



Taking Science Fiction seriously: Unveiling its relationship with employee's Innovative Work Behavior

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ABSTRACT

While existing literature acknowledges the role of science fiction in foreseeing technological advancements, a notable gap persists in understanding the underlying factors that drive or hinder individuals from the intention to generate and promote ideas gathered through science fiction. Our research model aims to shed novel light on what factors influence employees' propensity to generate and promote ideas inspired by science fiction, through the lenses of institutional theory. Purposefully, we frame science fiction methodologies inside the Innovative Work Behavior discourse, as science fiction could be a fruitful tool to generate and promote ideas, and we investigate the interplay of rational and institutional influences on such behaviors. The findings provide valuable insights that can be leveraged to design and implement effective methodologies within organizational settings. Our study, based on data from 480 employees, employs Structural Equation Modeling to reveal the pivotal role of normative influence in idea generation, while idea promotion exhibits a robust association with cultural-cognitive influence, pinpointing the dual phase of science fiction methodologies.

1. Introduction

Science fiction (or sci-fi), intended as the narrative form that deals with alternative worlds and scenarios (Bell et al., 2013; Bina et al., 2020; Dator, 1998) has inspired innovation since the early 20th century. Cases of sci-fi artifacts becoming reality are indeed numerous, such as in the case of the jet-powered hoverboard used to cross the English Channel by Franky Zapata, the usage of DNA as a storage system for information or the implementation of smart home technologies (Lee, 2021; Michaud and Appio, 2022). The corporate world has therefore started to look up to sci-fi as a possible source of inspiration. Companies use sci-fi stories to reflect upon the near and distant future, and to generate technological ideas that might improve society. Sci-fi can help companies explore their technological capabilities, and the commercialization potential of their innovations by uncovering how these might interact in alternative worlds (Gibbs, 2017). In doing so, sci-fi stimulates deep reflections on the interactions between technologies and society, and might prevent companies from developing a tunnel vision of their innovations (Pinto et al., 2021; Vint, 2021). It is thus not surprising that Intel collaborated

with sci-fi novelist Brian David Johnson, to write sci-fi stories collected in "The Tomorrow Project Anthology" (Johnson, 2011); or Microsoft collaborated with nine award-winning sci-fi authors to project novel technologies in the future in "Future Visions" (Bear et al., 2015), to understand how future development of their technologies might influence the world and people's lives. In essence, sci-fi is a form of technological foresight that organizations can adopt to generate radically new ideas and processes (Achiche et al., 2013; Marion and Fixson, 2021; Michaud and Appio, 2022).

Despite its appeal for some companies, individuals might elsewhere be reluctant to generate or propose ideas that are explicitly inspired by sci-fi (Baumer et al., 2020; Grimshaw and Burgess, 2014). They might fear they will not be taken seriously by their organization because of the unconventional origin of their ideas. As Johnson (2013b, p. 80) noted: "When I said to my engineering colleagues at Intel, (...) I use science fiction based on science fact to help build better technology solutions, I pretty much figured they'd kick me out of the lab.". Understanding what motivates individuals to generate and promote ideas inspired by sci-fi is central to our contribution. Past research has used experimental designs to study

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the influence of sci-fi on innovation outcomes (e.g., Dunne and Raby, 2013; Johnson, 2011; Bear et al., 2015), or explored how specific new tools based on sci-fi have been developed or exploited throughout the innovation process (e.g., Fergnani and Song, 2020). This body of research has mostly overlooked individual-level analysis exploring the motivations and barriers that employees and managers face when they generate and promote ideas inspired by sci-fi in their corporate settings. This individual level of analysis is essential to understand what organizations might need to do to stimulate their employees and managers to use sci-fi for innovation purposes. Following this, our study aims to explore the drivers of employees' engagement with the generation and promotion of sci-fi-based ideas in an organization.

Our study is driven by the overarching hypothesis that individuals' engagement with sci-fi for innovation purposes might suffer from legitimacy concerns, i.e. individuals might perceive sci-fi as inconsistent with institutionalized values, norms, rules, beliefs, and taken-for-granted assumptions (cf. Barley and Tolbert, 1997). Our empirical model thus conceives employees' engagement with sci-fi as a form of innovative work behavior (IWB) (cf. Janssen, 2000). Then, our model evaluates the innovative work behavior correlation with (i) individuals' acceptance of sci-fi as a useful innovation tool (cfr. Ajzen and Cote, 2008) and (ii) individuals' perception of its fit with regulative, normative and cognitive pillars of their organization (cf. Scott, 2003).

2. Theoretical framework and hypotheses development

2.1. Sci-fi engagement as innovative work behavior

We consider individuals' engagement with sci-fi as a form of Innovative Work Behavior (IWB). IWB represents individuals' intentional initiation and introduction of new ideas (on processes, products, or procedures) in their organization (Farr and Ford, 1990; Janssen, 2000). IWB refers to 'everyday innovation' dependent on the employees' intentional efforts to provide beneficially novel outcomes at work. IWB includes three dimensions, i.e., idea generation, promotion, and implementation (Janssen, 2000; Kanter, 1988; Scott and Bruce, 1994). Idea generation refers to the recombination or 'bisociation' (Koestler, 1989) of previously unrelated elements – e.g., information, concepts, and thoughts – into a new pattern to solve problems or to improve performance (Kanter, 1988). Idea promotion tackles the issue of organizational legitimization of newly generated ideas, which typically do not match the status quo. Through promotion, individuals with formal or informal roles push innovation by expressing enthusiasm and confidence, building consensus, engaging the right people, and creating coalitions around the new projects (Shane, 1994; Wilson and Mergel, 2022; Wittenstein, 2022). Idea implementation eventually deals with how innovation is executed within the organization, in terms of new products, services, solutions, and work processes (Kanter, 1988). In this study, we will focus primarily on idea generation and idea promotion, as the two forms of IWB that the individual can control with greater autonomy.

Employees' engagement with sci-fi can be classified in two forms relevant to their IWB.

