Innovation energy: The stimulus converting employees' innovation properties into innovative work behaviour

Henk Jan van Essen | Jan de Leede | Tanya Bondarouk

Faculty of Behavioral, Management and Social Sciences, University of Twente, Enschede, The Netherlands

Correspondence
Henk Jan van Essen, Faculty of Behavioral, Management and Social Sciences, University of Twente, Enschede, The Netherlands.
Email: h.j.vanessen-1@utwente.nl

Anticipating the post-Covid-19 period, the need for innovation remains urgent, with the innovative work behaviour (IWB) exhibited by employees being a crucial aspect. Since Scott and Bruce (1994) wrote about this behaviour, many IWB-related factors have been found. In this study, we distinguished various employees' personal innovation properties as IWB-related factors: creativity, psychological empowerment, optimism and work-contextual factors like room for autonomy, leadership, multidisciplinary innovative teamwork and external contacts. In our qualitative research within two innovative Dutch companies (Philips and Topicus), we interviewed 49 employees, most with a high degree of IWB, and their 22 managers to uncover the relation between the factors and IWB. Earlier research provided rich information about IWB and its factors, mostly from an organizational viewpoint. Our research focuses on the employees themselves, who are showing IWB. We assumed at the start of our research that in addition to these factors, there must be an overall energetic stimulus, because innovation is a process with many obstacles. Therefore, we introduce the concept of innovation energy, which converts employees' innovation properties into innovative work behaviour. This outcome can be used in further research and in the managerial and HRM practice.

KEYWORDS
case study, innovation energy, innovative work behaviour, qualitative research

1 | INTRODUCTION

Organizations are looking for solutions to survive or grow in times of rapid global transitions. In the last decades, business companies have had to respond to stricter customer requirements, price competition and shorter delivery times (Crossan & Apaydin, 2010). The corona crisis has also made it painfully clear how quickly companies must adapt to changing environments. The need for innovation, using ideas supplied by both employees and customers, is growing urgent in many businesses (Guterres, 2020; Schröder, 2020).

From earlier research, we know that although management can create a support base for innovation, an individual creative employee is often the source of a new idea (Mumford, 2000; Nijhof et al., 2002; Tang, 1998). These employees with different backgrounds, experiences and activities have to develop, carry out, react to and modify ideas in sociopolitical organizational processes (Van De Ven, 1986). They are stimulated by the right organizational context, such as an innovative organizational structure supported and facilitated by management (Bass et al., 1999; Mumford, 2000; West et al., 2004). Contra-intuitively, IWB is also shown in environments that are less helpful. de Clercq and Pereira (2019) stated, for example, that rigid organizational climates can trigger the resilience levels of employees and stimulate disruptive creative behaviour.
The concept of innovative work behaviour (IWB) is not new; many authors have referred to it since its first appearance in the article of Scott and Bruce (1994). This was followed by further research on this behaviour (de Jong & den Hartog, 2008; de Spiegelaere et al., 2014; Dorenbosch et al., 2005; Van Den Brand et al., 2021).

In the literature on IWB, this behaviour often seems to be a result of thoughtful managerial choices made by management (e.g. Mumford, 2000; Scott & Bruce, 1994) or human resource management (e.g. Bos-Nehles et al., 2017). Of course, this will often be the case, but IWB is also the outcome of the empowered, creative drive of the employee showing this behaviour.

Researchers have called for more exploration of the individual component in the IWB process. For example, de Jong and den Hartog (2005) typified personality features as important factors for IWB, such as: tolerance for uncertainty, self-confidence, independence, flexibility, expertise, career anchors and above average intelligence. However, they could not find enough data about this relationship and excluded it from their research. They suggested that other researchers should pick up on this omission. Madrid et al. (2013) discovered, drawing on the Big Five Personality model, that openness to experience in combination with organizational support creates a highly activated positive mood that stimulates IWB. They stated that future developments in the theory about individual innovative behaviour will lead to improvements in this innovation, job-related well-being and organizational effectiveness. In short, science should pay more attention to the question of how organizations could foster employees with IWB in order to stimulate them to innovate from their own personal perspective.

To function as an employee with IWB is not easy. Many obstacles have to be dealt with en route from a creative idea to an innovation, like getting commitment from the management and finding the budget and solutions for development and implementation problems. Before starting our research, we assumed that there must be an overall energetic stimulus of the employees with IWB to get them to persist and overcome these obstacles. They must persevere to innovate in structured and unstructured situations with and without the support of their managers. We call this energetic stimulus ‘innovation energy’. This new concept is needed to identify and clarify the individual drive for innovation. It is more than motivation alone; it is more than expertise; it is also the perseverance; the inner will to insist on the development, promotion and implementation of ideas. With the concept of ‘innovation energy’, the focus of our research is on this individual energy, which is influenced by the work context and influences this work context at the same time.

In what follows, we first elaborate on the conceptualization of the main concepts. Then, we introduce our research method, followed by our findings. In the discussion, the new construct ‘innovation energy’ is described, including an IWB conceptual model with this construct. The article ends with limitations of the study and managerial implications.

2 | THEORETICAL FRAMEWORK

2.1 | Innovative work behaviour

de Spiegelaere et al. (2014, pp.144–145) wrote, ‘IWB is all employee behaviour aimed at the generation, introduction and/or application (within a role, group or organization) of ideas, processes, products or procedures, new and intended to benefit the relevant unit of adoption’. We use this definition in our research because it gives a good insight into this behaviour and clarifies that the behaviour has to lead to a benefit for the organization.

