastery ([Bandura, 1986](#)), understood as the perceived ability to accomplish work-related tasks, and it influences individual performance in a managerial context ([Morse, 1976](#)). Indeed, there are ample longitudinal and experimental studies supporting the causal influence of self-efficacy (captured by the competence dimension of empowerment) on individual performance in the workplace ([Bandura and Locke, 2003](#); [Chen et al., 2007](#)). This leads the way to the second proposition:

*P2.* The capability to perform activities with abilities is related to license agreements.

*Self-determination* reflects and how circumstances such as management style and work context support or thwart the individual's motivation and well-being in the workplace ([Rigby and Ryan, 2018](#)). Self-determination reflects autonomy in launching and continuing job tasks, such as decisions on approaches, timeline and effort ([Spector and Jex, 1998](#)). Self-determination supports "work motivation and shows its relevance to organizational behavior" ([Gagné and Deci, 2005](#)). In this regard, self-determination influencing motivation, personal goals, wellness in the workplace ([Rigby and Ryan, 2018](#)) and, in particular, individual performance in the workplace ([Gagné and Deci, 2005](#); [Deci et al., 2017](#); [Ryan and Deci, 2017](#)). This leads the way to the third proposition:

*P3.* The autonomy launching and continuing of job activities process is related to license agreements.

The fourth dimension of perceived empowerment is *impact* ([Spreitzer, 1995](#)). We define impact as the degree to which a person manages to influence job performance, both operationally and strategically ([Ashforth, 1989](#)), and is affected by the working environment ([Spreitzer, 1995](#)). Individuals have an influence strategic when the probability of success of their actions is positive ([Mowday, 1978](#)) and when the work environment is reactive to their influence attempts. In this way, *impact* influences individual performance in workplace ([Degago, 2014](#)). This leads the way to the fourth proposition:

*P4.* The degree to which a person manages strategic results at work is related to license agreements.

*2.2.2 Perceived engagement.* [Kahn \(1990\)](#) identified employees' perceived engagement as "harnessing the self of the members of the organization with respect to their working roles through which they employ and express physically, cognitively and emotionally during the performance of the roles." This description considers perceived engagement as the union between emotional, physical and cognitive energy and work factors. Consequently, according to this definition, the perceived engagement allows employees to direct their

energies (physical, cognitive and emotional) simultaneously (Kahn, 1990) toward a goal. Perceived engagement has also been defined as “a cognitive, emotional and behavioral state directed towards the desired organizational results” (Shuck and Wollard, 2010).

Engagement literature suggests that employees who perceive more engagement perform better at work (Salanova *et al.*, 2005). Several authors show that perceived engagement is positively linked to the provision of high-quality services (Salanova *et al.*, 2005). Furthermore, better-perceived employee engagement creates a healthy working atmosphere (Anitha, 2014). Halbesleben and Wheeler (2008) showed that engagement generates feelings that improve work performance. Following Kahn (1990) and Soane *et al.* (2012), we define perceived engagement as a higher involvement of the knowledge transfer professionals in carrying out their work.

Soane *et al.* (2012) built and implemented a new way to evaluate perceived engagement: the intellectual, social and affective-scale involvement. This scale has been used in this study to evaluate employee engagement. As stated by this scale, perceived engagement is an element made up of three factors (Perceived engagement scale 2): performance of activities (task performance), organizational citizenship behavior (OCB) and intention to quit (quit) (Soane *et al.*, 2012). Building on this literature and following Soane *et al.* (2012), we focus on the perceptions of knowledge transfer professionals and we hypothesize that the three constructs of perceived engagement are related to licensing agreements.

Perceived engagement scale (Soane *et al.*, 2012):

1. TASK PERFORMANCE:

- I always complete the duties specified in my job description.
- I meet all the formal performance requirements of the job.
- I fulfil all responsibilities required in my job.
- I never neglect aspects of the job that I am obligated to perform.
- I often fail to perform essential duties.

2. ORGANIZATIONAL CITIZENSHIP BEHAVIOR:

- Attend functions that are not required but that help the organizational image.
- Offer ideas to improve the functioning of the organization.
- Take action to protect the organization from potential problems.
- Defend the organization when other employees criticize it.