First, employees might engage in the *analysis of the sci-fi landscape*, i.e. analysis of existing sci-fi content available in books, movies, TV shows, comics, or video games, and extracting valuable insights that could be used by the organization (Hällgren and Buchanan, 2020; Kotecha et al., 2021). Such a process can be performed through the following steps: source identification, sample selection (Bina et al., 2020; Fergnani and Song, 2020; Zheng and Callaghan, 2018), and analysis of the content (Kotecha et al., 2021). This analysis aims at presenting new technological or process solutions. Some examples of methodologies based on these approaches are "Diegetic Innovation Templating", a method to identify fictional inspirations and then map their potential route to reality, as shown by the Sunfed Fashion example, creating fashion designs starting from sci-fi well-known stories (Zheng

and Callaghan, 2018), and the "Six Scenario Archetypes", which extracts predetermined archetypal images of the future from the sci-fi stories (Fergnani and Song, 2020). The use of these approaches allows organizations to draw specific themes and ideas from utopic and dystopic futures for the ideation of novel ideas, unimaginable technologies, risks, warning signals and to consider possible responses (Kotecha et al., 2021; Zheng and Callaghan, 2018; Hällgren and Buchanan, 2020), as well as to align with the society imaginary about the future by embedding society expectations, aspirations and fears (Fergnani and Song, 2020; Osawa et al., 2022; Zheng and Callaghan, 2018).

Second, employees might engage with the *design of sci-fi stories* to explore futures for organizational purposes. Some examples of this approach are "Design Fiction", a design practice that starts from current trends and uses speculation to create disruptive scenarios of the future (Kirby, 2010; Rapp, 2020), as in the cases of the narratives of Microsoft and Intel, and, "Science Fiction Prototyping", which aims at the creation of short fictions on a particular technology, which starts from current scientific knowledge, created to act as a prototype for people to explore the implications, effects, or ramifications of the technology (Brucker-Kley et al., 2021; Harwood et al., 2019; Johnson, 2013b). This method was used by Lowe's to envision the Holoroom,¹ inspired by Star Trek holodeck (Popper, 2015), by Visa² to create technology kiosks and immersive touchscreen environments to explore the future of payments, as well as by Cisco to investigate and communicate data security issues.³ By creating sci-fi stories and prototypes, organizations can promote creativity and imagination, allowing a better comprehension of the dangers that could manifest in a dystopian context (Pinto et al., 2021), as in the case of Cisco data security, and long-term critical thinking (Merrie et al., 2018; Selwyn et al., 2020; Spiers et al., 2022), thus opening up all diverse possibilities to collectively discuss a preferable future for a given group of people, companies or societies (Potstada and Zyburá, 2014). Indeed, a more vivid materialization of a dystopian future can change how objects and themes play in specific contexts and raise questions about novel challenges and social, ethical, pedagogic, and management issues (Cox, 2021; Selwyn et al., 2020).

The analysis and creation of sci-fi stories can inform employees' idea generation efforts, and can be particularly a source of inspiration for engineers, scientists, and inventors who can envision innovation opportunities, such as utopian technologies to include in R&D programs and product innovation ideas, evaluate and envision the socio-technological change that could emerge as a result of these innovations, promoting and sharing ideas inside and outside the organization (Lee, 2021; Michaud and Appio, 2022). These approaches can inspire disruptive innovations (Michaud and Appio, 2022). The generative potential of sci-fi design tools may be used to drive creativity and generate unique ideas, as in utopian and dystopian futures existing and non-existing pieces of information can be combined and recombined in a completely novel whole (Kotecha et al., 2021; Michaud and Appio, 2022; Rapp, 2020; Zheng and Callaghan, 2018). For instance, such methodologies allow researchers, employing creative processes, to have a novel understanding of innovations-in-use, by generating ideas about how consumers and society will interact with the innovation in the future possibility space (Potstada and Zyburá, 2014; Harwood et al., 2019). The fictional story is a powerful tool for this purpose, as it has been shown to spur people to reflect on the development of ideas and their relation with wider changes happening in the individual, society, and at the political and economic level (Rapp, 2020; Selwyn et al., 2020; Michaud and Appio, 2022).

The analysis and creation of sci-fi stories can also inform employees'

¹ <https://corporate.lowes.com/newsroom/press-releases/science-fiction-inspires-lowes-holoroom-and-home-improvement-innovation-06-11-14>.

² <http://www.ioncreativestudios.com/visa-innovations>.

³ https://threatcasting.asu.edu/sites/default/files/2019-11/Cisco_Two_Days_After_Tuesday.pdf.

idea promotion effort, i.e. convey a specific interpretation of a new product, process or service through the sci-fi metaphor. Idea promotion could leverage sci-fi storytelling potential, to create a compelling and engaging story around innovation's introduction (Baumer et al., 2020; Pinto et al., 2021). The engaging narratives and visual representations typical of sci-fi can add clarity in sharing a specific perception of the future and communicate ideas within the organization (Pinto et al., 2021; Selwyn et al., 2020). The fiction can motivate, inspire and align the company's members towards the same vision (Baumer et al., 2020; Pinto et al., 2021), by writing together a compelling story around such vision, following the engaging style of the sci-fi genre; and it is a mean for idea promotion which in turn can drive organizational change, by leveraging the empathic and motivational storytelling characterizing sci-fi, which could touch upon employees and managers' emotions and feelings concerning future states of the organizational evolution (Janssen, 2000; Popper, 2015).

2.2. Innovative work behavior hypotheses

Idea generation and idea promotion are likely to be strongly correlated (Mascareño et al., 2021; Perry-Smith and Mannucci, 2017). Reflective measures of IWB assume that innovative individuals engage with both idea generation and idea promotion, because both behaviors are necessary for expert work (e.g., De Jong & den Hartog, 2010; Janssen, 2000). Individuals who generate a new idea, for instance, are likely to also engage in its promotion inside the organization, e.g., to gather resources for its implementation, and to improve their organizational standing (Scott and Bruce, 1994). Furthermore, individuals do not engage with idea generation in isolation from others; rather, they are likely to connect, through a combination of weak ties and strong ties, with several other individuals in their own organization. The network-building typical of creative efforts is likely to facilitate subsequent promotional attempts (Howell and Boies, 2004). In essence, the generation of new ideas gains organizational value only when it is followed up by its promotion in the organization. For these reasons, we hypothesize that a prior proper Idea Generation (IG), as in the case of being inspired by sci-fi stories or prototypes, can be positively related to a higher level of Idea Promotion (IP) of ideas inspired by sci-fi.