Dorenbosch et al. (2005) divided IWB into two main dimensions, creativity-oriented work behaviour and implementation-oriented work behaviour, and distinguished four stages within these dimensions: problem recognition, idea generation, idea promotion and idea realization. We used these dimensions and stages of IWB for our conceptual model, following Scott and Bruce (1994), who stated that IWB does not necessarily involve all phases of the innovation process. We call the creativity-oriented stage the development-oriented stage because we see creativity as a personal innovation property (see Figure 1).

Having conceptualized IWB and its phases, let us move on to a deeper insight into its personal and work-contextual factors.

Various researchers have tried to express the personality of people in several factors, making psychological research possible. The most famous is ‘The Big-Five Factor Structure’ (Goldberg, 1990), which formulated five personality character types that are widely used in psychology. The Big Five are extroversion, agreeableness, conscientiousness, emotional stability and openness to experience. Although there is a broad consensus on the value of these character types, it is impossible to directly connect them to IWB without considering several influential variables (Madrid et al., 2013; Woods et al., 2018; Zuraik et al., 2020).

de Jong and den Hartog’s (2005) theoretical exploration of personality features and IWB is strongly related to the psychological empowerment theories of Spreitzer (1995, 2008) and the creativity

FIGURE 1 | IWB model inspired by Dorenbosch et al. (2005) [Correction added on 11 October 2022 after first publication, Figure 1 has been updated in this version]
theories of Amabile (1988, 1998). These two international, widely respected researchers published on the relation of these two constructs and innovation initiatives of employees. Amabile (1988, 1998) described the employee with IWB as creative, with three distinct properties for creativity: task motivation, expertise and creative thinking skills. Creativity alone does not lead to IWB, given the possible resistance against change of colleagues, managers or the organization itself. According to Spreitzer (1995, 2008), employees with IWB must be psychologically empowered to bring new ideas forward in an environment, which often does not encourage change. Four properties of psychological empowerment were found: meaningfulness, self-determination, self-efficacy and impact. These creativity and psychological empowerment properties are not directly connected to the well-known personality theories like the Big Five, so we called them personal innovation properties rather than personality features.

We argue that to be able to show IWB, a psychologically empowering force will be necessary as described by Spreitzer (1995, 2008). She distinguished psychological empowerment from social structural empowerment. Social structural empowerment is focused on how the organization can accommodate the power of its employees by participatory decision-making, knowledge and profit sharing, open information flow, flat structure and skills. Psychological empowerment is the employee’s power to achieve performance from intrinsic motivation, a state of mind of the employees themselves.

de Jong (2007) concluded in his dissertation that the innovation climate is not directly linked to IWB, which is consistent with the psychological theory of empowerment of Spreitzer (2008). The explanation could be that an enabling environment is less important in this context because individuals can innovate without the help of others given their high degree of autonomous acting. An important implication is employees can also show IWB in less social structured empowering circumstances. Disruptive IWB can even be stimulated by a rigid organizational climate or dysfunctional politics (de Clercq & Pereira, 2019). Yuan and Woodman (2010) drew a similar conclusion that dissatisfaction with the status quo can stimulate IWB.

Concerning the work-contextual factors, we took into account four factors that are mentioned frequently in IWB research: transformational and transactional leadership, having external contacts, perceived room for autonomy and innovation-stimulating team culture.

**Transformational and transactional leadership.** Transformational leaders focus on how the hopes and talents of their employees are linked to common goals and the creation of involvement. The transactional leader, in contrast, focuses more on the result and growth (Quinn et al., 2016). Bass et al. (1999) described both types of leadership in detail, which we used for recognizing the style of managers in our research. Transformational leadership and empowerment are positive influences on IWB (Spreitzer, 1995, 2008). Nederveen-Pieterse et al. (2010) also described a positive relation between transformational leadership and IWB. Recently, Van Den Brand et al. (2021) confirmed again the positive influence of transformational leadership on IWB, on both the individual and team level.

**External innovation contacts.** de Jong and den Hartog (2005) stated that having contacts with the outside world can stimulate IWB. Differentiation through competition will encourage companies and their managers and employees to distinguish and develop new products or services that can stimulate employees, as can a heterogeneous demand from customers.

**Perceived room for autonomy.** Autonomy is the space that the employee gets from the company to influence the goals and organization of the work, as well as the ability to be independent and fill the space offered (Kessels, 2004). In our research, we use the organizational space for autonomy as a separate factor. We see the ability to be independent of the employee as a part of the self-determination and self-efficacy innovation properties, which are subdimensions of the psychological empowerment factor. Lumpkin et al. (2009) referred to this as the perceived room for autonomy, because the organization structures this space, and each employee will experience it in their own way. Bos-Nehles et al. (2017) concluded in their review that the scope for autonomy offered by the organization appears to have a positive influence on IWB.

**Innovative multidisciplinary teamwork.** The positive effect of multidisciplinary teamwork on innovation is well known in the literature (Lee, 2013; West et al., 2004). Lee (2013) stated in this context that trans- and multidisciplinary research programmes need small autonomous teams that must have a high degree of freedom. He concluded that a transformational leader has a major role to play in aligning individual and team innovation with the strategic goals of the organization to avoid disappointment and frustration. Groupthink can also be counterproductive for innovation in teams which strive for stability (Van De Ven, 1986; Van Hootegem, 1999). That is why we placed the adjective innovative before the multidisciplinary teamwork factor.

