Electronic version of an article published in International Journal of Innovation Management. DOI:
<https://doi.org/10.1142/S1363919621500328> © copyright World Scientific Publishing Company. Journal
URL: <https://www.worldscientific.com/worldscinet/ijim>

**Efficaciously smuggling ideas: untangling the relationship between
Entrepreneurial Self-Efficacy, Creative Bootlegging and Embedded Lead
Users**

Khatereh Ghasemzadeh

Research and Documentation Center for the 2030 Sustainable Development Agenda (CRA2030)

DIES Department, University of Brescia, Brescia, Italy

Aldijana Bunjak

Institute for Leadership and Human Resource Management

University of St. Gallen, Switzerland

Guido Bortoluzzi

DEAMS Department, University of Trieste, Trieste, Italy

Matej Černe

Department of Management and Organization

School of Economics and Business, University of Ljubljana, Ljubljana, Slovenia

Abstract

The phenomenon of Embedded Lead Userness has gained considerable attention in the past years. The present study examines the relationship between entrepreneurial self-efficacy and embedded lead userness when mediated by creative bootlegging. After analysing the data collected from 554 employees in 41 Italian and Croatian firms, our study unveils that entrepreneurial self-efficacy exerts a positive impact on embedded lead userness when mediated by creative bootlegging. Consistent with research on identity work, these results suggest that employees who show self-motivation and conviction in entrepreneurial activities tend to commit to unofficial innovation projects, which in turn, makes them act as lead users of the products and services. The study's contributions and practical implications are also discussed.

Keywords: Embedded lead userness, user employees, entrepreneurial self-efficacy, creative bootlegging, social cognitive theory

Introduction

Starting from the seminal works by von Hippel (1976, 1986) the literature on lead users has been growing consistently. Lead users can be of great help to firms because they can provide information and suggestions, enabling firms to better understand users' needs and, consequently, to develop new solutions that better address such needs (Urban & von Hippel, 1988). However, recognising and involving lead users both *efficiently* and *effectively* still comprise an open challenge for firms (Poetz & Schreier, 2012; von Hippel, Franke, & Prügl, 2009). A possible solution to such challenge has been found in the form of Embedded Lead Userness (ELU). Embedded lead users (also from now on) are “employees who are lead users of their employing firms' products or services” (Schweisfurth & Herstatt, 2015, p. 2).

Hence, ELUs' knowledge comes from the direct use of the products in their private life and from their role within firms (Schmidt-Keilich & Schrader, 2019). Given the foregoing, ELUs are less difficult to be found and to be engaged, thus increasing the *efficiency* of the process of user involvement for firms. Further, emerging literature has found that ELUs are more *effective* than regular employees in carrying out a multitude of innovation-related activities (Schweisfurth & Raasch, 2015). However, other studies have also highlighted that ideas coming from external users tend to be of higher quality and novelty compared with those coming from employees (Chatterji & Fabrizio, 2014; Magnusson, 2009).

The figure of ELU and the impact that ELUs may have on companies' innovation processes are attracting increasing academic interest. For example, ELUs have been found to actively contribute to various stages of product innovation – well beyond the phase of concept generation – namely, idea generation, product testing and product-related exchange with the network of users (Schweisfurth & Herstatt, 2014). Furthermore, ELUs are also active in carrying out marketing

activities: from getting-together market information to spreading it within the organisation (Schweisfurth & Raasch, 2015).

However, theoretical and empirical research on the drivers of ELU and the inner characteristics of such internal (to the firm) lead users are more scant (Schweisfurth, 2017; Schweisfurth & Herstatt, 2016). Extant literature has shown that ELUs have different cognitive structures compared to *external* lead users as a consequence of their double identity of being external users and internal collaborators (Schweisfurth & Herstatt, 2016). Leveraging on cognitive sources in the innovation process, ELUs put themselves in the users' shoes and confront the problems encountered during product use; as a sailing company said, "Since you have direct access all the time, you can decide whether there is a problem with the sail itself, or if the customers are just too – let's say – clumsy [. . .] and then the sails look weird, since the mast is in the wrong position" (Schweisfurth & Herstatt, 2014, p. 119).

Adopting a micro-foundation perspective, a study by Schweisfurth and Raasch (2015) showed that ELU in workers is positively associated to their customer orientation behaviour and innovative work behaviour, and that this association is independent from other variables such as product involvement or job satisfaction. In other words, ELUs have loan-blend enthusiasm and motivation for innovation, having both use-related and employment-related characteristics. Given the importance of attitudes, mindsets and behaviours of individuals for the success of innovation processes (Brenton & Levin, 2012; Salter, Ter Wal, Criscuolo, & Alexy, 2015), an open call for a better understanding of the inner characteristics, motivations and capabilities of ELUs has been advanced (Faillant, Schwarz, Krajger, & Breitenecker, 2012; Schweisfurth & Raasch, 2015). In other words, extant research is contributing significantly in clarifying *how* ELUs are contributing to product innovation (Schmidt-Keilich & Schrader, 2019; Schweisfurth & Dharmawan, 2019;

Schweisfurth & Raasch, 2015). Our guess is that more research is needed to understand *who* ELUs are and how their peculiar attitudes, beliefs, and behaviours drive them to act as they do.

The present study provides a partial answer to such call by aiming to increase our understanding of the forces causing employees to act as lead users within their organisation. Based on previous research on identity work, which is the effort people make to attain and hold an ‘identity play’ at the workplace (Ibarra & Petriglieri, 2010), and social cognitive theory, which is in relation to the perception employees have about themselves (Bandura, 1991), our study focuses on the link between employees’ entrepreneurial self-efficacy and lead userness.

Entrepreneurial self-efficacy consists of “a person’s beliefs that she or he is capable of successfully performing the various roles and tasks of entrepreneurship” (Ahlin, Drnovšek, & Hisrich, 2014, p. 4). It has been shown to be an important belief in turning the creative potential of individuals into innovative action (Ahlin et al., 2014). High levels of entrepreneurial self-efficacy result in enhanced recognition of creative opportunities and more innovative behaviour at the workplace (Axtell et al., 2000; Barakat, Boddington, & Vyakarnam, 2014; Speier & Frese, 1997).