H1. *Idea Generation is positively correlated with Idea Promotion.*

2.3. Antecedents of sci-fi IWB

Individuals' engagement with organizational behaviors is typically driven by a combination of volitional and institutional factors (Emirbayer, 1997; Lawrence et al., 2009). On the one side, actors are driven by a pragmatic and rational motivations and thus behave strategically to pursue what is useful for them in the cultural and historical situation in which they are embedded (Ortner, 1984). On the other side, actors internalize rules, social norms and cognitive frameworks that dictate what 'should be done' (Lawrence et al., 2009).

Existing research on IWB has mostly focused on volitional drivers as it derives mostly from behavioral scholars investigating how personal qualities and work environment factors (such as autonomy, tasks, and trust) influence individual behaviors (Shanker et al., 2017). The factors determining the intentionality of behavior have been studied by several behavioral models, such as the theory of reasoned action (Ajzen and Fishbein, 1980), the technology acceptance model (Davis, 1989), and the theory of planned behavior (Ajzen, 1991). These models all include attitude as a key predictor of behavioral engagement. Perceived usefulness, i.e. the belief that the behavioral output is useful for the self and the organization, is especially important in forming individuals' attitudes. Individuals believing that sci-fi ideas are relevant to the organizations are more likely to pursue idea generation and promotion, i.e., to engage with ad-hoc methods inspired by sci-fi, and to proactively convince others that sci-fi is useful for their own work. Conversely,

individuals who do not believe in the organizational value of sci-fi ideas are unlikely to put any effort into it. As the positive correlation between perceived usefulness and IWB has been frequently displayed in past research (Kwon and Kim, 2020; Ramamoorthy et al., 2005), we hypothesize that it also applies in the context of sci-fi ideas.

H2a. *The Perceived Usefulness is positively correlated with Idea Generation.*

H2b. *The Perceived Usefulness is positively correlated with Idea Promotion.*

IWB is also a complex and non-routine behavior where employees might move beyond traditional thinking to generate new ideas and might challenge others' routines and beliefs to promote them. This is especially the case for new ideas based on sci-fi thinking, which might be regarded as unorthodox or irrelevant by peers and superiors. The generation and promotion of ideas inspired by sci-fi might face significant legitimacy issues in an organization, and are likely to emerge only when the institutional context of an organization allows for it (Kessel et al., 2012; Scott, 2003). Individuals embedded in organizations whose regulations, social norms and cognitive frameworks antagonize ideas inspired by sci-fi are (i) likely to form negative opinions about sci-fi as well and (ii) unlikely to engage with idea generation and promotion even though they might, individually, perceive sci-fi as useful.

Individuals' behaviors are guided by three forms of institutional pressure, i.e., regulative pressures channeled by laws, rules, policies, and sanctions indicating what individuals 'must do' and 'must not do'; normative pressures channeled by social norms and moral expectations that govern what individuals 'should do' and cultural pressures channeled by shared beliefs and cognitive schemas that stimulate individual attitudes ('you cannot do otherwise') (Scott, 2003). Institutional pressures occur at any level of analysis, and particularly between organizations and their employees (Besharov and Smith, 2014). At the organizational level, employees' behaviors are shaped by a web of rules, regulations, values, social norms, beliefs, and taken-for-granted assumptions (Barley and Tolbert, 1997), which are not necessarily designed by management but emerge spontaneously over time (Barley and Tolbert, 1997; Scott, 1995, 2001; Vermeulen et al., 2007).

The Regulative Influence is based on force, fear, and experience, tempered by rules (North & Douglass, 1990; Scott, 2003). Regulative elements might be conveyed through proper carriers, such as rules and laws, but also through protocols or standard operating procedures, which actors should conform to (Scott, 2003). Regulations in an organization are designed to compel its employees to comply with its rules, otherwise sanctions would be delivered (Zucker, 1987). Organizations can be expected to introduce regulations to create the conditions to start and stabilize new behaviors, e.g., by creating rules that confer status, rights, resources and incentives to innovators; by deterring or sanctioning individuals that antagonize change; and by creating reward/incentive conditions that allow for a stable engagement with risky innovative behaviors (Lawrence and Suddaby, 2006). We extend this explanation to individuals seeking to generate and promote ideas through sci-fi methods. Specifically, the more companies adopt regulative mechanisms that direct, if not compel, individuals towards sci-fi activities, and/or deter, if not sanction, individuals from not engaging with sci-fi methods – the more the individuals are likely to comply with innovative work behaviors.

H3a, H3b. *Regulative Influence positively affects IWB, both in terms of idea generation and promotion.*

The Normative Influence is based on prescriptive expectations as the basis of the social order, as internalized social obligations are as important as external sanctions (March and Olsen, 1998; Scott, 2003). In organizations, normative elements can be conveyed through values, expectations, and standards, as well as job routines and roles, and there are relevant peer groups for assessing compliance, monitoring, and evaluation (Lawrence and Suddaby, 2006; Scott, 2003). Previous

research provides extensive evidence that social pressures explain the likelihood of innovative behaviors at any level of analysis (Caldwell and O'Reilly, 2003; Montalvo, 2006; Perry-Smith and Mannucci, 2017; Zhang-Zhang et al., 2022). Organizational behavioral models have also acknowledged the importance of normative influences. For instance, the theory of planned behavior includes the concept of subjective norm to emphasize how individuals tend to replicate behaviors they observe in their social proximity, and particularly from similar peers or relevant leaders (cf. Ajzen, 1991; Venkatesh et al., 2003). Following this, we extend this explanation to individuals generating and promoting ideas through sci-fi methods. Specifically, the stronger the social influence (either by peer pressure or by leaders' example) in favor of the application of sci-fi methods, the more the individuals are likely to emulate and replicate innovative work behaviors in this area.

