

# A Structural Equations Approach Applied to Social Innovation

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**Abstract:** Social innovation is a topic that has rapidly gained visibility during the last decades, where public organizations, private companies, and community groups are interested in developing more efficient and effective solutions to important societal challenges, such as poverty, demographic change, climate change, and unemployment. The University has been recognized for a long-time as a place of learning and academic research as well as a driver of economic growth, social mobility, and reducer of social inequality within and beyond its locality and region. Several researchers have advocated that the engagement of universities would foster the social innovation process, drawing on their existing resources and capabilities to benefit society at large. However, less is known about to relationship between creativity, entrepreneurial intention, and social innovation. Based on these arguments, the main aim of this study to investigate the effect of creativity and entrepreneurial intention on social innovation tendency within the academic community. The approach to empirical research adopted was a structural equation model. The sample used is comprised of students and professors or researchers from Portuguese universities. Confirmatory factor analysis supports the differentiation among the theoretical constructs, namely: self-creativity, creativity stimulated in the family, creativity stimulated in the university, entrepreneurial intention, and social innovation tendency. Results from the structural analysis support the suggestion that engagement in social innovation is positively related to self-creativity, family context, and entrepreneurial intention. Additionally, family role models seem to exert an effect on entrepreneurial intention. This study contributes to the body of social innovation literature at two levels of development: the core theoretical contributions are the research on social innovation tendency models and, at a broader level, on social innovation education. Particularly, this finding contributes to the line of research of social innovation tendency indicating that personality traits may have an essential role to play in developing theories of the entrepreneurial process.

**Keywords:** creativity, entrepreneurial intention, social innovation tendency, university, structural equation modeling

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## 1. Introduction

In the last decades, social innovation has been rapidly gained visibility, where public organizations, private companies, and community groups are interested in developing more efficient and effective solutions to important societal challenges, such as poverty, demographic change, climate change, and unemployment (Bazan et al,2020). However, there is a lack of consensus on the social innovation definition. Several definitions have emerged in the literature to explain the meaning of social innovation and to understand how social innovation happens (João-Roland and Granados, 2020). The term social innovation tendency is applied to the individual's tendency toward social innovation (Bulut et al,2013). Despite the fragmentation of this field, the models proposed to explain

the social innovation process highlighted idea generation as the first stage of that process (Benneworth and Cunha, 2015; Mulgan, 2006). In this context, creativity emerges as an important driver of social innovation initiatives and projects (Cunha et al., 2021). Creativity is defined as the generation of novel and useful ideas (Benneworth and Cunha, 2015; Mulgan, 2006). Creativity comprises an important element of business entrepreneurship (Ip et al., 2018), and the same about social entrepreneurship (Petkova, 2019). Zampetakis and Moustakis (2006) suggest that individual creativity is related to a capacity to think outside the box influencing an individual's decision to form a new venture. On the other hand, the literature related has been highlighting that creativity is sensitive to the context in which an individual develops (Zampetakis and Moustakis, 2006). Creativity is, therefore, described as the outcome of an interactive process in interpersonal settings (Zampetakis et al., 2011). Zampetakis and Moustakis (2006) and Zampetakis et al. (2011) highlighted the role of the family environment and academic community in prompting individuals' creativity and shaping entrepreneurial attitudes. For these authors, the academic community plays an essential role in encouraging creativity. Chambers (1977) argues that discouraging student ideas or being too critical is a behavior that is likely to hamper creativity among university students. Thus, the family and educational environment on the development of creativity should be underlined.

Entrepreneurship reflects the creativity and innovative activity by which individuals and organizations create value (Biraglia and Kadile, 2019). Centered on planned behavior theory, entrepreneurial intention is usually used as a good proxy for entrepreneurial action (Meoli et al., 2020). Research on entrepreneurial intention argues that having the intention to engage in entrepreneurial behavior is a strong predictor of actually engaging in entrepreneurial behavior (Farukh et al., 2018). Zhao et al. (2005) show that entrepreneurial intentions are influenced by psychological characteristics, entrepreneurship education, and familiar context. Several authors (e.g. Biraglia and Kadile, 2019; Meoli et al., 2020) argue for a positive association between personality traits and entrepreneurial intention, where the entrepreneurial intention can be employed as a proxy for entrepreneurial action within the university environment.

Universities have been emerging in literature as facilitators of the social innovation process, drawing on their existing resources and capabilities to benefit society at large (Cunha and Benneworth, 2013). Particularly, their attention focuses on promoting the entrepreneurial initiatives stemming from the university context, that is, entrepreneurship is perceived as an amplifier of economic development and inclusion, generating positive impacts on several social challenges (Shi et al., 2019). Therefore, to the best of our knowledge, empirical evidence considering the links between creativity, entrepreneurial intention, and social innovation tendency within the university context is scarce.