3. INTENTION TO QUIT:

- During the next year, I will probably look for a new job outside my current employer.
- I am seriously considering quitting my current employer for an alternative employer.

In particular, *task performance* is a self-assessment of the performances (Kahn, 1990). *Task performance* refers to performance on the job that “you were hired to do.” This cognition is more likely to benefit the self in terms of career opportunities or bonuses rather than benefit the collective (Van Knippenberg, 2000). Several authors argue that task performance contributed uniquely to overall performance in managerial jobs (Conway, 1999; Sonnentag and Frese, 2002). Indeed, *task performance* is part of the job requirements, and it affects individual performance in the workplace (Alfes *et al.*, 2013). This leads the way to the fifth proposition:

P5. The self-assessment of the performances is related to license agreements.

OCB also influences individual (Ehrhart and Naumann, 2004) and organizational performance (Dunlop and Lee, 2004). OCB, the discretionary behavior of employees, going beyond the formal descriptions of the work (Organ, 1988), contributes to positive organizational functioning (Klotz *et al.*, 2018). Indeed, two of the most commonly-cited dimensions of OCB are compliance and altruism (Organ *et al.*, 2006). Moreover, OCB is positively related to both the quality organization's service (Morrison, 1996) and team performance (Lai *et al.*, 2013). Moreover, OCB reflects the strength of the employee's perceived social exchange relationship with the organization (Snape and Redman, 2010). Thus, OCB clearly is relevant for individual performance in the workplace (Snape and Redman, 2010; Zayas-Ortiz *et al.*, 2015). This leads the way to the sixth proposition:

*P6.* Organizational citizenship behavior is related to license agreements.

Quit is an intention to turnover (Shuck *et al.*, 2014). Dynamic work environments tend to be associated with high levels of emotion and stress (Dane and Brummel, 2014; Klein, 1998). These pressures may become difficult to bear, leading people to consider giving up their employment. According to Hom and Griffeth (1995) and Coyne and Ong (2007), turnover intention is the individual cognition that has been found to have a direct effect on actual turnover. The intention of turnover is subject to a series of influences linked to the characteristics of the work context and to factors at the individual level (Cardador *et al.*, 2011; Meyer *et al.*, 2002). Therefore, even within the same work environment, people's intentions may differ (Dane and Brummel, 2014). A strong organizational identity and a positive organizational climate influence the intention to change jobs and consequently the organizational performance (Cole and Bruch, 2006). As a consequence, the intention to turnover is related to individual performance and OCB (Shore *et al.*, 1990). Indeed, this leads the way to the seventh proposition:

*P7.* Quit is related to license agreements.

### 3. Methodology

#### 3.1 Data sources

We used data from two different sources: the Netval [1] database and a specific survey aimed at Italian university KTPs. The first source provided information on the knowledge transfer activities of Italian universities and research hospitals. Netval annually performs a survey of Italian research organizations to collect data about their knowledge transfer activities. Concerning the second source, a questionnaire [2] was prepared following the work of Spreitzer (1995) and Soane *et al.* (2012), to measure the perceived empowerment and perceived engagement of Italian KTPs. The questionnaire was first translated in Italian and tested on 10 KTPs. The survey was then conducted between December 2017 and March 2018, addressing all the population of Italian KTPs which, according to Netval (2019), was of 220. After having sent the questionnaire to the whole population, we obtained 187 full questionnaires, with an 85% response rate considered a good response rate for surveys addressing practitioners (Dillman, 2000). The final sample consists of 77 men and 96 women (14 people have not declared their gender). The average age is 41; 51 people are head of their KTO, and 136 people do not hold full-time positions.

Table 1 shows the descriptive statistics of our sample, which consisted of 63 different research organizations (corresponding to 61% of Italian KTOs). The average number of KTPs was four. Each KTO spent, on average about € 77,000 in legal fees for external consulting. In 2018, the average number of average licensing agreements was nine.