H4a, H4b. *Normative Influence positively affects IWB, both in terms of idea generation and promotion.*

The Cultural-Cognitive Influence is aimed at establishing a shared set of beliefs, languages and logics of actions that individuals take for granted in their job (Scott, 1995, 2003). Extensive research has already pointed out that favorable innovation cultures and dedicated cognitive devices (e.g., innovation frameworks, training) are essential for creativity and innovation, so much so that individuals would not need to be constantly incentivized or monitored (Anderson et al., 2014; Crossan and Apaydin, 2010). Cognitive and cultural frameworks can become the strongest influence for individuals, as they shape how individuals tacitly interpret the rules and social pressures of their organization. For instance, while rules and regulations coerce individuals into performing specific behaviors, cognitive and cultural frameworks affect how such rules are actually enforced; and how much individuals can interpret their application (Shadnam and Lawrence, 2011; Zilber, 2008). Several studies have thus argued that institutional work is needed to make sure that the explicit regulative and normative pressures coming from the organization and from peers are consistent with the more implicit and tacit aspects of the culture and cognitive frameworks (Lawrence and Suddaby, 2006; Perkmann and Spicer, 2008; Radaelli et al., 2017). This is usually done by elaborating on the core assumptions of the rules and norms; decreasing the perceived risks of new behaviors; educating actors in the knowledge and skills; and associating new practices with existing and taken-for-granted ones. Building upon this, we hypothesize that the stronger the cognitive and cultural influence in favor of innovative methods, the more the individuals are likely to embrace innovative work behaviors informed by sci-fi.

H5a, H5b. *Cultural Influence positively affects IWB, both in terms of idea generation and promotion.*

The direct correlations between institutional influences and IWB imply that employees pursue sci-fi ideas to be consistent with the institutional expectations of their organizations (i.e. because they must, should, cannot do otherwise) – regardless of what they individually think of sci-fi ideas. Yet, institutional pressures are likely to shape how and why individuals perceive the generation and promotion of sci-fi ideas as useful for others (Abdelnour et al., 2017; Lawrence et al., 2009). Regulations recommending that individuals must engage with sci-fi ideas stimulate individuals to think about why this institutional pressure is so strong. Following this, individuals might do more than mindlessly comply with the institutional pressure, and instead internalize its request as valuable (Scott, 2003). Likewise, normative pressures emanating from relevant others are likely to influence individuals' interpretation of reality, i.e., if peers and superiors strongly believe that sci-fi ideas are important for the organization, individuals are more likely to accept that sci-fi ideas are indeed useful (cf. also the concept of subjective norm in Ajzen, 1991). Finally, cognitive-cultural pressures are explicitly aimed at shaping individuals' perceptions of behaviors and outputs, i.e. to institutionalize taken-for-granted assumptions of what is useful or not (Scott, 2003). Following which, we hypothesize:

H6a. *The Regulative Influence is positively correlated with Perceived Usefulness.*

H6b. *The Normative Influence is positively correlated with Perceived Usefulness.*

H6c. *The Cultural Influence is positively correlated with Perceived Usefulness.*

2.4. Control variables

Some control variables were included in the model. We controlled for the time the individual had spent in the company (Backes-Gellner and Veen, 2013), the innovativeness of the product or service produced by the company (Wulfen, 2011), the size of the company, as in extant literature both start-ups to multinational cases are present (Bell et al., 2013; Russell and Yarosh, 2018), as well as the individual interest in sci-fi.

3. Methods

3.1. Measurement development

We designed a questionnaire to measure the six constructs, namely Regulative Influence, Normative Influence, Cultural-Cognitive Influence, Perceived Usefulness, Idea Generation, and, Idea Promotion. Each construct was measured through multiple items adapted from previously validated measures or developed based on a literature review.

For what concerns the institutional constructs, past research shows few examples of empirical measures, which are mostly investigated through the qualitative methodology. For this reason, non-institutional items were retrieved from extant literature and adapted to the context. Three items for each institutional construct were developed (Ajzen, 1991; Khoja et al., 2007; Ravlin and Meglino, 1987).

The individual attitude was measured through the items to measure the construct of the Perceived Usefulness of the Technology Acceptance Model. The three items were retrieved from the widely tested scales (Davis, 1989; Davis and Venkatesh, 2004) and adapted to the reference contexts.

For what concerns, instead, the constructs related to IWB, namely Idea Generation and Idea Promotion, the three items for each construct were built over the ones tested in the works of Janssen (2000) and de Jong & den Hartog (2010). The final items partially depart from the original ones as they were adapted to the context and aimed to measure sci-fi as support for IWB. Additionally, they were translated into Italian and adapted to the target respondents. All the items were measured through a five-point Likert ranging from strongly disagree (1) to strongly agree (5), and are shown in Table 1.

Additionally, a preliminary set of questions has been dedicated to gathering general information on respondents, such as personal and demographic data, and to measure the control variables. The first part of the questionnaire includes 11 questions concerning the socio-demographic information of the respondents as well as information about the place where they work. Indeed, questions were related to respondents' age, gender, nationality, education, and interest in Sci-fi. Additionally, some questions were included about the size of the company, type of product or service produced in the company, time spent by the respondent in the company, role of the respondent, and experience of the company with Sci-fi approaches.

3.2. Data collection

The research model was empirically tested by developing a questionnaire, which was implemented on Qualtrics and distributed on LinkedIn. A cover letter explaining the study objectives was written to diffuse the post. The post was shared by four co-authors and reached around 20800 impressions among a network of professionals in different

Table 1
Results of the CFA.