Different quantitative methodologies have been conducted among university students to investigate what factors influence intention linked to business entrepreneurship (e.g. Bazan et al., 2020, Zampetakis et al., 2011; Zampetakis and Moustakis, 2006). Particularly, these studies focus on business entrepreneurship: what leads students to start new business firms with a clear profit maximization orientation. However, few empirical studies address the relationship between creativity, entrepreneurial intention, and social innovation tendency within the academic community. In this context, one key issue emerges: How are creativity and entrepreneurial intention

affecting the social innovation tendency inside the academic community? Using the structural equation modeling approach, the current study is an attempt to provide an answer to this question. This research intends to contribute to understanding the influence of creativity on social innovation tendency as well as to investigate the effect of entrepreneurial intention on social innovation tendency.

### **1.1 Conceptual model and research hypotheses**

A structural model is proposed incorporating the relations between creativity, entrepreneurial intention, and social innovation tendency. In concordance with models proposed by Zampetakis and Moustakis (2006), Zampetakis (2008), Zampetakis, et al (2011), and Blut et al (2013), we propose a conceptual model (Figure 1) taking into account two constructs (creativity and entrepreneurial intention) to predict social innovation tendency within the academic community.

Based on the arguments mentioned above, we suggest that when creativity is stimulated in the family, has an impact on creativity stimulated in the university and entrepreneurial intention, which in turn influences self-creativity. On the other hand, the entrepreneurial intention is a good predictor of social innovation tendency and can be considered as a mediating factor in the relationship between creativity stimulated in family and social innovation tendency. Furthermore, to answer the societal challenges, the social innovation tendency entails a positive self-creativity. Thus, we propose the following hypotheses (Figure 1):

*H1: Creativity stimulated in the family context is positively related to entrepreneurial intention*

*H2: Entrepreneurial intention is positively related to self-creativity.*

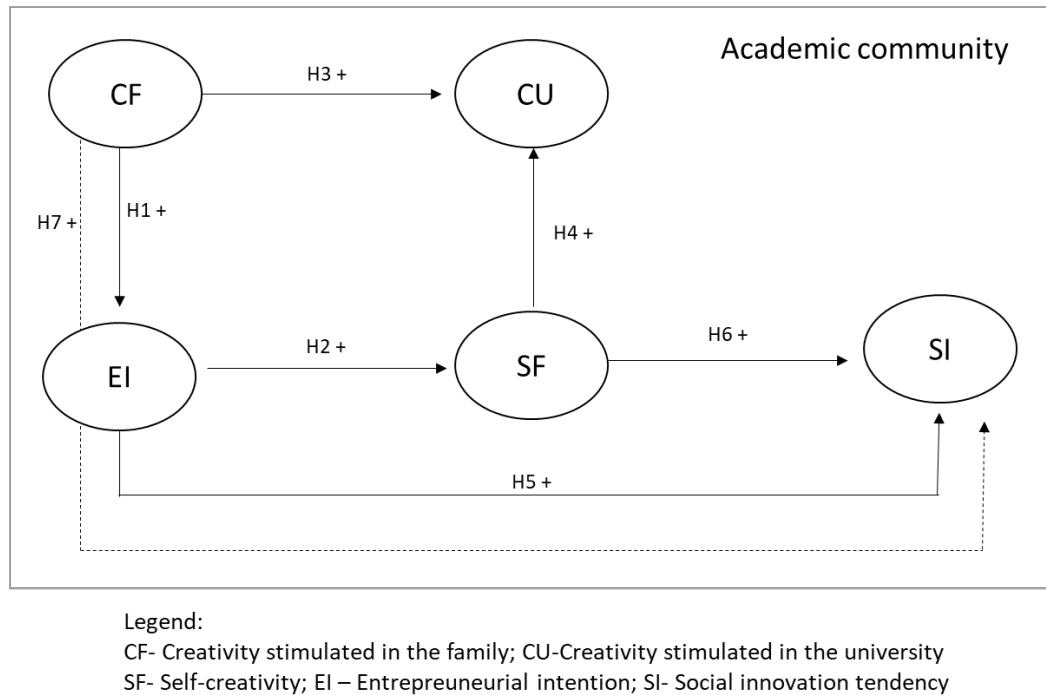
*H3: Creativity stimulated in the family context is positively related to creativity stimulated in the university*

*H4: Self-creativity is positively related to creativity stimulated in the university*

*H5: Entrepreneurial intention is positively related to social innovation tendency*