## 2.2 | Innovation energy

Based on the call for more exploration of the individual component in IWB (de Jong & den Hartog, 2005; Madrid et al., 2013), we assumed at the beginning of the research that there must be an overall energetic stimulus within employees who are innovating. This is something that we could not see within the mainstream literature, as it generally focuses more on thoughtful managerial choices. We call this factor ‘innovation energy’. What now follows is the theoretical exploration of innovation energy, which will be continued in the discussion, where our empirical data will substantiate the theoretical base.

The literature about the role of energy at work provides two related forms: organizational energy and human energy (Cross et al., 2003; Quinn et al., 2012; Schiuma et al., 2007). When searching with the word ‘energy’, we find most hits correlate with the world of physics. The Cambridge Dictionary (2020) gives two explanations of energy. One is about strength: ‘The power and ability to be physically and mentally active’. The other is about power: ‘The power from something such as electricity or oil that works, such as providing light and heat’. Quinn et al. (2012) divided human energy into two main components: physical energy as the used and unused ‘capacity to do work’ and energetic activation as a ‘biobehavioural system of activation’. This energetic activation is explained by Quinn et al. (2012,
Innovation energy can be viewed as a stimulus for IWB. This is related to energetic activation. In the context of IWB, innovation energy refers to the strength that is related to human energy. Schiuma et al. (2007, p. 70) described three types of energy: individual energy, team energy and organizational energy and defined individual energy as follows: ‘Individual energy is a complex result of multiple causes, which can be traced back to the fundamental laws affecting the conditions of well-being: the physical state, i.e. the body’s conditions; the cognitive state, i.e. the mind’s conditions; and emotional state, i.e. feelings, both conscious and unconscious’.

According to the job-demand-resource model (JD-R model), an organization must find a good balance between job demands and job resources. Job demands like a high work pressure, an unfavourable physical environment and emotionally demanding relationships with clients can be stressors and can lead to a depletion of energy. Job resources like achieving goals, reducing demands and stimulating growth and learning can lead to vitality, motivation and energy. In this model, energy is the result of a dual process (Bakker & Demerouti, 2007). Cross et al. (2003) concluded about this energy balance that energizers in an organization or in a team can be active people who can spark the process in a project, whereas de-energizers mentally rehearse how they will cope with change processes.

To resume our exploration of innovation energy as the starting point for this research, we focus on the human level of energy, to be physically and mentally active, not on the energy of an organization or a team (Cambridge Dictionary, 2020; Cross et al., 2003; Quinn et al., 2012; Schiuma et al., 2007). In the process of IWB, innovation energy is a cognitive, emotional and physical state (Schiuma et al., 2007), which gives energetic activation, and the employee ‘experiences feelings of vitality, vigour, or enthusiasm’ (Quinn et al., 2012, p. 342). This energetic power gives the employee strength in the balance between job demands and job resources (Bakker & Demerouti, 2007). In the light of the above considerations, the purpose of this paper is to introduce a new innovation energy construct to answer the following research question:

What is the role of innovation energy in the process between personal innovation properties, work-contextual factors and IWB?

### 3 | METHOD

#### 3.1 | Sampling

The focus on the individual innovative employee led us to select two Dutch organizations where innovation is part of the daily routine because we assumed we would be able to interview enough employees with IWB to get reliable data. We chose Philips (Case Study 1) because this company had the highest R&D budget of all Dutch companies in 2016 in a ranking list (Waardenburg, 2017). Topicus (Case Study 2) was chosen because it grew in 22 years into a successful IT company with more than 1000 employees and is well known for its innovative capabilities (Dijkstra et al., 2020). In both case studies, we did as many interviews as needed to get information saturation. The samples represented different aspects like gender, organizational tenure and organizational units covering different work types. We invited both managers and employees working in highly innovative circumstances. Because of the applicable privacy laws we could not chose the respondents, the participation was entirely voluntary.

Sampling Case Study 1. At Philips, we started by interviewing seven department heads to define the perceived autonomy and leadership style. After determining two work-contextual circumstances, we chose four departments in which interviews took place. Criteria for inclusion were the expected leadership style, the perceived room for autonomy and a differentiation in the main goals of the departments. Three departments were highly involved in innovation; the fourth department was a facilitating unit for the implementation and monitoring of safety rules. We expected here to talk to employees with low IWB, which turned out to be the case. We held 27 in-depth interviews with employees about the influence of these circumstances on their IWB behaviour. All the employees of the chosen departments were asked if they voluntarily want to participate.

Sampling Case Study 2. At Topicus, we conducted research in all four divisions to cover all the business domains of the organization. We did not have to choose departments for the case study because we could do the research in all four divisions. Another reason was that Topicus works with small teams and the managers are operational members of these teams. Here, we took the bottom-up approach, firstly to discover employees with IWB and then interviewing their manager afterwards. We held 22 in-depth interviews with employees working in four business units and 15 interviews with their managers. In this case study, we could not ask every employee to participate, because this population would be too big. We chose the following approach here: The research coach working in the HRM department sent some e-mails to employees who were known for their IWB and some who were known as less innovative. She did not tell us which respondent was typed as innovative or not.

#### 3.2 | Analytical approach

We chose a qualitative approach in order to gain more insight into the nature of the relationships between influential factors and IWB. The interviews were done in an abductive way with the starting inductive ‘innovation energy’ assumption (Boeije, 2014). This was followed by a deductive literature scope to reach a construct validity for the factors we adopted to explain the IWB process in relation to personal innovation properties and the new innovation energy construct. During the empirical research, we were still inductively open to new findings.
Recently, Setre & Van de Ven (2021, p. 696) stated that theory building by abductive reasoning is not a ‘single flash of inspiration’ but a useful systematic method that ‘may reoccur to make sense of complex phenomena: observe and confirm an anomaly, and develop and evaluate hunches’.