Construct	Item Code	Item	Factor Loading	Cronbach's alpha	CR	AVE
Regulative Influence (RI)	RI1	If I tried to promote sci-fi activities in my company, I would run up against the procedures that are in place in the company.	0.7545	0.8606	0.8653	0.6825
	RI2	Some business rules would prevent me from participating effectively in sci-fi activities.	0.8679			
	RI3	The regulations I follow in the company would not allow me to promote participation in sci-fi activities.	0.8514			
Normative Influence (NI)	NI1	I fear that the colleagues I value most do not consider it appropriate to promote activities based on sci-fi ideas.	0.5884	–	–	–
	NI2	The colleagues I value most would think it would be interesting to participate in activities based on sci-fi ideas.	0.8163	0.7371	0.7412	0.5899
	NI3	The colleagues I consider more knowledgeable would not think that I have wasted my time promoting these sci-fi-based activities.	0.7166			
Cultural Influence (CI)	CI2	My company now pushes us to think "out of the box".	0.8149			
	CI3	My company engages employees in proposing ideas that can lead to product and/or process innovations.	0.7405			
Perceived Usefulness (PU)	PU1	Sci-fi-based activities could be useful for me to acquire tools for thinking innovatively.	0.8752	0.8616	0.8732	0.6972
	PU2	Sci-fi-based activities could be useful for me to think outside of the box.	0.8559			
	PU3	Sci-fi-based initiatives could help me think in a more structured way about innovation.	0.7700			
Idea Generation (IG)	IG1	Through sci-fi-based activities, I will develop considerations of possible future scenarios.	0.8948	0.8747	0.8701	0.6913
	IG2	Sci-fi-based activities would help me think about the future impacts of some technologies.	0.8170			
	IG3	Sci-fi-based activities would help me think about the future impacts of some technologies.	0.7783			
Idea Sharing (IS)	IS1	During sci-fi-based initiatives, I would gladly share my insights into the future with colleagues.	0.8637	0.8896	0.8860	0.7215
	IS2	During sci-fi-based activities, I would not just keep to myself my thoughts on the implications of technological evolution and/or society.	0.8592			
	IS3	During sci-fi-based activities, I would discuss with my colleagues how to deal with the future competitive environment.	0.8248			

companies. Data collection has been performed in compliance with GDPR, as respondents have been informed and ensured anonymity.

Among the 480 responses collected, with a response rate of around 2%. A total number of 269 questionnaires were fully completed. To ensure the validity of institutional pressures, a threshold of experience in the current company was set to be at least 2 years for considering the answer included in the analysis. The final number of answers analyzed was 194.

3.3. Data analysis

First, data were analyzed with descriptive statistics to obtain insights from the questions about demographics and personal information. Second, Structural Equation Modelling (SEM) was used to test the hypotheses and the relationships among the various constructs. The second part of the analysis was carried out in Stata 17.

For the model testing, firstly, the Kaiser-Meyer-Olkin (KMO) test was applied to verify the sample adequacy for the Exploratory Factor Analysis (EFA). The KMO result is above 0.7, indicating that the sample is adequate to conduct an EFA (Barrett et al., 2005). The Exploratory Factor Analysis (EFA) has been carried out through the Principal Component Methodology to evaluate the number of components and the loadings. Loadings were rotated through the Kaiser normalization, and all six components were retained, although one item was dismissed (CI1), as it showed a loading of 0.3595 below the threshold of 0.45 (Hair, J. F., 1998)

Additionally, data were assessed concerning the common method variance using Harman's one-factor test (Podsakoff and Organ, 1986). Common method bias would be represented by a single factor emerging accounting for the majority of the covariance in the interdependent and dependent variables. As each of the principal constructs explains roughly equal variance, the data do not indicate the presence of common method bias in the collected data.

Data analysis utilized a two-stage approach of Structural Equation Modeling as recommended by Anderson and Gerbing (1988). The first stage involves a Confirmatory Factor Analysis, while the second stage

tests the structural relationships among latent constructs.

The validity and consistency of the method to measure the constructs have been assessed through the Confirmatory Factor Analysis (CFA). The factor loading for each item was computed and assessed again at the threshold of 0.7 (Hair et al., 2006). The factor loading for item NI1 fell below this threshold and was thus eliminated. Additionally, the convergence validity has been assessed by two indicators: Composite Reliability (CR) and Average Variance Extracted (AVE). The CR of all scales exceeds the 0.7 threshold for acceptable reliability, as suggested by (Bagozzi and Yi, 1988), as well as AVE exceeds the suggested threshold of 0.5 (Bagozzi and Yi, 1988; Henseler et al., 2009). To assess the internal consistency reliability, Cronbach's alpha for each construct was computed and each one exceeded the threshold of 0.7 (Cronbach, 1951; Nunnally and Bernstein, 1994). Results are reported in Table 1.

Comparative Fit Index (CFI (Bentler, P. M., 1990)), Tucker-Lewis index (TLI), the Standardized Root Mean Square Residual (SRMR), and the Root Mean Square Error of Approximation (RMSEA; (Steiger, 1990) were applied to test the model fit.

Comparative fit index (CFI) and Tucker-Lewis index (TLI) are goodness-of-fit indexes measuring the relative improvement in the fit of researchers' model over the baseline model (Bentler, 1990; Kline, 2016) They are recommended to be above 0.9 (Bentler and Bonett, 1980). A favorable value for SRMR is less than 0.10 (Kline, 2016) or more strict thresholds are lower than 0.08 (Hu and Bentler, 1999). A favorable value for RMSEA is less than or equal to 0.08, and values less than or equal to 0.10 are considered "fair" (Browne and Robert, 1989; Mac-Callum et al., 1990).

4. Results

4.1. Descriptive analysis of the sample

The final number of answers analyzed was 194. The sample size is adequate both for the rule of thumb and for the N:q rule with a ratio of at least 10, with N being the number of answers and q the number of constructs (Kline, 2016).

Women accounted for 36%, while men for 63%, and 1% preferred to not provide information. 30% of the respondents were aged 41–50, 27% were between 31 and 40, and 21% were between 51 and 60. Italians represented 94% of the sample. The majority of respondents obtained a bachelor's degree or higher academic title (88%).

59% of the sample agreed or strongly agreed with the sentence "I read books/comics and/or watch movies/TV series and/or play video games on science fiction subjects in my spare time", while 10% and 16% of the respondents never or rarely use sci-fi content. However, 70% agreed or strongly agreed with the sentence "I like science fiction" while 17% were not interested at all.