*H6: Self-creativity is positively related to social innovation tendency*

*H7: Entrepreneurial intention mediates the effect of creativity stimulated in the family on social innovation tendency*



**Figure 1:** Conceptual model

## 1.2 Overview of the study's aims

This study focus on three main goals: (1) to determine whether, and the extent to which, the entrepreneurial intention and individual creativity are associated with social innovation tendency; (2) to determine whether, and the extent to which, the individual creativity and the creativity supported in the family context are associated with creativity supported in the university; and (3) to investigate whether, and the extent to which the entrepreneurial intention mediates the relationship between creativity supported in the family context and social innovation tendency. To achieve these aims, a structural equations model approach was applied. This approach allows to clearly distinguish the relationship between the five constructs and verify the mediatory power of entrepreneurial intention.

## 2. Methodology

### 2.1 Participants and procedure

Participants were 301 individuals of the academic community, where 155 were students and 146 were faculty. Participation in the survey was voluntary, and there were no incentives for participants. The survey was digitally distributed between May and July of 2020. The questionnaire has been put online within the framework of a website whose address has been subsequently disseminated within the academic community in different Portuguese Universities, like a snowball effect perspective. The total sample means age was 37.55 years (Standard Deviation-SD=14.33, minimum=18 years, and maximum= 68 years). Sixty-three percent (63%) of the individuals that participated were women; Sixty percent (60%) of the participants were from the Social/Human Sciences area. The survey instrument contained the five theoretical constructs along with demographic data.

## **2.2 Measurement of theoretical constructs**

The five theoretical constructs included in the analysis were assessed self-reported. Responses to all items were made on a five-point Likert-type scale. The specific measures of the relevant constructs are outlined.

### ***Entrepreneurial intention (EI)***

We assessed the entrepreneurial intention using a two-item scale employed by Zampetakis and Moustakis (2006) and Zampetakis et al (2011): (EI1). Probably I'll start my own firm in the near future; (EI2). I would like to be an entrepreneur. The coefficient alpha for the entrepreneurial intention scale was 0.84.

### ***Self-Creativity (SC)***

To perceive an individual's attitude toward his own creativity, a three-item scale proposed by Zampetakis and Moustakis (2006) and Zampetakis et al (2011) was used: (SC1). I think I am a very creative person; (SC2). I like to try novel things, despite failure probability; (SC3). I can easily think of a lot and different ideas. The coefficient alpha for this scale was 0.72.

### ***Creativity stimulated in the family (CF)***

To ensure a degree of compatibility (Zampetakis and Moustakis, 2006; Zampetakis et al (2011) we assessed the creativity stimulated in the family with three items: (CF1). My family members easily adapt to several circumstances; (CF2). My family members are always thinking of new ideas for making their life easier; (CF3). I can freely talk to my family members about whatever concerns me. The coefficient alpha for this construct was 0.80.

### ***Creativity stimulated in the university (CU)***

To perceive whether creativity is promoted in the university context, we applied the three-item scale employed by Zampetakis and Moustakis (2006); Zampetakis et al (2011): (CU1). In my university you learn that there is more than one solution to a problem; (CU2). In my university you learn to examine old problems with new ways; (CU3). In my university the faculty encourages students to produce and employ new ideas. The coefficient alpha for this construct was 0.81.

### ***Social Innovation tendency (SI)***

We assessed the social innovation tendency using the eight-item scale proposed by Blut et al (2013): (SI1). I would like to improve the quality of community life by developing social services and new products; (SI2). I look for solutions to create political and social changes in society; (SI3) I want to develop new training techniques to increase the innovative capacity of the community; (SI4) I would use new technologies to solve problems and find solutions to social requirements; (SI5) I look for ways to increase social participation and cooperation in the society; (SI6) I create new ideas that will generate social value and make society more effective; (SI7) I look for opportunities that will change norms and rules; (SI8) I would like to be useful to the community without expectation of any financial benefit. The coefficient alpha for the social innovation tendency was 0.79.

### 2.3 Data analysis

In order to assess the hypothesized relationships, the Structural Equation Modelling (SEM) was employed, using the maximum likelihood estimation method (AMOS 7.0). We used a two-stage analytic procedure: in stage 1 confirmatory factor analysis was conducted, to estimate and test the hypotheses designed to explain the relationship between observed and no observed variables in the context under analyses. This approach investigates the validity of the construct considering the set of scales in which there is a strong theoretical hypothesis related to the structural model. During the second stage, the analysis of the measurement model and the structural model were combined. The sequential  $\chi^2$  differential test was performed to assess nested model comparisons. We applied several model fit statistics (RMSEA: Root Mean Square Error Approximation; CFI: Comparative Fit Index; GFI: Goodness of Fit Index; SRMR: Standardized root means square residual; PCLOSE: Tests for the closeness of fit; TLI: Tucker-Lewis index) (Byrne, 2016; Hair et al, 2014). Finally, to select among the competing structural models, we employed model selection for Structural Equation Modelling.