#### 3.2 Measurement of variables

The survey we used for our study was composed of two main sections. The first regards respondents' characteristics, such as age, years of experience in the job and gender. The second section was used to build the constructs of interest on the basis of seven-point



**Table 1** Descriptive statistics

Variable name	Mean (* Proportion)	SD	Min	Max
<i>Individual cognitions</i>				
MEANING	0.60	0.20	0	1
COMPETENCE	0.57	0.18	0	1
DETERMINATION	0.54	0.18	0	1
IMPACT	0.49	0.21	0	1
TASK	0.48	0.23	0	1
ORG_CITIZ	0.54	0.17	0	1
QUIT	0.43	0.21	0	1
ENGAGEMENT	0.57	0.18	0	1
EMPOWERMENT	0.43	0.17	0	1
<i>Information about KTO</i>				
DIMENSION	2,555	1,803	99	7,656
LICENSE	8.8	18.8	0	77
AGE_KTO	11	4.81	1	19
STAFF_KTO	4.2	3.30	0.3	15.2
LEGAL	77,639	99,786	0	436,295
D_PRIVATE*	0.06	0.23	0	1
AGE	41	8.54	24	61
GEN*	0.54	0.50	0	1
HEAD_KTO*	0.28	0.45	0	1
FULL_IND*	0.55	0.49	0	1

Likert scale items devised to tap meaning, competence, self-determination, impact, task performance, organizational, citizenship behavior, intention to quit. More specifically, we used the multidimensional measure of perceived empowerment at the workplace proposed by Spreitzer (1995) and the one for perceived engagement proposed by Soane *et al.* (2012), which have been built using the items presented in perceived empowerment scale and perceived engagement scale.

To evaluate and explain performances in KT activities, it is necessary to identify their outcome, in our case represented by the number of license agreements (LICENSE), consistently with authors who have investigated knowledge transfer processes (Anderson *et al.*, 2007; Belenzon and Schankerman, 2007; Chapple *et al.*, 2005; Goh, 2002; Narteh, 2008; Siegel *et al.*, 2003; Siegel *et al.*, 2008; Campbell *et al.*, 2020) who have used the same outcome variable (Chapple *et al.*, 2005; Bican *et al.*, 2017; Siegel *et al.*, 2008; Thursby and Kemp, 2002).

Bercovitz and Feldman (2006) define KTOs' licenses as "the legal rights to use a specific part of university intellectual property." Several other studies on KTOs' performance use the number of license agreements or license income as an outcome variable (Macho-Stadler *et al.*, 2007; Siegel *et al.*, 2003; Ustundag *et al.*, 2011). We followed Siegel *et al.* (2003), who used the annual number of licensing agreements and annual licensing income generated by universities and research organizations, as well as several other studies, which discussed the role of licensing as a tool for knowledge transfer (Lach and Schankerman, 2004; Thursby *et al.*, 2001). Furthermore, a license agreement is a process that certainly involves a considerable commitment by knowledge transfer professionals (Inés Macho-Stadler *et al.*, 2007; Lach and Schankerman, 2004; Owen-Smith, 2011; Thursby *et al.*, 2001) and is therefore appropriate for our study. In fact, the relevance of this indicator is also linked to the fact that it involves a considerable commitment by KTPs, whose skills are particularly valuable in the various phases of the licensing process (from the first contacts with the licensee to the final agreement) (Inés Macho-Stadler *et al.*, 2007; Lach and Schankerman, 2004; Owen-Smith, 2011; Thursby *et al.*, 2001).

Following Ageeva *et al.* (2018), we run a “confirmatory factor analysis” to assure the validity and reliability of the scale. For all our scales, we obtained satisfactory reliability represented by an  $\alpha$  value ranging from 0.70 to 0.85. Namely, our results support the construct homogeneity.

### 3.3 Fuzzy-set qualitative comparative analysis

By integrating qualitative and quantitative approaches, configurational comparative methods are helpful to complete prior studies (Fiss, 2007). Recently, such approach has been used in knowledge management (Cabrilo and Dahms, 2018; Del Sarto *et al.*, 2019; Douglas *et al.*, 2020; Lowik *et al.*, 2016), organizational behavior (Frazier *et al.*, 2016) and social science (Schneider and Wagemann, 2012) literature. These methods are appropriate to analyze systems that, starting from an initial status, may reach final states following different paths (Schneider and Wagemann, 2012; Cabrilo and Dahms, 2018). Accordingly, the aim of qualitative comparative analysis is to highlight patterns which supports the presence of casual relation (Schneider and Wagemann, 2012). Moreover, according to Ragin (2008), fsQCA is a valuable method also for the analysis of small samples.