The sample was split between people working in large companies (52%), in SMEs (32%), in startups (5%), in academia (4%) or in public administration (3%). Most of the respondents worked in complex service organizations (49%), and the remaining categories are complex product organizations (27%), standardized products (14%), and standardized services (10%). 56% of respondents had been with their current company between 2 and 10 years, 23% between 11 and 20 years, and 18% between 21 and 30 years. The sample is divided between people working as product managers (27%), in R&D (21%), in marketing (16%) and in other areas (36%). 92% of the respondents said their companies had never used Sci-fi methodologies, although 5% reported there are plans to use them. Among the remaining part, 2% use them repeatedly and 7% have already used them sporadically.

4.2. Path analysis

Through the goodness-of-fit indicators, the structural model showed a good fit to the data, as shown in Table 2.

Table 3 shows the structural model of the relations among the various constructs, while Fig. 2 provides a graphical representation of the significative hypotheses. (see Fig. 1)

The results indicate that the Regulative Influence is not significantly correlated with the Perceived Usefulness, nor with any construct of the IWB. Instead, Normative Influence is significantly and positively related to both IG ($\beta = 0.2163$; $p < 0.05$) and PU ($\beta = 0.6268$; $p < 0.001$). In turn, the model shows that Perceived Usefulness is significantly and positively correlated with Idea Generation ($\beta = 0.7876$; $p < 0.001$). Furthermore, the relation between Cultural Influence and Idea Promotion is significant and positive ($\beta = 0.1863$; $p < 0.05$). Lastly, Idea Generation is significantly and positively related to Idea Promotion ($\beta = 0.4793$; $p < 0.001$).

Finally, as shown in Table 4, some control variables resulted significantly related to IWB constructs, although with a very low impact. For instance, Idea Promotion is slightly and negatively correlated with the seniority of the respondent ($\beta = -0.0089$; $p < 0.05$), company products and services ($\beta = -0.0912$; $p < 0.050$), thus pinpointing individuals in product companies have a greater propensity for idea sharing than the ones in service companies. Instead, company size has a significant and slight correlation on Idea Promotion ($\beta = 0.1189$; $p < 0.050$). Meanwhile, the control variable related to a personal interest in sci-fi has a significant yet very low correlation on Idea Generation ($\beta = 0.0915$; $p < 0.050$).

Table 2
Goodness-of-fit indicators.

Indicator	Threshold	Value
RMSEA	<0.08	0.053
SRMR	<0.08	0.069
CFI	>0.9	0.957
TLI	>0.9	0.945

Table 3
Hypotheses testing results.

Hypothesis	Path	Coefficient β	Std. Err.	p-value	Findings
H1	IG → IP	0.4793	0.1416	0.001 ^a	Significant
H2a	PU → IG	0.7876	0.0967	0.000 ^a	Significant
H2b	PU → IP	0.1014	0.1511	0.502	Not Significant
H3a	RI → IG	-0.0761	0.0644	0.237	Not Significant
H3B	RI → IP	0.0432	0.0704	0.540	Not Significant
H4a	NI → IG	0.2163	0.1059	0.041 ^b	Significant
H4b	NI → IP	0.1269	0.1129	0.261	Not Significant
H5a	CI → IG	-0.0244	0.0691	0.723	Not Significant
H5b	CI → IP	0.1863	0.0814	0.022 ^b	Significant
H6a	RI → PU	0.0668	0.0784	0.394	Not Significant
H6b	NI → PU	0.6268	0.1065	0.000 ^a	Significant
H6c	CI → PU	-0.1521	0.0820	0.064	Not Significant

p-value representation.

** $p \leq 0.010$.

^a $p \leq 0.001$.

^b $p \leq 0.050$.

5. Discussion

5.1. Theoretical implications

By employing existing narratives or crafting innovative stories, methodologies using sci-fi as a source of inspiration offer a unique approach to integrating innovative concepts within intricate social, political, and economic frameworks (GarduñoG arcfa and Gaziulusoy, 2021; Michaud and Appio, 2022). While existing research mostly investigated how and why organizations engage with experiments of sci-fi innovations (Pinto et al., 2021; Rapp, 2020), our study sought to investigate how and why individuals do so. For this purpose, we interpreted the engagement with sci-fi ideas as an example of IWB (Janssen, 2000; Scott and Bruce, 1994), and investigated two drivers: (i) individuals' perception of sci-fi usefulness for their work and (ii) the influence of regulative, normative and cognitive pressures from the organization. Because sci-fi ideas are unusual in organizational contexts, we expected the interplay between volitional and institutional factors to be relevant. On the one hand, perceptions of sci-fi usefulness are likely to be necessary for individuals to commit to difficult and time-consuming behaviors, such as the generation and promotion of new ideas. On the other hand, they are likely to be insufficient as regulative, normative and cognitive pressures from the organization might create insurmountable legitimacy barriers (Johnson, 2013b). Our results confirmed this overarching hypothesis and displayed more specifically that (i) perceived sci-fi usefulness is directly correlated with idea generation, and only indirectly correlated with idea promotion (i.e., through idea generation); (ii) only normative influences are correlated with perceived usefulness; and (iii) while only normative influences are directly correlated with idea generation, only cognitive influences are directly correlated with idea promotion. Overall, our findings underscore the salient role that socio-cognitive dimensions of the organization play in stimulating the generation and promotion of ideas based on sci-fi.

Based on these results, we derive two contributions.