Interestingly, self-efficacy has been found to encourage bootlegging activities among employees (Ahlin et al., 2014). In our study we define bootlegging as a deviate behaviour hidden from senior managers whereby organisational time and resources are used for pursuing innovative ideas that are mainly in line with organisational goals and benefits (Sakhdari & Bidakhavidi, 2016, p. 6). Cardon, Wincent, Singh, and Drnovsek (2009) showed that different identities shape entrepreneurial behaviour. Additionally, individuals tend to craft their own identity and be more spontaneous than pre-planned while experiencing identity play between conventional work role and identity growth (Ibarra & Petriglieri, 2010). According to social cognitive theory, individuals with self-exploration characteristics are willing to learn things about themselves and inspect and

improve their own identity (Berzonsky, 2004). Similarly, employees who hold higher levels of self-belief in entrepreneurial abilities begin bootleg activities (Globocnik & Salomo, 2015), associating those to experimentations, hobbies and passion projects (Demetry, 2017).

Thus, bootleg activities may ensure a transitional space for employees to engage in identity play and experiment with their work identity. In particular, we assume that employees who demonstrate a high level of entrepreneurial self-efficacy (ability to produce something creative) may find themselves ‘in between’ spaces – engaging in everyday work roles but also less conventional work roles such as creative bootlegging. The experimental phase between the two roles (i.e., starting from the hobby and work out of love to its actual identity growth) may lead to higher userness of such products and services, and thus, ELU. In sum, in our study, we advance the hypothesis that bootlegging may mediate the relationship between entrepreneurial self-efficacy and embedded lead userness.

The intended contributions of this study are threefold. First, our study outspreads the sphere of lead user theory (von Hippel, 1986) by adding to extant literature a deeper understanding of embedded users’ characteristics and cognitive antecedents (Schweisfurth & Herstatt, 2015; Schweisfurth & Raasch, 2015). Second, it extends the validity of social cognitive theory by showing how entrepreneurial self-efficacy may trigger employees to devote more time on non-conventional activities along with their official duties and, through creative bootlegging, engage in innovation-related activities to the benefit of the firm. Third, it extends work identity theory, bridging the concepts of creative bootlegging and ELU by examining how individuals who find themselves “in between” spaces can leverage on such situation to become proactive innovators at their own benefit and at the benefit of the organisations they work for, thus complementing

previous research done on creative bootlegging (Agostini, Nosella, & Filippini, 2016; Criscuolo, Salter, & Ter Wal 2013).

Theoretical background and hypotheses development

Entrepreneurial self-efficacy and ELU

In this study, we rely on social cognitive theory to inspect employees' mindsets towards thinking creatively and developing new ideas. Social cognitive theory is concerned with personal cognition, physiological characteristics and behaviour. It implies that understanding one's own behaviour affects the individual himself and the environment and, in turn, triggers future behaviour (Bandura, 1985; Bandura & Walters, 1977). Such theory relies on self-regulatory mechanisms through which individuals' thoughts, motivations and performances are affected by the exercise of self-control and self-motivation in a proactive way (Bandura, 1991). In fact, the self gets cognitive, emotional, behavioural and social boundaries from identity (Petriglieri, Ashford, & Wrzesniewski, 2019), which makes people's inner and social worlds intelligible and manageable (Swann Jr & Bosson, 2010).

A well-established literature stream crossing management and psychology of work have deepened the concept of the self-reflective nature of identity work (Caza, Vough, & Puranik, 2018) and self-efficacy in trying to understand how such self-perceptions impact various creative and innovative behaviours of individuals (Bunce & West, 1995). Self-efficacy deals with one's confidence about his or her ability to perform a specific task (Bandura, 1989; Bandura & Cervone, 1986), in the sense that individuals assess themselves based on their capabilities to trigger cognition resources and motivation concerning the challenges to be accepted and exert efforts to expand the endeavour (Mauer, Neergaard, & Linstad, 2017).

Entrepreneurial self-efficacy is a particular type of self-efficacy that refers to the individuals' beliefs connected to carrying out entrepreneurial tasks (Stajkovic & Luthans, 1998). It is associated with specific behaviours like opportunity recognition and innovative work behaviour (Barakat et al., 2014).

Ahlin et al. (2014) declare that individuals require entrepreneurial self-efficacy to turn their creative potential into innovation. In particular, people with high levels of entrepreneurial self-efficacy also show high levels of self-confidence towards thinking creatively, creating new ideas and products and commercialising them (Newman, Herman, Schwarz, & Nielsen, 2018).

According to Cardon et al. (2009), different identities shape entrepreneurial behaviour. Grounded on social cognitive theory, individuals differ in how they approach the tasks of constructing and reconstructing a sense of identity to determine how effectively they deal with various identity functions like entrepreneurial self-efficacy (Berzonsky, 2004). People with self-efficacy characteristics try to find opportunities for identity work and always craft who they are and what they do at work (Caza et al., 2018). More precisely, individuals with high levels of self-efficacy have been shown to be more persistent in performing tasks and problem-solving efforts and motivating themselves in a proactive way, which is a vital condition for creative productivity (Bandura, 1991; Bandura & Walters, 1977). Therefore, employees with a higher level of self-efficacy put more effort towards a specific task that will result in more successful outcomes related to work performance (Stajkovic & Luthans, 1998).

Moreover, the results of a study carried out by Schweisfurth and Herstatt (2016) showed that embedded users generally display higher innovative behaviour than regular employees and contribute more effectively to product innovation activities. For example, embedded users test products and give technical feedback to the R&D department (Schweisfurth & Raasch, 2015).