The conceptual model and theoretical framework were used for the interviews of Case Study 1 and were expanded for Case Study 2 with extra factors based on the findings of Case Study 1. We repeated this step after Case Study 2 with the final conceptual model, which is presented in this article as the result. When exploring the data of Case Study 1, we made four observations (transformational leadership was provided in a supportive way; co-creation was an important IWB factor in external contacts; having a multidisciplinary team stimulated IWB; and an optimistic nature is helpful for IWB). With these four inductive findings, we did a new deductive literature review to define supportive leadership, co-creation, multidisciplinary innovative teamwork and optimism in order to get construct validity for Case Study 2 and posed new questions about these factors in the interview protocol.

As a fifth additional factor, we included innovation energy. In case one, we simply observed with an open mind to see if we could find an overall factor resembling innovation energy. We closely observed the tone of voice and the facial expression of the respondents during their talks about innovation. After Case Study 1, we were convinced that innovation energy is indeed an overall factor. That is why we asked questions in Case Study 2 about what gives the respondent energy

### TABLE 1 Some example questions in employee interviews

<table>
<thead>
<tr>
<th>Question about IWB</th>
<th>If you think about an innovative employee, what are your spontaneous thoughts?</th>
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<tbody>
<tr>
<td>Respondent E3</td>
<td>‘I look outside customer assignments. If I see a space in which an idea fits, then I see if we can create support for it instead of waiting’.</td>
</tr>
<tr>
<td>Codes</td>
<td>IWB idea generation, IWB idea promotion, Co-creation (new inductive code)</td>
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</tbody>
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<thead>
<tr>
<th>Question about leadership</th>
<th>How would you characterize your direct manager? (In Case Study 2, we asked follow-up questions using the definition of supportive leadership)</th>
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<tbody>
<tr>
<td>Respondent E18</td>
<td>‘Yes, then I only have to send a message, and the credit card is pulled out’</td>
</tr>
<tr>
<td>Code</td>
<td>Transformational supportive leadership</td>
</tr>
</tbody>
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<tr>
<th>Question about external contacts</th>
<th>Do you have contacts outside the organization, and, if so, how does this influence your work?</th>
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<tr>
<td>Respondent E2–E5</td>
<td>‘For us, external contacts are extremely important now in the health care domain. It was natural earlier when you made televisions, and you had everything in house, then it did not matter so much’</td>
</tr>
<tr>
<td>Code</td>
<td>External contact</td>
</tr>
</tbody>
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<tr>
<th>Question about autonomy</th>
<th>In what way do the organizational processes help or hinder you in innovation?</th>
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<tbody>
<tr>
<td>Respondent E1–E2</td>
<td>‘As for the freedom we get, you just see, we get to make a lot of decisions ourselves’</td>
</tr>
<tr>
<td>Code</td>
<td>Autonomy high</td>
</tr>
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<tr>
<th>Question about teamwork*</th>
<th>How do innovations arise?</th>
</tr>
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<tbody>
<tr>
<td>Answer respondent E1–E4</td>
<td>‘The composition of the team definitely has an impact. One has an idea, the other gets away with it’</td>
</tr>
<tr>
<td>Code</td>
<td>Innovative teamwork</td>
</tr>
</tbody>
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<tr>
<th>Question about creativity</th>
<th>What is your idea about creativity at home and at your work?</th>
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<tbody>
<tr>
<td>Answer respondent E4</td>
<td>‘Once in a while I have the idea that, when there are problems, I’m able to look at them differently’</td>
</tr>
<tr>
<td>Code</td>
<td>Creativity: creative thinking skills</td>
</tr>
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<tr>
<th>Question about psychological empowerment</th>
<th>In what way do you do your work?</th>
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<tr>
<td>Answer E11</td>
<td>‘I’ve turned my hobby into my work, say, but it’s not an out-of-control hobby, it’s more of an out-of-control job’</td>
</tr>
<tr>
<td>Code</td>
<td>Self-determination</td>
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<tr>
<th>Question about optimism*</th>
<th>What is your common reaction in uncertain times?</th>
</tr>
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<tbody>
<tr>
<td>Answer respondent E17</td>
<td>‘And then I mention thinking in opportunities and challenges a lot, instead of thinking in impossibilities and seeing bears on the road’.</td>
</tr>
<tr>
<td>Code</td>
<td>Optimistic nature</td>
</tr>
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<table>
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<tr>
<th>Question about innovation energy*</th>
<th>Can you tell me something about your energy level at work?</th>
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<tbody>
<tr>
<td>Respondent E9</td>
<td>‘Informal atmosphere is what generally drives me to stick with this company. There is a fun team, and you are working on fun things’.</td>
</tr>
<tr>
<td>Code</td>
<td>Informal atmosphere, teamwork gives energy</td>
</tr>
</tbody>
</table>

Note: Quotes and codes related to the main constructs; the questions with * were asked in Case Study 2 using the inductive results of Case Study 1.
during their innovative work, without pushing in the direction of a specific outcome. The questions were general, such as ‘Can you tell me something about your energy level at work?’

Along with questions that were related to our theoretical framework and proposition, we asked open-ended questions to obtain new explorative findings, like ‘Can you tell me something about the latest innovation which was made in your department?’

Employees with IWB were recognized using the coding process of the transcripts if they were active in one or more of the four phases of Dorenbosch et al. (2005). In Table 1, we give some examples of the questions as formulated in the interview protocol. The questions functioned as a reminder of the necessary topics to ask but were used in a semi-structured way to ensure in-depth conversation.