## 3. Results

### 3.1 Assessment of the measurement model

Table 1 shows the fit statistic for the measurement model. Construct reliability (CR), average variance extracted (AVE) and Cronbach's alpha values were higher than the threshold, which is 0.8, 0.5, and 0.7, respectively. To reach the threshold values of AVE, the item "SC2" from the construct "self-creativity" and also the items "SI1", "SI7", and "SI8" from the construct "Social innovation tendency" were eliminated. In summary, the results suggest that the proposed factor structure presents a statistically adequate and sufficient fit to the data, allowing to conduct an analysis of the structural model.

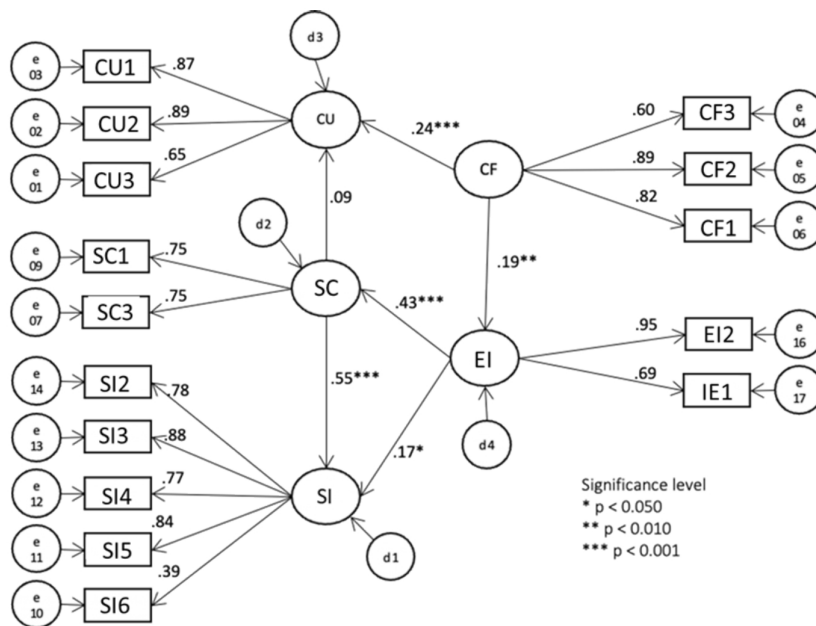
**Table 1:** Validity coefficients of the measurement model

	convergent validity			discriminant validity				
	CR	AVE	Cronbach's alpha	CU	CF	SF	SI	EI
<b>CU</b>	0.849	0.656	0.874	0.810				
<b>CF</b>	0.819	0.608	0.801	0.262***	0.780			
<b>SC</b>	0.725	0.569	0.723	0.127	0.225**	0.754		

SI	0.860	0.565	0.789	0.170*	0.148*	0.621***	0.751	
EI	0.817	0.698	0.841	-0.027	0.183**	0.424***	0.395***	0.836
Significance level: *p < .050; ** p < .010; *** p < .001								
Legend: CU- creativity stimulated in the university; CF- creativity stimulated in the family; SC- Self-creativity; EI- Entrepreneurial Intention; SI- Social innovation tendency								

### 3.2 Assessment of the structural models

Figure 2 displays the conceptual model with derived path coefficients from the structural equation analysis. This model revealed an excellent fit to the data:  $\chi^2(84) = 124.140$ ,  $p = 0.003$ ;  $\chi^2/df=1,478$ ; GFI= 0.947; AGFI= 0.925; CFI= 0.979; SRMR= 0.062; RMSEA= 0.040; and PClose= 0.871. Examining Figure 2, the model postulated that all relationship between the five constructs were statistically significant, except for the relationship between the “self-creativity” and “creativity stimulated in the university” constructs.



**Figure 2:** Standardized results of structural model assessment

### 4. Discussion

To our knowledge, this study is the first to analyze the combined effects of self-creativity, creativity supported in the family, and entrepreneurial intention on social innovation tendency. Table 2 presents a summary of the results against the hypotheses of this study.