The literature has further shown that personality and cognition, along with domain-specific factors such as motivation and knowledge, determine the employees' role in contributing to innovation in firms (Woodman, Sawyer, & Griffin, 1993). Generally, individuals employ different cognitive processes towards problem-solving, which differentiates them in the innovation process (Barron & Harrington, 1981). As mentioned earlier, individuals with high levels of self-efficacy are more willing and confident to take part in creative thinking and innovation-related activities. This is due to the fact that employees' identities grow in a gradual process from a sense of self towards developing one's own values, norms and commitments (Ibarra & Obodaru, 2016).

Given the above argumentations and considering the literature regarding embedded users' position inside and outside (at use context) of the firm and their high level of innovative behaviour, it is expected that employees with high levels of positive judgment about their capabilities towards entrepreneurial tasks grow their identities during the time and likely become embedded lead users of their organisation.

H1: Entrepreneurial self-efficacy is positively related to Embedded Lead Userness.

Mediating role of creative bootlegging

Globocnik and Salomo (2015) already provided evidence that self-efficacy acts as an individual-level determinant factor of creative bootlegging. The authors posit that employees begin bootleg activities if they believe themselves to have the necessary abilities for entrepreneurial tasks and motivation for bootlegging. Such employees believe so deeply in their abilities to successfully improve their ideas that they start acting even in the absence of an organisation's formal backing.

Bootlegging is a kind of secret, bottom-up, nonprogrammed proactive activity (Criscuolo et al., 2013). Employees undertake bootlegging activities in order to increase their knowledge about the overall feasibility of their idea (Masoudnia & Szwejczewski, 2012) to establish legitimacy for the idea within an organisation and to obtain the needed resources to further develop such idea (Kannan-Narasimhan, 2014).

Self-effective individuals craft their characteristics and what they do at work (Berzonsky, 2004) meaning that they play with their identities. “Identity play” is defined as “people’s iterative engagement in provisional trials of possible future selves” through which individuals dig their possible selves (Ibarra & Obodaru, 2016, p. 56). More specifically, “identity play” is a starting point to discover the various, often heterogeneous and variable nature of the self, as well as the process of exploration and intuition for creating new identities (Ibarra & Petriglieri, 2010).

In line with such logic, in this study, we assume that employees who demonstrate a high level of entrepreneurial self-efficacy may find themselves *in between* spaces, meaning engaging in everyday work roles but also less conventional work roles such as creative bootlegging. Bootlegging behaviour lets employees gain more autonomy by themselves in their efforts to develop innovations through unconventional paths and postpone the official judgment process of the organisation in the sense that employees deviate from formal job requirements and show proactive creativity to generate innovative outcomes (Criscuolo et al., 2013). To do so, employees often circumvent formal rules (Kanter, 1988) and get involved in pre-development activities in the absence of official control (Harding, 1994).

Since, self-efficacious individuals demonstrate more motivation towards performing tasks and are more committed, risk-taking and optimistic in facing difficulties (Krueger Jr & Dickson, 1994; Mitchell & Shepherd, 2010; Wood & Bandura, 1989), we assume that creative bootlegging

activities provide the opportunity for such employees to play with their identities and to craft professional and occupational identities within them, which leads them to their identity growth (Ibarra & Obodaru, 2016). Additionally, it is declared that a degree of “playfulness” provokes individuals to come up with significant and breakthrough ideas (Miner, 1994). Hence, taking part in bootleg activities gives individuals the chance to work on preferred projects and hobbies and to look for better ways of doing their jobs, seeking new practices and learning new things to enhance the quality of their performance (Criscuolo et al., 2013). Furthermore, Masoudnia and Szwajczewski (2012) linked bootlegging to creative and innovative outputs, showing that employees undertake bootleg activities to decrease the uncertainty associated with their ideas for the latter to be accepted by managers.

Starting from such evidence, in this paper, we hypothesise that employees with a higher level of entrepreneurial self-efficacy are willing to devote more time on informal and pet projects. In turn, the experimental phase between the two roles (i.e., starting from the hobby and work out of love to its actual identity growth) may motivate them to challenge the status quo and think of the future needs of the market, making such individuals both curious and passionate in their domain, thus reinforcing their lead user status. Hence, our second hypothesis follows:

H2. Creative bootlegging mediates the relationship between entrepreneurial self-efficacy and ELU.

Figure 1 depicts the research framework including the two research hypotheses empirically tested in this study.

Figure 1: Research framework with hypotheses

Methodology

Sample and data collection

Survey data were collected in the period May 2018-October 2018 from employees belonging to 41 firms in Italy and Croatia (17 from Croatia and 24 from Italy). All the firms included in the study belong to the shipbuilding and boating sector or to the supply chain, providing technologies, products and services to ship-building and boat-building companies (such as engines, furniture, industrial design services, etc.).

Hence, all firms bear sufficient levels of homogeneity in relation to the knowledge, resources and capabilities needed to compete in the industry. Furthermore, the firms comprise employees with a passion for sailing, and thus, have the possibility to see, use and judge the products and the services they produce, as well as employees who possess the minimum knowledge and skills needed to

make a fair assessment of the goodness of the products and the services realised by companies operating in the shipbuilding and boating sector.

Data were collected through both online and paper-based (in smaller companies) questionnaires administered to white collars and managers. In both options, the employees were recommended to answer alone in order to avoid any external influence. They were reassured that the data will be used only for scientific activities and that no individual data will be given to their employers. The questionnaire was originally developed in English language and then translated into Italian and Croatian, respectively. Back-translation procedures were used in both cases (Brislin, 1970).

Less than 5% incomplete questionnaires were collected and then discarded from the analysis. In total, 554 employees responded to the questionnaires. Of the received responses, 431 (78%) were from Italian companies and 123 (22%) from Croatian. In total, 77% of the respondents were males. The average tenure was 11.5 years of work. The highest number of respondents belonged to the 35-44 age range (31%). In terms of education, 47.6% of the respondents declared possessing a bachelor's or master's degree while 46.3% have a middle or high school diploma. Few respondents possessed an MBA/EMBA degree (4.8%) and doctorate degree (1.3%).