First, we establish a more precise link between perceived institutional pressures from the organization and individuals' engagement with IWBs based on sci-fi. Particularly, we link normative influences on individuals' perception of usefulness, which in turn correlates with idea generation – and then idea promotion. This link is critical as it shows how the engagement with this 'unusual' behavior is not exclusively dependent on individuals' own beliefs. Rather, organizations have a pathway to influence individual behaviors by means of social influence – i.e. peers and supervisors are likely to persuade reluctant employees to embrace sci-fi methods and generate radical new ideas. On the flip side, organizations need to be aware that individuals interested in sci-fi methods and ideas might be hindered by 'relevant others' that do not share such enthusiasm. Our results are consistent with the notion that

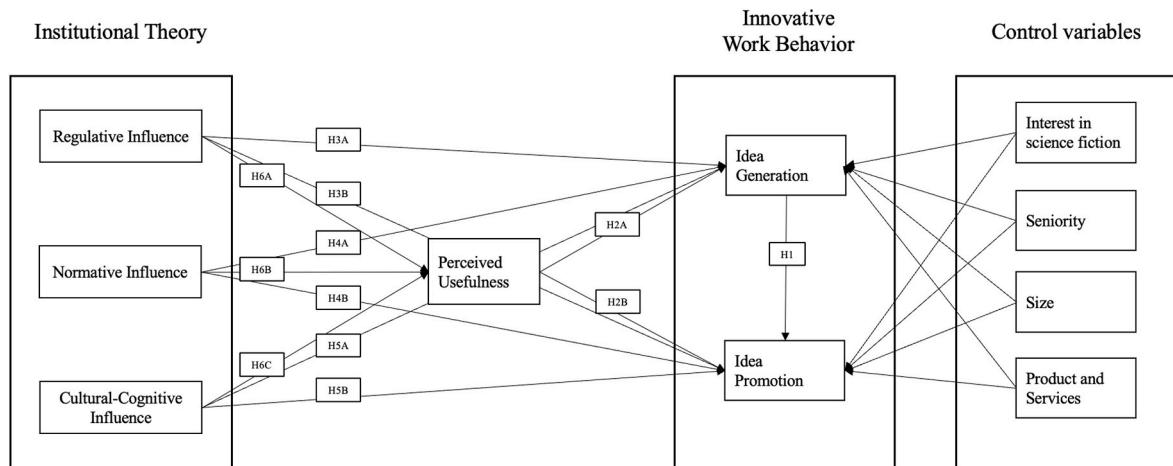


Fig. 1. Research model.

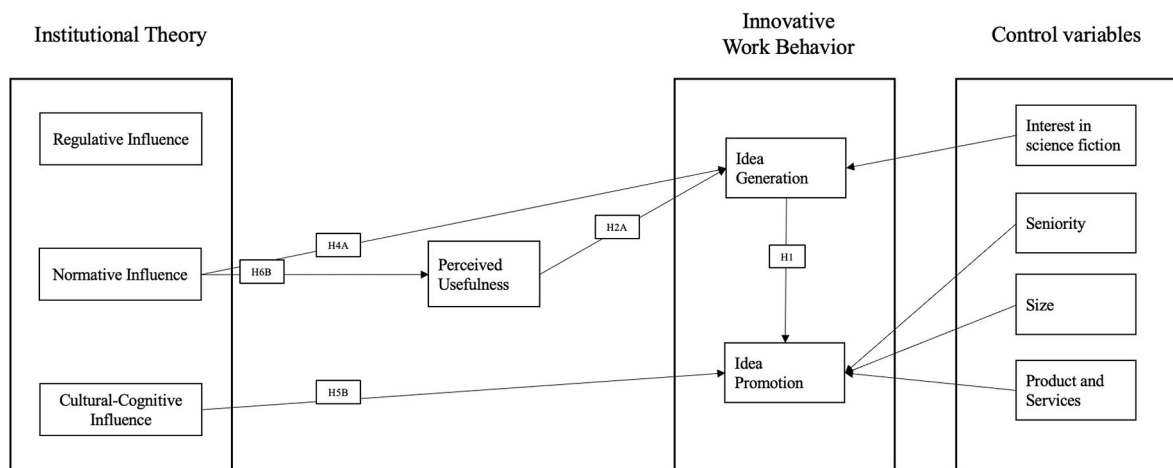


Fig. 2. Validated hypotheses in the research model.

Table 4
Control variables hypotheses testing.

Item	Control Variable	Path	Coefficient β	Std. Err.	p-value	Results
SEN	Seniority	SEN → IG	-0.0020	0.0042	0.626	Not Significant
		SEN → IP	-0.0089	0.0045	0.050 ^b	Significant
PES	Company Products and Services	PES → IG	0.0254	0.0390	0.515	Not Significant
		PES → IP	-0.0912	0.0423	0.031 ^b	Significant
SIZ	Company Size	SIZ → IG	-0.0187	0.0554	0.736	Not Significant
		SIZ → IP	0.1189	0.0592	0.044 ^b	Significant
INT	Individual interest in Sci-Fi	INT → IG	0.0915	0.0336	0.006 ^a	Significant
		INT → IP	0.0527	0.0383	0.170	Not Significant

p-value representation.

***p ≤ 0.001.

^a p ≤ 0.010.

^b p ≤ 0.050.

social influences ('something should be done') might be more effective than hard regulations ('something must be done') and soft cultural framework ('something cannot be done otherwise') (cf. Lawrence and Suddaby, 2006; Scott, 2003). This evidence reinforces the notion that the generation of ideas based on sci-fi might be an individual effort, but (i) occurs within a social context that scrutinizes behaviors carefully and (ii) is an especially risky behavior as sci-fi is not naturally associated with products and services (as stated in Johnson, 2013b). Following which, 'relevant others' play a massive role in shaping individuals' attention towards this IWB (cf. Alpkhan et al., 2010; Shanker et al., 2017).

Second, we establish a distinction between the act of generating and promoting ideas based on sci-fi. We suggest that this is a distinction between "promoting your ideas" and "promoting others' ideas". On the one hand, we suggest that idea promotion is a follow-up to idea generation, i.e. individuals who generate new ideas based on sci-fi are also likely to promote it. Following which, the social expectation that an individual 'should' use sci-fi as an inspiration to generate new ideas extends to a social expectation that that individual also promotes that idea to others. On the other hand, we found a more direct link between cognitive influences and idea promotion. This suggests that individuals might be willing to pick up ideas that others have generated and help promoting them because of the established culture of the organization. This result extends insights into the importance of cognitive and cultural frameworks for organizational innovation (e.g., Crossan and Apaydin, 2010; Martín-de Castro et al., 2013; Tian et al., 2018). While past research has typically emphasized such influence on the generation and

implementation of new ideas in practices, we suggest that our findings highlight the additional cognitive/cultural expectation that individuals promote novel methodologies and ideas they have not personally generated.