In this study, a particular QCA technique has been used: fsQCA. fsQCA aims at establishing connections between combinations of causal conditions (i.e. meaning, competence, self-determination, impact, task, OCB, quit) and an outcome (i.e. license). The result of the analysis are recipes which summarize which combination of conditions are related to an outcome of interest (Mendel and Korjani, 2013). fsQCA works through several phases (Ragin, 2006); the first phase is generating a “truth table” reported in Table 2. The truth-table is a logically based mathematical table and reports all the possible combinations of casual conditions associated with an outcome (Ragin, 2006).

Phase two reduces the number of rows in the truth-table considering “frequency and consistency threshold.” For this study, owing to the high number of cases in the sample, we used a “frequency threshold” of 3 and a “consistency threshold” of 0.80 (Russo *et al.*, 2016). The third phase uses an algorithm to simplify the truth-table, and the solution is minimized and analyzed. In this phase, the authors must define how to logically handle the reminders by using one of three different techniques: “parsimonious solution, intermediate solution and complex solution” Del Sarto *et al.* (2019). The “parsimonious solution” includes all simplifying assumptions, without considering if they include easy or difficult counterfactuals, the “intermediate solution” includes simplifying assumptions by including easy counterfactuals, and the “complex solution” does not includes easy and difficult counterfactuals (Ragin, 2006).

**Table 2** Truth table derived from fuzzy-set data

Rows	Conditions							No. of cases	Raw Consist	PRI Consist
	Meaning	Competence	Determination	Impact	Task	OCB	Quit			
1	1	0	0	1	0	1	0	8	0.98	0.98
2	1	1	1	1	1	1	0	4	0.95	0.93
3	0	1	0	0	0	0	0	2	0.58	0.2
4	1	1	1	0	1	0	0	2	0.58	0.19
5	1	0	0	1	1	1	0	2	0.98	0.97
6	0	0	0	0	0	0	0	1	0.45	0.07
7	1	1	0	0	0	0	0	1	0.66	0.28
8	0	1	1	1	1	0	0	1	0.64	0.28
9	1	1	0	0	1	1	0	1	0.84	0.56
10	1	0	1	0	1	1	0	1	0.86	0.72
11	0	1	1	0	1	1	0	1	0.76	0.44
12	1	0	1	1	1	1	0	1	0.98	0.98

**Notes:** Rows are labeled as follows: 1, membership in the set; 0 non-membership in the set. 2<sup>7</sup>. Further, we only present configurations that were exhibited by at least one case in our data

### 3.4 Calibration

To run fsQCA, calibration of variables is required. The calibration process is the process through which variables are operationalized as membership scores within predefined sets. The “direct method” is used to transform measurements into sets (Ragin, 2008).

Owing to the fact that the variables used in our study are not dichotomous, the variables have been transformed into fuzzy-set membership scores by using three qualitative anchors: threshold for “full membership in a set” (i.e. value 1); threshold for “full non-membership in a set” (i.e. value 0); the “crossover point” (i.e. value 0.5) (Ragin, 2008). To manage multiple-item measures, items were combined into an average score (Leischnig and Kasper-Brauer, 2015; Russo *et al.*, 2016). The three qualitative anchors used for the calibration, “full membership” (value 7), “full non-membership” (value 1) and the “crossover point” (value 4), were represented by the endpoints and the midpoints of the seven-point Likert scales (Gligor *et al.*, 2019).

## 4. Results

### 4.1 Analysis of necessary conditions

Through the analysis of necessary conditions, the fsQCA determines if a causal condition is a “necessary condition” for the outcome to occur. It means that this analysis tests if a condition is necessary for the outcome, represented by licensing agreements. Following Schneider and Wagemann (2012), for a condition to be necessary its consistency must be greater than 0.9. As reported in Table 3, only the consistency of the condition  $\sim$ Quit is higher than 0.9. For this reason, we can conclude that Quit is sufficient for the outcome to occur. As the consistency of other conditions is below the threshold of 0.9, we conclude that none of the other conditions (e.g. meaning, competence, determination, impact, task, OCB, quit) are necessary for the outcome “License”. As a consequence, only the absence of the condition Quit is sufficient for the output.