Measures

Creative bootlegging and ELU consisted of 5-point Likert-type scale items anchored at 1 ("strongly disagree") to 5 ("strongly agree") and entrepreneurial self-efficacy at 1 ("not at all confident") and 5 ("very much confident"). We reverse-coded some items in the questionnaire, which diminished the risk of biases.

Dependent variable. We measured ELU using a 5-item scale ($\alpha=0.79$) developed by Franke, von Hippel, and Schreier (2006). Given the mixed nature of our sample, which is composed of both

B2B and B2C companies, we focused exclusively on the dimension “high expected benefit” of the overall construct, as proposed by Schweisfurth and Herstatt (2015).

Independent variable. We assessed entrepreneurial self-efficacy by using a 4-item measurement scale developed by Zhao, Seibert, and Hills (2005) ($\alpha=0.79$).

Mediator variable. We based the valuation of creative bootlegging on the scale developed by Criscuolo et al. (2013) ($\alpha=0.72$), which has been originally created for identifying bootlegging attitude among R&D scientists. Since embedded lead users also carry out innovation-related activities, we found it reasonable to extend the scope of the original scale beyond the boundaries of the R&D department.

Control variables. We controlled for basic demographic information (gender and age). Following Schweisfurth and Herstatt (2015), we also included cognitive empathy as a control variable ($\alpha=0.81$). Cognitive empathy captures the attitude of people (users) of taking the perspective of other people (users). Previous studies have shown that cognitive empathy contributes to embedded lead userhood in various ways (Schweisfurth & Raasch, 2015).

Analyses

Given the cross-sectional and single-source nature of our research, we applied (Lindell & Whitney, 2001) a marker variable test using a theoretically unrelated variable (i.e. marker variable) to adjust the correlations among the principal constructs in the model. Any high correlation of the marker variable with any other of the study’s principal constructs would indicate potential common method bias. For robustness, we separately repeated the marker variable test with two additional variables that were not included in the model (whether respondents have children in their household and mindfulness) for which we have little or no theoretical basis to expect a relationship with the study’s principal constructs. The average correlations between the study’s principal

constructs with respondents who reported having children ($r = .05$) and with mindfulness ($r = .09$) were low and non-significant, and the inclusion of these variables into the research model did not alter the significance of the relationships that were mainly studied, providing no evidence of common method bias.

We tested our hypotheses using SPSS® by IBM (version 25) statistical software. Moreover, we applied hierarchical regression to test our hypotheses. To test the first hypothesis, we first entered the control variables followed by the independent variable; ELU is considered an outcome variable for this regression analysis (model 1). We also tested the mediating effect of creative bootlegging in the relationship between entrepreneurial self-efficacy and ELU (H2). We followed the multiple regression analytical approach suggested by Baron and Kenny (1986) to test the mediation effect (models 2, 3, 4). According to their approach to affirming a mediation model, three basic conditions must be met: 1) there must be a significant relationship between the independent variables and the outcome variables, 2) there must be a significant relationship between the independent variable and the mediator, and 3) the significant relationship between the independent variables and outcome variables becomes non-significant when the mediator is defined in the model.

Finally, we assessed the mediation effect of creative bootlegging using the PROCESS macro (Preacher & Hayes, 2004) (model 4). With this technique, the indirect effect was tested using the bias-corrected percentile method by bootstrapping 5,000 samples, presenting 95% confidence intervals. Tables 2 and 3 present the results.

Results

Descriptive statistics, reliability and validity

Descriptive statistics including minimum, maximum, mean values, standard deviations and correlations related to the variables in the study are presented in Table 1. We ran different screening tests, namely, Mahalanobis, Cook's and Leverage to check the outliers. Regarding the normality, the results showed that the data are normal as none of the items has skewness and kurtosis values greater than (-1 to +1). The level of correlations among our key variables is quite low, confirming the absence of a multicollinearity problem in our data. Reliability analysis, which looks at the extent to which a set of items all measure the same underlying construct, was conducted using Cronbach's alpha coefficient. All of the Cronbach's alpha coefficients of the tested variables are above 0.60, as suggested by (Bagozzi & Yi, 1988).

Next, we observed the factor structure of the focal variables using confirmatory factor analysis (CFA) in order to test the construct validity and factor structures in our data applying AMOS software version 24. The expected three-factor solution (entrepreneurial self-efficacy, creative bootlegging, employee lead userness) displayed a good fit with the data [chi-square (74) = 299.9, CFI = .903, SRMR = .0607, RMSEA = .074]. The standardised factor loadings ranged from .56 to .81 for entrepreneurial self-efficacy items, from .39 to .71 for creative bootlegging items and from .39 to .79 for employee lead userness items.

Results of hypotheses testing

Hypothesis 1 predicted that entrepreneurial self-efficacy would be positively associated with ELU. Model 1 in Table 2 shows the regression of ELU on the control variables and entrepreneurial self-efficacy. As hypothesised, there was a significant positive relationship between entrepreneurial self-efficacy and ELU ($\beta=.096$, $p<.05$).

The results of our mediating model support the hypothesis that entrepreneurial self-efficacy is positively related to creative bootlegging ($\beta=.29, p<.01$) and that creative bootlegging is positively related to ELU ($\beta=.11, P<.01$). Applying Baron and Kenny (1986) mediating effect testing method revealed that the beta coefficients of model 2 and model 3 were significant and positive, in support of the first and second mediation conditions. Finally, the last hierarchical regression analysis was applied by entering ELU as the outcome variable. Then, we inserted control variables in the first step. In the second step, we inserted entrepreneurial self-efficacy and creative bootlegging as independent variables to test the mediating effect of creative bootlegging in the relationship between entrepreneurial self-efficacy and ELU. Model 4 in Table 2 shows the regression equations for ELU on both the mediator (creative bootlegging) and independent variable (entrepreneurial self-efficacy). The coefficient of entrepreneurial self-efficacy in relation to ELU decreased and became insignificant ($\beta=.068, p>.01$) while the coefficient of creative bootlegging is positive and significant ($\beta=.097, p<.05$), which according to Baron and Kenny (1986) is consistent with a full mediation effect exerted by creative bootlegging in the relationship between entrepreneurial self-efficacy and ELU.