The interviews with the managers were less in depth and purely meant to discover the style of leadership and perceived room for autonomy, in the manager’s view. To be able to recognize the style of leadership by coding the transcripts of the interviews, we used the features of both styles inspired by Bass (1990) and Bass et al. (1999), as presented in Table 2.

Some example questions are given from the manager interviews, quotes and codes used to recognize the style of leadership and the perceived room for autonomy (Table 3).

To ensure trustworthiness, we used the case study protocol aspects of Yin (2018) as a checklist for an overall research plan and the two case study reports. The construct validity for the axial codes was secured by making definitions of the constructs used before starting the interviews. The data were systematically collected using an interview protocol with questions based on theoretical constructs and open-ended questions. The interview protocol included in detail which information the interviewee would receive in the introduction part, like repeating the text of the informed consent, the explanation of the interview procedure and a promise of insight into the results.

All deductive and inductive opening and possible follow-up questions were written out. During the interviews, they were used in an in-depth conversational way, giving the interviewee much room for free speech.

The outcome was discussed with experts. We performed an inter-coder reliability check on the transcripts of two employees and two managers from another researcher using the method of Campbell et al. (2013). The results of the two cases were cross-checked by the contact persons of the two companies. The association of the results in the direction of the new innovation energy construct was made in ongoing discussions during a period of 5 years between the authors of this article and internal colleagues and internationally with external researchers Van Essen and De Leede (2020a, 2020b).

### 3.3 Data analysis

All interviews were fully transcribed. We used the ATLAS-ti software for the coding process. The employee properties and work-contextual factors we found theoretically were axially coded directly. The inductively findings were open coded. The style of leadership was discovered by axial coding of the transcripts of the interviews with the managers. During the interviews and afterwards by axial coding, we were able to analyse whether an employee was talking about the stages of IWB as defined in the theoretical framework. This was used

<table>
<thead>
<tr>
<th>Question about the room for autonomy and/or degree of formalization</th>
<th>What is your opinion about the rules and procedures in relation to freedom to innovate in the organization?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Answer manager M10</td>
<td>‘I try to give a lot of freedom within the rules. But when we have a process, we follow it too’</td>
</tr>
<tr>
<td>Code (with indicators high, middle and low)</td>
<td>Perceived room for autonomy (middle)</td>
</tr>
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</table>

### Table 3  Two example questions in manager interviews, quotes and codes related to the main constructs

<table>
<thead>
<tr>
<th>Question to recognize the transactional or transformational style</th>
<th>What do you think is important in a manager’s approach towards employees?</th>
</tr>
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<tbody>
<tr>
<td>Answer manager M3</td>
<td>‘What I do always support, we work with the recognition system, then you can give someone points, they are free to spend those points on something, if an employee comes to me who has done something really good, can I give those recognition points? Always, without apology’</td>
</tr>
<tr>
<td>Code</td>
<td>Transactional leadership: contingent reward: exchange of rewards for effort, promise rewards for good performance</td>
</tr>
</tbody>
</table>

### Table 2  Transformational and transactional leadership dimensions inspired by Bass (1990) and Bass et al. (1999)

<table>
<thead>
<tr>
<th>Transformational leadership</th>
<th>Charisma</th>
<th>Provides vision and sense of mission, instils pride and gains respect and trust</th>
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<tbody>
<tr>
<td></td>
<td>Inspiration</td>
<td>Communicates high expectations, uses symbols to focus efforts and expresses important purposes in simple ways</td>
</tr>
<tr>
<td></td>
<td>Intellectual stimulation</td>
<td>Promotes intelligence, rationality and careful problem-solving</td>
</tr>
<tr>
<td></td>
<td>Individualized consideration</td>
<td>Gives personal attention, treats each employee individually, coaches and advises</td>
</tr>
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<table>
<thead>
<tr>
<th>Transactional leadership</th>
<th>Contingent reward</th>
<th>Exchange of rewards for effort, promises rewards for good performance and recognizes accomplishments</th>
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<tbody>
<tr>
<td></td>
<td>Management by exception (active)</td>
<td>Looks for deviations from rules and standards and takes corrective action</td>
</tr>
<tr>
<td></td>
<td>Passive avoidant</td>
<td>Intervenes only if standards are not met</td>
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</table>

<table>
<thead>
<tr>
<th>Code (with indicators high, middle and low)</th>
<th>Perceived room for autonomy (middle)</th>
</tr>
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**TABLE 2** Transformational and transactional leadership dimensions inspired by Bass (1990) and Bass et al. (1999)

**TABLE 3** Two example questions in manager interviews, quotes and codes related to the main constructs
for recognizing an employee with IWB. We also coded if he/she possessed the matching innovative employee properties.

Atlas-ti was used to analyse any connection between stages of IWB and the presence of the defined factors. It also allowed triangulation of the quotes of managers and employees about the style of leadership or the perceived room for autonomy. After systematic analysis of these data, we could summarize the results of the research using tables and quotes in order to formulate conclusions.

4 | RESULTS

In this section, we reproduce some interesting quotes given by the employees, which provide insight into the relation between the factors we found in the literature and innovation energy. Table 4 quantifies the basic material available for the findings.

Innovative work behaviour. Most of the 49 employees showed at least some IWB stages, although seven of them did not show any stage. Employees with no IWB had almost no personal innovative properties, whereas employees who showed all four stages of IWB had almost all of the properties of creativity and psychological empowerment. The respondents with IWB were mostly driven by a high task motivation with the idea that their work will have an important impact and is meaningful. As an inductive result, we described a third important personal property: optimism, which was described earlier as a positive personal factor influencing IWB by Hsu et al. (2011) and Li and Wu (2011).