### 4.2 Analysis of sufficient conditions

The analysis of sufficient conditions identify which conditions are “sufficient” for the outcome to occur. In particular, in our study we used a “frequency threshold” of 3 and a “consistency threshold” of 0.8. The use of such threshold are commonly accepted management literature (Cabrilo and Dahms, 2018; Del Sarto, *et al.*, 2020; Lowik *et al.*, 2016) because according to

**Table 3** Analysis of necessary conditions

<i>Outcome: License agreements</i>	<i>Consistency</i>	<i>Coverage</i>
Meaning	0.88	0.84
$\sim$ Meaning	0.22	0.55
Competence	0.52	0.72
$\sim$ Competence	0.48	0.70
Determination	0.50	0.71
$\sim$ Determination	0.50	0.71
Impact	0.24	0.81
$\sim$ Impact	0.76	0.68
Task	0.51	0.82
$\sim$ Task	0.48	0.62
OCB	0.89	0.86
$\sim$ OCB	0.19	0.45
Quit	0.06	0.56
$\sim$ Quit	0.96	0.71

Ragin (2008, 118), “No consistency values lower than 0.8 should be accepted.” By using this frequency threshold, we consider as relevant cases only configurations that occur in more than one case. The model used for the analysis contains seven conditions:

$$\text{License} = f(\text{MEANING}, \text{COMPETENCE}, \text{DETERMINATION}, \text{IMPACT}, \text{TASK}, \text{OCB}, \text{QUIT})$$

The fsQCA method allows the analysis of combinations of conditions that lead to the outcome of interest, in our case licensing agreements. The combinations are named “configurations”.

We report the results of the analysis performed in Table 4. In this table show the configurations that are sufficient for the outcome “higher level of license agreements.” For our analysis we use an “intermediate solution.” The intermediate solution “can be understood as the complex solution reduced by the conditions that run counter to fundamental theoretical or substantive knowledge” (Schneider and Wagemann, 2012, p. 172). Moreover, according to Rihoux and De Meur (2009), the “intermediate solution” has considerable benefits over the parsimonious and the complex solution. We found that two configurations have consistency higher than 0.80. Solution coverage and solution consistency are compliant with Ragin (2008) and Woodside (2012), according to whom consistency and coverage must be greater than 0.80 and 0.25, respectively.

The first configuration is the following:

$$\text{Meaning}^* \text{Competence}^* \text{Determination}^* \text{Impact}^* \text{OCB}^* \sim \text{Quit} \quad (1)$$

The raw coverage of the first configuration is 0.34, its unique coverage is 0.19 and its consistency is 0.95. The first configuration highlights that 34% of the KTOs in which their managers have no intention of changing jobs have a higher level of license agreements.

The second configuration is as follows:

$$\text{Meaning}^* \sim \text{Competence}^* \sim \text{Determination}^* \text{Impact}^* \sim \text{Task}^* \text{OCB}^* \sim \text{Quit} \quad (2)$$

The raw coverage of the second configuration is 0.27 its unique coverage is 0.12 and its consistency is 0.96. According to the second configuration, 27% of the KTOs in which their managers have a high level of organizational citizenship behavior, a high grade to which an individual manages to influence results at work (degree of impact) and a high level of level the value of a work goal (degree of the meaning), in this case, the KTOs generate a high level of license agreements.

An important finding from the analysis of the main configurations shows the co-presence of perceived engagement and perceived empowerment as a variable that leads to the outcome “license agreements”, jointly with other factors. The level of organizational citizenship behavior; the degree to which an individual can influence strategic or operational results at work (degree of impact); the value of a work goal (degree of the meaning) are present in two of the three most important configurations. This result highlights

**Table 4** Analysis of sufficient conditions

	<i>Raw coverage</i>	<i>Unique coverage</i>	<i>Consistency</i>
Meaning*Competence*Determination*Impact* Task* OCB*~Quit	0.34	0.19	0.95
Meaning*~Competence*~Determination*Impact* ~Task* OCB*~Quit	0.27	0.12	0.96
Solution coverage: 0.47			
Solution consistency: 0.96			

that knowledge transfer professionals who (i) have a discretionary behavior going beyond formal descriptions of the work, see their work environment as responding to their attempts to influence attempts (Spreitzer, 1995) and have confidence in their ability to carry on their activities (Gist, 1987) perform better.