To provide further confirmation of H2, the PROCESS macro model 4 (Preacher & Hayes, 2004) was used to statistically examine the significance of the mediating effect of creative bootlegging. The results confirmed the outcomes from the regression analysis. The process macro identified a significant relationship between entrepreneurial self-efficacy and ELU ($b=.0904, t=2.05, p<.05$), thus supporting H1. Additionally, we used 5000 samples and constructed 95% bias-corrected confidence intervals for the hypothesised indirect mediating effects. PROCESS macro confirmed the whole mediation model using model 4 in the provided templates (Preacher & Hayes, 2004). We observed a significant mediation effect because the confidence interval from the bootstrap

analysis excluded zero [CI=.001, .054], which provides support for H2. The results of the MACRO process are provided in Table 3.

Table 1 *Descriptive statistics*

	Mean	SD	Cronbach α	(1)	(2)	(3)	(4)	(5)
(1) Embedded lead userness	2.96	.66	.79	-	-	-	-	-
(2) Entrepreneurial self-efficacy	3.44	.70	.79	.128**	-	-	-	-
(3) Creative bootlegging	2.92	.79	.72	.128**	.344**	-	-	-
(4) Cognitive empathy	3.55	.68	.81	.094*	.371**	.198**	-	-
(5) Gender	1.32	.46		-.030	-.216**	-.191**	-.053	-
(6) Age	3.08	1.06		-.045	.067	-.032	.108*	-.173**

N = 554. Age was classified into 5 classes: 1= less than 24, 2= 25-34, 3= 35-44, 4= 45-54, 5= over 54. For gender, 1 = male, 2 = female. *p < .05; **

Table 2 Hierarchical regression results for the mediating effect of creative bootlegging in the relationship between

	model 1				model 2				model 3				model 4			
	ELU				creative bootlegging				ELU				ELU			
	B	SE	β	t	B	SE	β	t	B	SEB	β	t	B	SE	β	t
Constant	2.67	.22		12.06**	1.89	.25		7.56**	2.64	.21		12.24**	2.52	.23		10.85**
Gender	-.02	.06	-.02	-.46	-.23	.07	-.13	-3.32**	-.02	.06	-.01	-.39	-.01	.06	-.00	-.16
Age	-.03	.02	-.06	-1.43	-.06	.03	-.08	-2.05*	-.03	.02	-.05	-1.2	-.03	.02	-.05	-1.24
CE	.03	.04	.04	.87	.10	.05	.08	2.06*	.0	.042	.05	1.20	.03	.04	.03	.68
ΔR^2																
R ²			.01				.07				.01				.01	
F			1.75				15.33**				1.75				1.75	
CB									.09	.03	.11	2.58**	.08	.03	.09	2.09*
ΔR^2											.01				.00	
R ²											.02				.02	
F											3.00*				2.78**	
ESE	.09	.04	.09	2.04*	.33	.05	.29	6.74**					.06	.04	.06	1.38
ΔR^2			.00				.07								.00	
R ²			.01				.15								.01	
F			2.37*				23.81**								2.37*	

N = 554. In tables, CE= Cognitive empathy, ESE= Entrepreneurial self-efficacy, CB=Creative bootlegging. *p < .05; **p < .01

Table 3 Results of the mediation analyses with the PROCESS macro (Model 4)

Dependent variable	Creative bootlegging	Embedded lead userness
Constant	1.89**	2.52**
Entrepreneurial self-efficacy	.33 (.05) **	.06 (.04)
Creative bootlegging (mediator)	-	.07 (.03) *
Gender	-.23 (.07) *	-.01 (.06)
Age	-.06 (.03) *	-.03 (.02)
Cognitive empathy	.10 (.05) *	.03 (.04)
F	23.81	2.78
Df	(4,538)	(5,537)
R ²	.15	.02
Indirect effect of entrepreneurial self-efficacy on ELU via creative bootlegging	-	.02(.01) * (LLCI: .0014, ULCI: .0542)

N = 554. *p < .05; **p < .01; unstandardized coefficients are reported (standard errors in parentheses). LLCI, lower level confidence interval. ULCI, upper level confidence interval.

Discussion

This paper sets out to advance our understanding of ELU. In particular, we sought to explore how entrepreneurial self-efficacy and ELU are related both directly and indirectly (via creative bootlegging). Applying hierarchical regression and PROCESS macro of survey data, we found consistent support for the first hypothesis, showing that a significant and positive relationship

exists between entrepreneurial self-efficacy and ELU. Second, our results are consistent with the hypothesis that creative bootlegging may exert a mediating effect on this relationship.

Theoretical contributions

This study makes three main contributions to the literature. First, it enhances our understanding of Embedded Lead Userness by shedding more light on its antecedents. Past literature has mainly focused on the role of expertise, use experience, and general lead userness (Schweisfurth, 2017; Schweisfurth & Herstatt, 2016) as antecedents of ELU. Our study sheds new light on a complementary aspect related to people's cognitive characteristics and, in particular, to workers' self-beliefs in their abilities. By doing so, our study builds a theoretical bridge between social cognitive theory and lead user theory.

In detail, our study provides evidence that individuals are more likely to act as lead users in their firms if they think they possess higher levels of entrepreneurial self-efficacy. This is probably due to their tendency to craft their identity at work through what they do in the workplace and to grow this identity over time within the firms in which they operate. Social cognitive theory describes self-efficacy as a self-regulation factor stimulating people's motivations and actions (Bandura, 1991). In this regard, individuals' beliefs provide them with the behavioral, cognitive, and motivational resources they need to generate novel ideas for products/services or evolving marketing plans. In simpler words, past experience and individual benefits (Schweisfurth, 2017) are not the sole motivators for employees to act as embedded users. Individuals' convictions about their abilities in relation to thinking creatively and overcoming current and future challenges can count as well.