Work-contextual factors. The work-contextual factors we found in the literature were also mentioned by the respondents as positively influencing their IWB. These constructs were useful when talking about the influence of these factors on their IWB and innovation energy. We came to the same conclusion as Van Den Brand et al. (2021) that transformational leadership is a necessary influential factor on both the individual and team levels to stimulate IWB in order to align individual and team innovation with the strategic goals of the organization. In our research, the respondents (and their managers) made it clear that they needed transformational leadership in a supportive way. Some of the managers even gave more autonomy to their employees than was formally allowed by procedures. This outcome correlates with Schyns et al. (2009), who explained that supportive leadership encourages empowerment and development. In both organizations, IWB was stimulated by co-creation. Many respondents showing IWB mentioned that multidisciplinary teamwork is important to stimulate creativity. Autonomy is rewarded as positive for innovation. Some employees in the Topicus case study felt that they had less room for autonomy because of the need to work on customer demands.

The next section is about the concept of innovation energy. In Case Study 1, we observed innovation energy in the body language of the respondents like a blush on the cheeks, an energetic way of looking and talking. In Case Study 2, we asked the respondent about what is giving them energy in relation to innovation. Here, we present the outcomes related to the concepts of our conceptual framework.

Influence of employee properties. Employees with IWB talked about several properties, indicating also a certain association with energy.

- Passion and energy, that’s really just for me in that piece of innovation. (E13)
- I get a lot of energy from variety. I’m really someone who likes variety. (E3–17)
- That you obtain decision-making authority for something. Because people are convinced of your expertise. And think this is a right thing to do, just do it. This gives me energy. (E12)
- The interaction all around. A new idea and its implementation, so to speak. I think that’s where the energy comes from. (E5)

We observed in both case studies that employees showing IWB had a basically optimistic nature.

- What is important for being innovative is that you see the glass as half full instead of half empty, you need to have an optimistic nature. A sceptical person cannot be innovative. (E2.5)

TABLE 4 Components for the analysis

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<thead>
<tr>
<th>Components</th>
<th>Philips case</th>
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<th>Topicus case</th>
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I have the idea that we can make anything. Maybe it will take 5 or 10 years. There is always a solution. That is the optimism I have. (E2–22)

Influence of leadership. Our analysis suggests that all the managers at Philips showed transformational leadership behaviour, whereas at Topicus, 13 of the 15 managers showed transformational leadership behaviour, and the other two behaved transactionally. We found that the transformational leadership was provided in a supportive way. The managers believed in the innovative ideas of their employees with IWB and gave them the room for autonomy they needed and tried to find funding and political commitment so they could work independently:

If the fire is taken away a little bit to change things. Well, the manager will help to deal with that. (E8)

I notice she's trying really hard to help us. I also notice during meetings with other ventures and her supervisor that she is defending us. (E2.2)

And it is also the other way around. The employees are also influencing their managers, for example, to try to convince them of the value of the ideas.

My manager is very open to things but he really needs to be convinced that it sounds like a good idea, I must really show that it's a good idea. (E1–E7)

Influence of external innovative contacts. In both case studies, the employees mentioned that it was important to have contact with the outside world in order to feed their mind with new ideas. Having development and also entrepreneurial responsibilities in a co-creation process together with customers stimulated IWB. On the other hand, sometimes working constantly on customer demands led to less room for personal autonomy and more radical innovation.

In my previous work I really got more energy from helping consumers. (E3)

So I notice that especially for scientists it is easy to lose yourself in a piece of detail work and that you lose sight of the big picture you do it for. It's different if you are in contact with customers but also cancer patients that we ultimately are working for. (E1.2)

Again, we also found that employees are trusted by customers and get energy from the contacts with clients.

I do get to customers quite a lot. And then you are going to talk to people who are using that very innovation. You talk to them with a cup of coffee or just 1 on 1 or those people come to me. (E1–E2)

Influence of autonomy. Philips and Topicus have different organizational traditions. Because of Philips's current focus on the medical world, innovation is expected to be directed at improving medical devices and/or processes. The employees voiced that they experienced more freedom to innovate in the past and that the new way of working brought too many rules and bureaucracy and decreased their room for autonomy. At the same time, they sounded very proud about the new and disruptive medical innovations, which, in their view, gave them feelings of meaningfulness and the belief that their IWB had an impact. At Topicus, the employees experienced a lot of freedom to innovate, but some of them would have liked more insight into the strategic focus of the organization, so they could streamline their innovation efforts.

What gives me a lot of energy is a bit of control over my day. (E14)

I think with the projects as well there's a lot more freedom to play. (E3.3)

Influence of teamwork. The employees at Philips found that the multidisciplinary way of working is highly stimulating for IWB. At the same time, some of them mentioned that a high level of empowerment is sometimes necessary to get the right attention for a professional, monodisciplinary view. Their explanation was that teams at Philips Research have got members with diverse backgrounds. Teams at Topicus mostly have members with an IT background with different competences (development, analysis, testing). Having the same general background gives a sense of professional connectedness, which stimulates IWB. It is really a two-way process: They bring energy and ideas to the team, and they get ideas and energy from the teams.