Several authors argue that high employee performance is positively linked with perceived empowerment (Patterson *et al.*, 2004; Thomas and Velthouse, 1990) and perceived engagement (Soane *et al.*, 2012), but in this study, we highlight that only the combination of three cognitions leads to an increase in the number of licenses agreements.

An analysis result shows that individual behavior is important for increasing KTO's performance and perceived empowerment and perceived engagement may interact with each other to increase KTOs' performance. However, only the combination of three individual cognitions increases performance in terms of the number of licenses agreements.

## 5. Discussion

The goal of this work was to analyze the performance of KTOs on the basis of the organizational behavior and the level of empowerment and engagement by KTOs. In particular, we investigated the following research question: "Is there a relationship between the interaction of individual cognitions of perceived empowerment and perceived engagement and KTOs' performance?"

Answering such a research question is important since previous studies have neglected to investigate the impact of individual cognitions – in our case, perceived empowerment and perceived engagement – in the empirical setting of KTOs (Akbari and Ghaffari, 2017; Fernandez and Moldogaziev, 2013; Kirkman and Benson, 1999; Rich *et al.*, 2010; Yahya and Goh, 2002). To the best of our knowledge, our study is the first one that looks at the combined effect of the individual cognition of perceived engagement and perceived empowerment on KTOs' performances. Previous studies find significant and positive relationships on performances only when "engagement" and "empowerment" are observed in isolation and without considering KTOs' empirical setting (Akbari and Ghaffari, 2017; Conger and Kanungo, 1988; Dust *et al.*, 2014; Salanova *et al.*, 2005; Soane *et al.*, 2012; Spreitzer, 1995, 2007; Kirkman and Benson, 1999; Yahya and Goh, 2002).

After analyzing which individual cognitions constitute the constructs of "perceived empowerment" (Spreitzer, 1995) and "perceived engagement" (Soane *et al.*, 2012), we used the fsQCA approach, which allowed us to go deeper into the results of our study, while through confirmatory factor analysis, we tested if adopted scales are robust in terms of validity and reliability (Frazier *et al.*, 2016).

The results of the fsQCA suggest that considering the multiple combination of individual cognitions the combination between a high level of organizational citizenship behavior, a high level of the degree to which an individual can influence strategic or operational results at work and a high level of the value of a work goal affect KTOs' performance. However, none of the individual cognitions alone or other combinations are capable of influencing the KTOs' performance.

### 5.1 Theoretical implication

Based on these findings, our study offers theoretical contributions which expand the literature on organizational behavior and knowledge management by providing additional elements about how to improve the performance of KTOs (Goh, 2002; Kumar and Ganesh, 2009; Romano *et al.*, 2014). In particular, we offer three theoretical contributions.

First, our results point out that none of the individual cognitions of perceived empowerment and perceived engagement influences KTOs' performance in isolation. This result is in line with previous organizational behavior literature which has found that only the two constructs

of “empowerment” and “engagement” have a significant and positive relationship on organizational performance (Dust *et al.*, 2014; Patterson *et al.*, 2004; Saks, 2006; Seibert *et al.*, 2004; Spreitzer, 2007) and not the individual cognitions which constitute them.

Second, our results identify which combinations of individual cognitions are related to a KTO’s performance contributing to the knowledge management literature. The level of organizational citizenship behavior, the degree to which an individual manages to influence results at work (degree of impact) and the value of a work goal (degree of the meaning) are the cognitions which generate a higher level of license agreements. The literature on knowledge transfer, in fact, has analyzed the impact of different organizational elements on KTOs performance (Chapple *et al.*, 2005; Siegel *et al.*, 2003), whereas our study highlight that individual behavior is also important for increasing KTOs’ performance. Moreover, we found that the combination of individual cognitions of perceived empowerment (e.g. meaning and impact) with individual cognitions of perceived engagement (e.g. OCB) have an impact on KTOs’ performance, suggesting that perceived empowerment and perceived engagement may interact with each other to increase KTOs’ performance.