**Table 2:** Summary of the results against the hypotheses of this study

Hypotheses		Result
H1	Creativity stimulated in the family is positively related to entrepreneurial intention	H1 supported ( $p < 0.010$ )

<b>H2</b>	Entrepreneurial intention is positively related to self-creativity	H2 supported ( $p < 0.000$ )
<b>H3</b>	Creativity supported in the family is positively related to creativity supported in the university	H3 supported ( $p < 0.000$ )
<b>H4</b>	Self-creativity is positively related to creativity stimulated in the university	H4 not supported
<b>H5</b>	Entrepreneurial intention is positively related to social innovation tendency	H5 supported ( $p < 0.050$ )
<b>H6</b>	Self-creativity is positively related to social innovation tendency	H6 supported ( $p < 0.000$ )
<b>H7</b>	Entrepreneurial intention mediates the effect of creativity stimulated in the family on social innovation tendency	H7 supported ( $p < 0.050$ )

The results were found to demonstrate that all hypothesized relationships proposed were supported, except for Hypothesis 4. The results do not reveal a relationship between self-creativity and creativity stimulated in the university, meaning that Hypothesis 4 is not confirmed.

The results obtained corroborate Hypothesis 1 that the creativity stimulated in the family is positively related to entrepreneurial intention ( $\beta = 0.19$ ,  $p < 0.01$ , standardized path coefficient in Figure 2). In the same line, Zampetakis and Moustakis (2006) argued that a family environment that promotes creativity has a positive effect on entrepreneurial intention. These authors suggest that a family example of entrepreneurship assumes an important role in the development of intention. Furthermore, the findings also show that entrepreneurial intentions are positively related to self-creativity, ( $\beta = 0.43$ ,  $p < 0.001$ , standardized path coefficient in Figure 2), supporting Hypothesis 2. Several authors (e.g. Zampetakis and Moustakis, 2006; Zampetakis, 2008; Zampetakis et al. 2011) argue that entrepreneurship is an act of creativity. Therefore, entrepreneurial behavior promotes individual creativity to solve problems and pose new questions (Bazan et al 2020; Chia and Liang, 2016). There is evidence in the literature that entrepreneurial intention precedes social behavior, particularly in the intention to solve social challenges (Prieto, 2011, Bazan et al 2020). Yildirim and Ansal (2017) and Zampetakis and Moustakis (2006) argue that policymakers should be interested in understanding the creation of narratives in the academic community as a mechanism that can affect policy decisions and engagement of universities on societal challenges (Benneworth and Cunha, 2015). In this sense, the findings report that creativity stimulated in the family predicts creativity stimulated in the university, hence Hypothesis 3 is confirmed ( $\beta = 0.24$ ,  $p < 0.001$ , standardized path coefficient in Figure 2). Figure 2 displays that entrepreneurial intention is positively related to social innovation tendency, corroborating Hypothesis 5 ( $\beta = 0.17$ ,  $p < 0.05$ , standardized path coefficient in Figure 2).

Creativity is often perceived as an essential component of problem-solving and the driving force of innovation and entrepreneurship (Yildirim and Ansal, 2017). Particularly, the idea generation that involves creativity is the first stage of the social innovation process (Benneworth and Cunha, 2015). In this sense, the findings were found to corroborate that self-creativity is positively related to social innovation tendency, supporting Hypothesis 6 ( $\beta = 0.555$ ,  $p < 0.001$ , standardized path coefficient in Figure 2). According to Yildirim and Ansal (2017), Zampetakis and Moustakis, (2006), Zampetakis (2008), and Zampetakis et al (2011), the environment in which the individual lives and interacts influences interrelations and causality among creativity, innovativeness, and entrepreneurial skills.



Hypothesis 7 posits that entrepreneurial intention mediates the effect of creativity stimulated in the family on social innovation tendency. The results found to support this hypothesis, that is, the entrepreneurial intention of individuals has a mediating effect on this relationship ( $\alpha = 0.19 \times 0.17 = 0.03$ ,  $p < 0.05$ , standardized path coefficient in Figure 2). Thus, the present study supports the suggestion that engagement in social innovation is positively related to self-creativity, family context, and entrepreneurial intention.

## **5. Conclusion**

The present study analyses the effect of creativity and entrepreneurial intention on social innovation tendency within the academic community. For this, a structural equation modeling approach was conducted. Results from the structural analysis suggest that self-creativity, family context, and entrepreneurial intention have a positive effect on individuals' social innovation tendency.

In terms of implications, this study contributes to the development of social innovation tendency models indicating that personality traits may have an essential role to play in developing theories of the entrepreneurial process. Additionally, this research contributes to a broader level of social innovation education. Despite this study representing an important step in identifying factors associated with social innovation tendency additional research is required. For example, triangulation methods are recommended, to investigate the perception and attitudes regarding creativity and social innovation tendency.

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