Our second theoretical contribution consists in connecting the entrepreneurial self-efficacy and ELU through bootlegging as an underlying mechanism. Creative bootlegging provides a more nuanced understanding of the relationship by showing that the bootleg activities provide the opportunity for identity play among employees to boost their entrepreneurial attitude which result in showing more characteristics associated with leading-edge users. In this regard, employees with self-efficacy characteristics tend to find more time and freedom to play between the conventional routine tasks and what is assumed to be work out of love through unconventional and unofficial paths (Globocnik & Salomo, 2015). The group of employees showing self-motivation and conviction in entrepreneurial activities enjoy working around their personal ideas and take more time and risks to work on pet or unofficial projects through which they become more concerned about the status quo of products and services in current markets. In this regard, we suggest that self-efficacious employees take part in bootleg activities that, in turn, make them more willing to think of the dissatisfactions and problems associated with the products and services of their working firm and to pursue and then persist to provide ideas and solutions.

Third, this study makes a contribution in the relation between creative bootlegging and ELU by proposing and testing creative bootlegging as the underlying mechanism between entrepreneurial self-efficacy and ELU. We build on the literature that has shown that creative bootlegging is related to individuals' creativity and innovation (Criscuolo et al., 2013; Faullant et al., 2012). Different from previous studies, our study has shown that the effect of bootlegging as a self-regulating element on innovation is not "short-run", as shown by previous literature ('I give you more freedom and time, you produce more innovation') but also "long-run", meaning employees find freedom and time both secretly and with permission and invest it to gain more expertise on technological domain and market. This knowledge will become a useful resource to build upon for

several generations of new products. As proposed, higher levels of entrepreneurial self-efficacy make the employees of firms behave more proactively and undertake bootleg activities inside the firm, which in turn result in higher levels of ELU. Putting entrepreneurial self-efficacy aside, showing more creative bootlegging behaviour fosters lead user status among employees, which provides important implications for the study of ELU.

Accordingly, our study provides evidence of the importance of unofficial freedom that individuals provide themselves in relation to their willingness to become embedded lead users. This emphasises the positive effect of bootleg activities among employees like “stealing” official working time for working at unofficial innovation projects in which they strongly believe, generating ideas and problem solutions inside the firm and taking leading-edge status.

Managerial implications

Our study holds managerial implications, especially for people with leadership positions in firms. In particular, we showed how entrepreneurial self-efficacy and creative bootlegging could act in tandem in order to foster the lead user behaviour of employees.

Due to the increasing importance of users’ contribution for firms, managers who aim to benefit from internal lead users should generate a climate in which employees feel confident - and gain over time even more confidence - in behaving entrepreneurially and, at the same time, are not afraid of “stealing” some official working time to follow their own intuitions. Further, HR managers interested in obtaining such results should (a) select and hire new resources who possess an entrepreneurial attitude/mindset and (b) trigger the enhancement of entrepreneurial self-efficacy in employees, for example, through specific training programmes.

Moreover, managers and leaders should provide a flexible work environment for employees in order to let them work freely on their ideas and personal projects. A very famous example is the “15% policy” originally implemented by 3M Company through which employees have time and flexibility to work on their favourite and self-interest projects up to 15% of their time (Tidd, Bessant, & Pavitt, 2005). To do so, we suggest firms decrease the tight control over employees, especially on those who show a good entrepreneurial attitude and encourage let to experiment even in parallel to official obligations.

Limitations and suggestions for future research

Like any other research, our study is not immune to limitations. The most important one relates to the use of cross-sectional single-source data collection. We have applied all possible remedies to alleviate concerns of potential common method variance (Podsakoff, MacKenzie, & Podsakoff, 2012), including the post-hoc marker variable test, which did not reveal any issues with common method bias. However, another consequence of such an approach to data collection is that we cannot establish causality with absolute certainty. Although we have derived from theory our conceptual build-up of the hypotheses explaining the mediation model, additional experimental or longitudinal studies should be conducted to address issues related to potential reverse causality.

Future research should also examine the boundary conditions of the proposed mediating model in terms of a certain personality characteristic and/or context-specific factors such as management support and organisational climate (Globocnik, 2019; Sakhdari & Bidakhvidi, 2016). While this is beyond the scope of this study, future research could investigate the relationship between entrepreneurial self-efficacy and user entrepreneurs.

Conclusion

To avoid competitive irrelevance, companies need to become more systematic in the way they innovate. Firms need to count on curious and passionate employees who identify themselves with the products they produce and who become expert users of these products. This paper investigates the role played by a so far unexplored antecedent of embedded lead userness— entrepreneurial self-efficacy—and clarifies the role played by bootlegging activity between the two.

What we found is that employees who think and act in entrepreneurial ways are more likely to become embedded lead users. Bootlegging plays an important role in this process. By starting or taking part in non-official pet projects parallel to everyday work, employees can become precious resources for nurturing and boosting the innovation processes of firms.

Hence, firms should not be overly worried by the entrepreneurial attitude of their employees and their inclination to “follow their dreams” in the workplace but rather encourage these attitudes and behaviors across all functions and groups.

Acknowledgements:

This research was supported by the Slovenian Research Agency (grant numbers J5-9329 and P5-0410).