Third, our article contributes to the knowledge management literature highlighting that the willingness to change jobs is not related to the positive performance of a KTO. In particular, the absence of the willingness to quit the job in KTOs is positively related to a high level of the number of licenses. This result is consistent with previous literature on employee engagement (Kirschenbaum and Weisberg, 2003; Shuck *et al.*, 2014) which found that the willingness to change the job is negatively related with the performance of organizations (Shore *et al.*, 1990). Indeed, perceptions of a powerful organizational identity, a positive organizational climate and organizational empowerment and engagement affect employees’ turnover intention in a distinctive way (Cole and Bruch, 2006). This result is also valid also when considering KTOs.

## *5.2 Managerial implications*

In addition to theoretical contributions, our study provides some managerial implications which can be useful for KTO professionals, university managers and policymakers.

First, our results suggest that KTPs play a crucial role in knowledge transfer dynamics and, in particular, engagement and empowerment emerge as organizational supports which seem to be complementary rather than potentially substitutes. In other words, only when KTPs feel both empowered and engaged, there is a positive influence on KTOs performance. Moreover, our study shows that the individual cognitions of KTPs influence the performance of the KTO. However, to increase the degree of impact and meaning, specific actions of university managers may be necessary to legitimize the actions of KTPs. In fact, the degree of impact influences the value of the performance but is linked to the employees’ legitimacy to act. Moreover, perceived engagement can also be seen as a combination of commitment to the organization and its values of helping colleagues with organizational citizenship behaviors. This implies that professional satisfaction alone is not enough, but it is necessary to create an environment conducive to motivation. University and KTPs managers should, therefore, improve job satisfaction of KTPs encouraging KTPs to share their ideas, recognize the results achieved, thus allowing them to develop different approaches to daily activities, providing growth and training opportunities and offering career development to increase the degree of organizational citizenship behaviors.

Second, as “impact” and “meaning” seem to be very important for KTPs, university rectors and top managers might perhaps intensify communication activities, both internally and externally, about the achievements of KTOs, especially in terms of the benefits produced for society as a whole. This should reinforce KTPs sense of belonging to their institution.

Third, our study shows that beyond motivating KTPs increasing their level of empowerment, they must also be provided with the necessary managerial tools, adequate for complex situations such as those which normally characterize KT processes.

## 6. Conclusions, future research and limitations

In this study, we analyzed the relationship between the level of empowerment and engagement by KTPs and KTOs' performance. Understanding this relationship is important because previous studies have neglected to investigate the impact of individual cognitions in the empirical setting of KTOs (Akbari and Ghaffari, 2017; Fernandez and Moldogaziev, 2013). To address our research question (i.e. "Is there a relationship between the interaction of individual cognitions of perceived empowerment and perceived engagement and KTOs' performance?"), we drew on the literature on perceived organizational support to identify two individual cognitions influencing organizational performance, namely, perceived empowerment (Spreitzer, 1995) and perceived engagement (Soane *et al.*, 2012), and we conducted an fsQCA analysis (Ragin and Beck, 1987) based on a survey submitted to KTOs professionals.

The results of the fuzzy set analysis highlighted the role of individual cognitions in influencing KTOs' performance contributing to the literature on organizational behavior, knowledge transfer and knowledge management.

As with all research, this study has limitations that provide avenues for future research. First, the study only focuses on the Italian context. Various studies have emphasized the specificities of the Italian technology transfer context (Bianchi and Piccaluga, 2012; Geuna and Muscio, 2009; Algieri *et al.*, 2013; Baglieri *et al.*, 2018) and replicating this study in other countries would be useful. Second, we limited our analysis of performance to license agreements. Other performance indicators can be used in the future. Finally, this research highlights the fact that the individual cognitions that interact with each other are part of both perceived empowerment and perceived engagement. In order to influence KTOs' performance, in fact, the cognitions meaning and impact, which are part of perceived empowerment, interact with OCB, which is part of a perceived engagement. For these reasons, further investigations about the correlation of perceived empowerment and perceived engagement in explaining KTOs' performance through quantitative methods are needed.

## Notes

1. Netval is the Italian association for the valorisation of results from public research organizations. It includes 56 universities, 7 public research organisations, 6 research hospitals, 2 foundations and 1 agency.
2. The questionnaire is available on request.

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