It is also worth noticing that regulative influences do not appear to exert a significant influence on this IWB. This suggests that procedures, norms, and standards are not sufficient to stimulate individuals' engagement with sci-fi ideas; and perhaps not necessary either. Existing research shows contrasting results on the impact of rules and procedures on IWB. This result is not entirely surprising, since IWB is mostly driven by intrinsic rather than extrinsic motivators (e.g., [Devloo et al., 2015](#); [Yidong and Xinxin, 2013](#)); and sci-fi ideas are especially difficult to regulate in several organizational contexts ([Burnam-Fink, 2015](#); [Raven, 2017](#)).

5.2. Practical implications

The interpretation of the results made it also possible to deduce some insightful practical considerations.

For what concerns the relationship between Normative Influence and Idea Generation, we might discuss that the more the people around the employee think that these methodologies are useful, the more the employee will agree with the common opinion. In this case, as reported in real case examples, especially the emotional engagement perceived as a whole group allows people to step out of the common practices, allowing *even the most conservative engineers, planners, scientists, or executives* to see the impact of innovations and modify them ([Johnson, 2013a](#)).

Perceived Usefulness will thus increase the trust in the methodology and thus generate novel ideas. We argue that Perceived Usefulness might be fostered through proper training and education, to encourage future product managers and engineers to fully understand and thus exploit the potential of such methodologies, in line both with the insights of [Michaud and Appio \(2022\)](#), and with extant results conceive education and training a way that employees can gather knowledge, skills, and abilities, to engage in IWB ([Ong et al., 2003](#)). Additionally, Idea Generation is influenced by the control variable of personal interest in sci-fi, in line with [Johnson \(2013\)](#), stating that his first science fiction workshop worked because "(...) it was science fiction, and most engineers love science fiction". He also mentions the role of *Star Trek* in the development of space exploration missions, indicating how ideas generated by sci-fi can also be influenced by the personal sphere of interests. On the other side, this might indicate how, when an actor is not aware of sci-fi existing ideas, the actor might face difficulties in generating novel ones, therefore, providing an adequate background through education is paramount for the success of such methodologies.

To incentivize actors to successfully participate in Idea Generation, it might be useful to develop ad hoc environments to deploy sci-fi methodologies, where the freedom to explore and emotional engagement are supported. For this, it can be relevant to train managers to be supportive in all steps preliminary of the innovative ideas ([Alpkan et al., 2010](#)). Accordingly, supervision from experienced mentors and training with specialists in these practices can be relevant in getting people to feel supported in engaging in such methodologies. It is also relevant that these activities are performed in groups, to foster positive interaction among colleagues. In particular, the company might include sci-fi authors and consultants in the group activities, who act as sponsors of the practice and show how to apply the method effectively, increasing the perceived usefulness of the method by demonstrating the benefits that can be achieved ([Johnson, 2013a, 2013b](#)).

For what concerns the relationship between Cultural Influence and Idea Promotion, according to [Bysted and Jespersen \(2014\)](#), IWB can be regarded as a part of the opportunity window for career advancement. In this case, we argue it is especially the socialization of the novel ideas related to sci-fi that can lead to the advancement of the actor's status and career growth.

Additionally, the most significant control variable is company size, showing it is easier to promote ideas in larger companies. Therefore, organizations should, through day-to-day initiatives and discussions, share the idea that it is important to innovate, think outside the box, and have a long-term orientation with a strong trust in innovation. Additionally, a climate must be created in which the proposal of ideas is well received and promoted.

6. Conclusion

While the ongoing discourse surrounding the relationship between sci-fi and innovation continues to gather momentum, this study takes a novel approach to address an underexplored facet of this intersection. Current literature about sci-fi predominantly consists of isolated experiments focused on understanding the impact of literary fiction and fictional worlds on the innovation process ([Dunne and Raby, 2013](#)), overlooking the individual drivers in the generation and promotion of sci-fi-based ideas in an organization.

To address this void, our study frames the engagement with sci-fi ideas as an example of Innovative Work Behavior (IWB) and investigates the interplay of volitional and institutional factors in engaging in such behaviors.

By applying such an innovative framework, we have unveiled the underlying role of perceived institutional pressures toward the engagement of IWB, elucidating how organizations can influence individual behaviors through social influence. Additionally, we establish a distinction between the act of generating and promoting ideas based on sci-fi, behaviors that are driven by different volitional and institutional pressures."

While our study has provided valuable insights, there are still uncharted research avenues to explore. For instance, the relationship between Idea Implementation and sci-fi remains an intriguing topic warranting further investigation. This study serves as a foundation upon which future research can continue to advance our understanding of the transformative potential of sci-fi within the realm of innovation.

However, the research is not without limitations, which might encourage new research. For instance, the results are limited in terms of geographic areas. Indeed, most of the respondents are Italian, while a wider sample might be investigated. Additionally, further research to widen the sample could be suggested by involving a wider number of employees for each company and including more companies who have applied sci-fi methodologies. Another limitation concerns the specific industry dynamics. Indeed, a control variable about the type of product or service was included in the model, and a not significant relation was found. Despite this, it might be interesting to investigate how diverse industries exert institutional influences in different ways and if this influences the results. Therefore, a qualitative approach might be applied to investigate such aspects in depth.

Lastly, the IWB is studied only through two out of three constructs ([Scott and Bruce, 1994](#)), as the implementation of innovative ideas requires a higher level of maturity in the deployment of sci-fi methodologies. However, the companies involved had not implemented sci-fi, and was thus not possible to investigate this last step, which might be interesting to study on further studies.

CRedit authorship contribution statement

Francesca Zoccarato: Writing – review & editing, Writing – original draft, Validation, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Emanuele Lettieri:** Supervision, Project administration, Conceptualization. **Giovanni Radaelli:** Writing – review & editing, Writing – original draft, Supervision, Methodology. **Antonio Ghezzi:** Writing – review & editing, Writing – original draft, Visualization, Validation. **Giovanni Toletti:** Writing – review & editing, Data curation, Conceptualization.

Data availability

Data will be made available on request.

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