I did notice that I came up with new ideas a lot more often. So, the composition of the team definitely has an influence. (1–4)

The trust I get from people that I feel like they are coming to me with difficult questions. (3–22)

I have a really nice team with good people which gives me energy. I am very happy with that. I really enjoy being able to spar with colleagues. Then I throw out all kinds of questions and ideas. (E22)

What gives me energy are the little moments we (= the team) celebrate. I do not know if you are familiar with that: it's about little successes. (E17)

We noted that every employee needed a personal mix of the IWB factors as a boost to innovate, but this could vary from day to
day. For example, sometimes, the employees with IWB needed their supportive manager to find time or funding. At another moment, the innovative team spirit was crucial to help them to solve a problem. Basically, their employee properties, such as creativity, psychological empowerment and optimism, made them able to show IWB under different circumstances. Sometimes, they needed their creativity and expertise, another time psychological empowerment or optimism, and sometimes a combination of all three properties. If this mix of employee properties and work-contextual circumstances turned out to be the right one, then it gave the employees the energy to exhibit IWB. Our two case study organizations took different approaches to innovation: Philips preferred a more disruptive radical one, and Topicus an incremental one. Nevertheless, in both cases, innovations were developed in a highly energetic atmosphere influencing but also created by employees with IWB working in the right circumstances.

The innovation energy of employees with IWB is not only influenced by the work-contextual factors; it also influences these factors itself, which makes this relation mutually dependent.

5 | DISCUSSION

5.1 | Theoretical implications

The results showed that employees with IWB had the creative, psychological empowerment and optimistic innovation properties that are needed for this behaviour. Still, to be innovative, the employee has to overcome all kinds of obstacles, and we found that energy is needed to persevere until an invention really becomes an innovation.

We state that this energy converts these properties into IWB in five different mechanisms: (1) the individual mechanism, in which the person finds the energy in him- or herself leading towards IWB, with or without the other factors; (2) the job design mechanism, in which the individual energy is shaping and is shaped by the tasks with different levels of autonomy; (3) the team mechanism, in which the energy of the person influences the collective team behaviours and vice versa; (4) the leadership mechanism, in which the innovation energy is influencing and influenced by leadership; and (5) the external mechanism, in which the energy of the person influences the external stakeholders and vice versa.

A critical question could be: ‘Is the construct of innovation energy new or just another word for the well-known construct of work engagement?’ We will explain why it is a new and supplementary construct needed to fill a gap in the science about IWB.

According to Schaufeli and Bakker (2010), there is an overlap with the interchangeable terms employee engagement and work engagement and all kinds of other terms such as extra-role behaviour, personal initiative, job involvement, organizational commitment, job satisfaction and positive affectivity, flow and workaholism. They see engagement as superior to other approaches.

Schaufeli et al. (2006, p. 702) defined work engagement as ‘A positive, fulfilling work-related state of mind that is characterised by vigour, dedication, and absorption’. The vigour aspect in this definition is interesting for our research because it is characterized by the authors as ‘high levels of energy and mental resilience while working’. An employee with a high level of vigour also has a high level of energy. However, Schaufeli and Bakker (2010) explained that engagement is ‘the psychological state that accompanies the behavioural investment of personal energy’ (p. 22). From this statement, we can derive that engagement is not the energy itself; rather, it uses the energy for activities and behaviours to achieve the organization’s purpose. With our innovation energy construct, we dive deeper into this energy in relation to change processes.

We state that innovation energy is not a passive outcome of the job demands and job resources as proposed by the JD-R model; the employee with IWB is an active player in this process and even seems to like demands. Not so much the organizational pressure demands, the employee is glad to have a supportive manager to deal with those, but the demands of the innovation process itself. He/she is stimulated by creativity to solve a difficult puzzle. And if the organizational demands are not helpful, employees with IWB use psychological empowerment to create better circumstances, generating a belief in success in their environment for which an optimistic nature is also very helpful. Xanthopoulou et al. (2007) discussed the JD-R model on this point and also argued that personal resources play an important role in the process between an employee and job resources and organization demands. As a result, they stated that job resources activate employees’ self-efficacy, self-esteem and optimism and helps them to feel themselves more capable in handling the work circumstances which is confirmed by our findings.

Therefore, in innovation processes, an employee with IWB is not a passive observer nor a victim of the circumstances but is actively trying to influence the circumstances in the right direction. If the employee is successful in this, the innovation energy will grow progressively. In this way, the innovation energy is also influencing the factors themselves in a mutually dependent cycle. The supportive manager will perhaps become more supportive, and the innovative team more enthusiastic and helpful. Due to the enthusiastic energetic appearance, it is possible that the employee will be allowed to have more external contacts and more room for autonomy. Employees with IWB can deal with these circumstances due to their creativity, psychological empowerment and optimism. They use their energy to affect the contextual factors. Especially in radical innovation, the barriers to be surmounted can be very high. Griffin et al. (2014) found that radical innovation is not a linear process with stages where the management decides when the next stage of a project may start. This kind of innovation is done by a chaotic messy front part which is not helped by formal processes. Their research highlighted that radical innovation needs ‘serial innovators’, employees with special features who can overcome organizational barriers and are able to create and commercialize radical innovations. Employees with IWB are these serial innovators, although our research is providing more insight into the special properties they need to have, including the innovation energy as the power to convert the properties into IWB.

Considering our theoretical and empirical exploration, we are able to define the concept of innovation energy: ‘Innovative energy is a
stimulus converting employees’ innovation properties into innovative work behaviour in mutual dependency with the work context’.