References

- Agostini, L., Nosella, A., & Filippini, R. (2016). Users and radical innovation performance: the moderating role of the organisational context. *Technology Analysis & Strategic Management*, 28(7), 798-810.
- Ahlin, B., Drnovšek, M., & Hisrich, R. D. (2014). Entrepreneurs' creativity and firm innovation: the moderating role of entrepreneurial self-efficacy. *Small Business Economics*, 43(1), 101-117.
- Axtell, C. M., Holman, D. J., Unsworth, K. L., Wall, T. D., Waterson, P. E., & Harrington, E. (2000). Shopfloor innovation: Facilitating the suggestion and implementation of ideas. *Journal of occupational and organizational psychology*, 73(3), 265-285.
- Bagozzi, R. P., & Yi, Y. (1988). On the evaluation of structural equation models. *Journal of the academy of marketing science*, 16(1), 74-94.
- Bandura, A. (1985). *Social foundations of thought and action: a social cognitive theory*: Prentice Hall.
- Bandura, A. (1989). Human agency in social cognitive theory. *American psychologist*, 44(9), 1175.
- Bandura, A. (1991). Social cognitive theory of self-regulation. *Organizational behavior and human decision processes*, 50(2), 248-287.
- Bandura, A., & Cervone, D. (1986). Differential engagement of self-reactive influences in cognitive motivation. *Organizational behavior and human decision processes*, 38(1), 92-113.
- Bandura, A., & Walters, R. H. (1977). *Social learning theory*: Prentice-hall Englewood Cliffs, NJ.
- Barakat, S., Boddington, M., & Vyakarnam, S. (2014). Measuring entrepreneurial self-efficacy to understand the impact of creative activities for learning innovation. *The International Journal of Management Education*, 12(3), 456-468.
- Baron, R. M., & Kenny, D. A. (1986). The moderator mediator variable distinction in social psychological-research-conceptual, strategic, and statistical considerations. *Journal of personality and social psychology*, 51(6), 1173-1182.
- Barron, F., & Harrington, D. M. (1981). Creativity, intelligence, and personality. *Annual review of psychology*, 32(1), 439-476.
- Berzonsky, M. D. (2004). Identity processing style, self-construction, and personal epistemic assumptions: A social-cognitive perspective. *European Journal of Developmental Psychology*, 1(4), 303-315.
- Brenton, B., & Levin, D. (2012). The softer side of innovation: The people. *Journal of Product Innovation Management*, 29(3), 364-366.
- Brislin, R. W. (1970). Back-translation for cross-cultural research. *Journal of cross-cultural psychology*, 1(3), 185-216.
- Bunce, D., & West, M. A. (1995). Self perceptions and perceptions of group climate as predictors of individual innovation at work. *Applied Psychology*, 44(3), 199-215.
- Cardon, M. S., Wincent, J., Singh, J., & Drnovsek, M. (2009). The nature and experience of entrepreneurial passion. *Academy of management Review*, 34(3), 511-532.
- Caza, B. B., Vough, H., & Puranik, H. (2018). Identity work in organizations and occupations: Definitions, theories, and pathways forward. *Journal of organizational behavior*, 39(7), 889-910.
- Chatterji, A. K., & Fabrizio, K. R. (2014). Using users: When does external knowledge enhance corporate product innovation? *Strategic Management Journal*, 35(10), 1427-1445.
- Criscuolo, P., Salter, A., & Ter Wal, A. L. (2013). Going underground: Bootlegging and individual innovative performance. *Organization Science*, 25(5), 1287-1305.
- Demetry, D. (2017). Pop-up to professional: Emerging entrepreneurial identity and evolving vocabularies of motive. *Academy of Management Discoveries*, 3(2), 187-207.
- Faullant, R., Schwarz, E. J., Krajger, I., & Breitenacker, R. J. (2012). Towards a comprehensive understanding of lead user-ness: The search for individual creativity. *Creativity and Innovation Management*, 21(1), 76-92.

- Franke, N., von Hippel, E., & Schreier, M. (2006). Finding commercially attractive user innovations: A test of lead-user theory. *Journal of Product Innovation Management*, 23(4), 301-315.
- Globocnik, D. (2019). Taking or avoiding risk through secret innovation activities—The relationship among employees' risk propensity, bootlegging, and management support. *International Journal of Innovation Management*, 23(03), 1950022.
- Globocnik, D., & Salomo, S. (2015). Do formal management practices impact the emergence of bootlegging behavior? *Journal of Product Innovation Management*, 32(4), 505-521.
- Harding, R. (1994). Forbidden fruit: an analysis of bootlegging, uncertainty and learning in corporate R&D. *Technovation*, 17(11-12), 734-735.
- Ibarra, H., & Obodaru, O. (2016). Betwixt and between identities: Liminal experience in contemporary careers. *Research in organizational behavior*, 36, 47-64.
- Ibarra, H., & Petriglieri, J. L. (2010). Identity work and play. *Journal of Organizational Change Management*, 23(1), 10-25.
- Kannan-Narasimhan, R. (2014). Organizational ingenuity in nascent innovations: Gaining resources and legitimacy through unconventional actions. *Organization Studies*, 35(4), 483-509.
- Kanter, R. M. (1988). When a thousand flowers bloom: Structural, collective, and social conditions for innovation in organizations. *Knowledge Management and Organisational Design*, 10, 93-131.
- Krueger Jr, N., & Dickson, P. R. (1994). How believing in ourselves increases risk taking: Perceived self-efficacy and opportunity recognition. *Decision sciences*, 25(3), 385-400.
- Lindell, M. K., & Whitney, D. J. (2001). Accounting for common method variance in cross-sectional research designs. *Journal of Applied Psychology*, 86(1), 114.
- Magnusson, P. R. (2009). Exploring the contributions of involving ordinary users in ideation of technology-based services. *Journal of Product Innovation Management*, 26(5), 578-593.
- Masoudnia, Y., & Szwajkowski, M. (2012). Bootlegging in the R&D departments of high-technology firms. *Research-Technology Management*, 55(5), 35-42.
- Mauer, R., Neergaard, H., & Linstead, A. K. (2017). Self-efficacy: Conditioning the entrepreneurial mindset. In *Revisiting the Entrepreneurial Mind* (pp. 293-317): Springer.
- Miner, A. S. (1994). *Seeking adaptive advantage: Evolutionary theory and managerial action*: Oxford University.
- Mitchell, J. R., & Shepherd, D. A. (2010). To thine own self be true: Images of self, images of opportunity, and entrepreneurial action. *Journal of Business Venturing*, 25(1), 138-154.
- Newman, A., Herman, H., Schwarz, G., & Nielsen, I. (2018). The effects of employees' creative self-efficacy on innovative behavior: The role of entrepreneurial leadership. *Journal of Business Research*, 89, 1-9.
- Petriglieri, G., Ashford, S. J., & Wrzesniewski, A. (2019). Agony and ecstasy in the gig economy: Cultivating holding environments for precarious and personalized work identities. *Administrative Science Quarterly*, 64(1), 124-170.
- Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual review of psychology*, 63, 539-569.
- Poetz, M. K., & Schreier, M. (2012). The value of crowdsourcing: can users really compete with professionals in generating new product ideas? *Journal of Product Innovation Management*, 29(2), 245-256.
- Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior research methods, instruments, & computers*, 36(4), 717-731.
- Sakhdari, K., & Bidakhvidi, E. J. (2016). Underground Innovation: How to Encourage Bootlegging Employees to Disclose Their Good Ideas. *Technology Innovation Management Review*, 6(3), 5-12.
- Salter, A., Ter Wal, A. L., Criscuolo, P., & Alexy, O. (2015). Open for ideation: Individual-level openness and idea generation in R&D. *Journal of Product Innovation Management*, 32(4), 488-504.