5.2  Towards a conceptual model

The main reason for our research is a response to other researchers calling for more exploration of the individual component in the IWB process (de Jong & den Hartog, 2005; Madrid et al., 2013). This correlated with our observation that much theory about IWB is written from an organizational perspective instead of focusing on the employees with IWB themselves. We do not want to discuss all IWB-stimulating factors in detail; rather, we focus on the employee with the right creative and psychological properties with their innovation energy in the middle of the IWB process. With our innovation energy construct, we hope to open the way for further research on this interesting converting stimulus in the IWB process (Figure 2).

Innovative work behaviour is stimulated by employees with personal innovation properties like creativity, psychological empowerment and optimism and work conditions like supporting leadership, room for autonomy, a supporting leader and an innovative, multidisciplinary team. All these factors interact with each other, and every employee with IWB needs a unique and daily variable mix stimulated and created by high levels of innovation energy.

Innovation energy in this model is not a factor by itself but a very important stimulus between the employees’ personal innovation properties and IWB under the influence of the right work-contextual factors. It has to be present in order to connect the factors and IWB and light the innovation fire.

5.3  Managerial implications

The main recommendation we can give as a result of our research is to organize the right work context around employees with IWB (by providing supportive leadership, enabling external innovative contacts for co-creation, ensuring room for autonomy and creating innovative, multidisciplinary teams), and they will use their creativity, empowerment, optimism and innovation energy to realize unexpected incremental and radical innovations. We make the following specific recommendations to stimulate innovation energy and IWB:

1. Consider the properties of an employee with IWB and the properties of supportive leadership during recruitment, selection and coaching processes.
2. Develop job profiles that require these specific innovative qualities. Be precise in the stage of IWB needed for the job while mentioning in the job profile that employees (current or aspiring) have to be innovative.
3. Offer room for autonomy, reduce the number of formalized procedures and stimulate external contacts including co-creation. Be aware that constantly working on customers’ demands can also decrease IWB.
4. Create multidisciplinary teams and maintain a good balance between autonomy and knowledge sharing between teams. Share
the strategic innovation goals of the organization in order to stimulate both incremental and radical innovation and align these goals with individual innovation of employees.

5.4 | Limitations of the study

Like many qualitative studies, we are aware of the limitations of ours. Theoretically, we know of more possible factors than we used in our conceptual model. We made the choice to use the ones mentioned most often in the specific IWB literature. More research must be done on other possible factors. Inductively, we found that supportive leadership, co-creation, multidisciplinary teamwork and optimism were mentioned by the respondents as important factors of the employees with IWB. Because we focussed on innovation energy, these and other work-contextual factors must be explored by more research to get a deeper insight. We agree with de Jong and den Hartog (2005) that more research is needed about the relation between personality features and IWB. Our research gave more insight into some innovation properties, though a person’s personality has more aspects. New research questions are emerging, like how high levels of innovation energy with the right personal innovation properties are based on nature or nurture and how can they decrease or increase during someone’s life? And if so, what are the influencing factors for that? What is the role of the private life circumstances? New questions might also be related to team composition, such as to what extent it is necessary to spread the innovation energy across the team members, and do teams need a threshold for the amount of innovation energy?

A few limitations are related to our sampling choices. The study was done in highly innovative organizations with an emphasis on product innovation; more research is necessary to explore the role of innovation energy for other types of innovation such as process, organizational and social innovations. In addition, it is relevant to explore innovation energy in highly ambidextrous organizations in which exploration and exploitation are much more mixed.

A methodological flaw is that we were not able to interview all of the employees; it might be that our respondents liked to speak about their innovation achievements more than their colleagues who did not volunteer to participate in the research. Nevertheless, we assume that our concept of innovative energy always plays an important role in IWB. The amount of energy can differ, but without this energy, inventions will not result in explorative innovations. Based on our data, we were be able to conceptualize the new concept. The next step is to perform quantitative research in order to get more data to increase the external validity. As researchers ourselves, we felt a lot of innovation energy in recognizing this converging stimulus in the innovation process and hope to inspire other researchers to do more research on this interesting and, in our opinion, very important factor.

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ORCID

Henk Jan van Essen https://orcid.org/0000-0002-8672-7547


AUTHOR BIOGRAPHIES

Henk Jan van Essen, is lecturer Business Administration and Research at Saxion University of Applied Sciences. Before this position, he worked for 36 years as a manager and director in several profit and non-profit organisations, mostly in the healthcare. During his professional career, he became interested in bottom up innovation, which is crucial in his experience in change processes. He is currently finishing his PhD thesis on Innovation Energy at the University of Twente. Other publications about this topic can be found in the references list of this current article. https://research.utwente.nl/en/persons/henk-jan-van-essen

Jan de Lee is assistant professor of Human Resource Management at the Faculty Behavioural Management and Social Sciences, University of Twente. Next to this position, he is partner of ModernWorkx, a research and consultancy firm. Before starting his own business, he was employed as senior researcher/consultant at TNO Work and Employment. His teaching involves HR.
Analytics, team-based work and HR & Innovation. His research is focused on flexible labour, working times, new ways of working and (virtual) team-based work. https://people.utwente.nl/j.deleede

Tanya Bondarouk is professor of Human Resource Management and dean of the Faculty Behavioural Management and Social Sciences at the University of Twente. Her research projects cover topics related to an integration of Human Resource Management and social aspects of Information Technologies, such as digitalization of the workforce and HRM, implementation of digital HRM solutions, robotization and workforce management. Tanya Bondarouk is recognized as one of the founders of the electronic Human Resource Management (e-HRM) discipline. During the past two decades, her work was mainly concerned with the integration of HRM processes, and practices with the social aspects of (Information) Technology Implementations. https://people.utwente.nl/t.bondarouk