- Schmidt-Keilich, M., & Schrader, U. (2019). Sustainability innovation by integrating employees: the potential of sustainable embedded lead users. *International Journal of Innovation and Sustainable Development*, 13(1), 98-115.
- Schweisfurth, T. G. (2017). Comparing internal and external lead users as sources of innovation. *Research policy*, 46(1), 238-248.
- Schweisfurth, T. G., & Dharmawan, M. P. (2019). Does lead userness foster idea implementation and diffusion? A study of internal shopfloor users. *Research Policy*, 48(1), 289-297.
- Schweisfurth, T. G., & Herstatt, C. (2014). How internal users contribute to corporate product innovation: the case of embedded users. *R&D Management*, 46(S1), 107-126.
- Schweisfurth, T. G., & Herstatt, C. (2015). Embedded (lead) users as catalysts to product diffusion. *Creativity and innovation management*, 24(1), 151-168.
- Schweisfurth, T. G., & Herstatt, C. (2016). How internal users contribute to corporate product innovation: the case of embedded users. *R&D Management*, 46(S1), 107-126.
- Schweisfurth, T. G., & Raasch, C. (2015). Embedded lead users—The benefits of employing users for corporate innovation. *Research policy*, 44(1), 168-180.
- Speier, C., & Frese, M. (1997). Generalized self efficacy as a mediator and moderator between control and complexity at work and personal initiative: A longitudinal field study in East Germany. *Human performance*, 10(2), 171-192.
- Stajkovic, A. D., & Luthans, F. (1998). Social cognitive theory and self-efficacy: Goin beyond traditional motivational and behavioral approaches. *Organizational dynamics*, 26(4), 62-74.
- Swann Jr, W. B., & Bosson, J. K. (2010). *Self and identity*: John Wiley and Sons Ltd.
- Tidd, J., Bessant, J., & Pavitt, K. (2005). *Managing innovation integrating technological, market and organizational change*: John Wiley and Sons Ltd.
- Urban, G. L., & von Hippel, E. (1988). Lead user analyses for the development of new industrial products. *Management Science*, 34(5), 569-582.
- von Hippel, E. (1976). The dominant role of users in the scientific instrument innovation process. *Research Policy*, 5(3), 212-239.
- von Hippel, E. (1986). Lead users: a source of novel product concepts. *Management Science*, 32(7), 791-805.
- von Hippel, E., Franke, N., & Prügl, R. (2009). Pyramiding: Efficient search for rare subjects. *Research Policy*, 38(9), 1397-1406.
- Wood, R., & Bandura, A. (1989). Social cognitive theory of organizational management. *Academy of management Review*, 14(3), 361-384.
- Woodman, R. W., Sawyer, J. E., & Griffin, R. W. (1993). Toward a theory of organizational creativity. *Academy of management Review*, 18(2), 293-321.
- Zhao, H., Seibert, S. E., & Hills, G. E. (2005). The mediating role of self-efficacy in the development of entrepreneurial intentions. *Journal of applied psychology*, 90(6), 1265.

Appendix

Table A1 *Constructs and measures*

Construct	Question	Scale type	
Employee lead- userness (Schweisfurth & Herstatt, 2015)	I am often confronted with problems that cannot be solved by products available on the market (ours or our competitors')	1 (strongly disagree)	5 (strongly agree)
	I am dissatisfied with some pieces of commercially available products. ^[1] _{SEP}		
	In my opinion, there are still unresolved problems with products offered in the market.		
	If I was a client, I think I could have needs that are not covered by the products currently offered on the market.		
	I often get irritated about the lack of sophistication in certain products on the market.		
Entrepreneurial self-efficacy (Zhao et al., 2005)	Identifying new business opportunities?	1 (not confident at all)	5 (very confident)
	Creating new products?		
	Thinking creatively?		
	Commercialising an idea or new development?		
Creative bootlegging (Criscuolo et al., 2013)	I have the flexibility to work my way around my official work plan, digging into new potentially valuable business opportunities.	1 (strongly disagree)	5 (strongly agree)
	My work plan does not allow me the time to work on anything other than the projects I have been assigned to.		
	I enjoy tinkering around with ideas that are outside the main projects I work on.		
	I am running several pet projects that allow me to learn about new areas.		
	I proactively take time to work on unofficial projects to seed future official projects.		
Cognitive empathy (Schweisfurth & Herstatt, 2015)	I always sense exactly what users in our sector may want. ^[1] _{SEP}	1 (strongly disagree)	5 (strongly agree)
	I realise what other users mean even when they have difficulty in saying it.		
	It is easy for me to take the user's perspective.		