Unravelling complex job characteristics with network analysis

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Published in:
LinkedIn

Publication date:
2023

Document Version:
Other version

Link to publication

Citation for published version (APA):
"Studying human behaviour is complex because behaviour doesn’t occur in a vacuum, the individual resides within systems that influence behaviour." Professor Jessica Woodhams, a forensic psychologist explains that “behaviour results from an interaction between the individual and the environment, or more accurately the environments, they are in.”

Job demands (e.g., job insecurity, role ambiguity) impose psychological and physical costs on employees, draining their energy. In contrast, job resources (e.g., support from colleagues, autonomy) assist employees in handling job demands and achieving goals, safeguarding them from strain. Therefore, organizations must delve into the mechanism and interaction of these factors to understand their impact on employees and implement effective interventions. While researchers acknowledge the complexity of workplace behaviour influenced by numerous environmental factors, most studies overlook the combined influence of these myriad factors. This report illustrates how to model this complexity and implement targeted interventions using advanced analytics and dashboarding.

We surveyed 919 employees of a leading European provider of a cloud-based business communication using the Vitamins@Work platform. We examined the interactive interrelationships of work characteristics (measured in the fall of 2021), and their relationship with employee work engagement, yielding a unique network of work characteristics (see Figure 1).

![Network analysis of work characteristics and work engagement](image)
We observe that, even though some job demands (the blue nodes) form a ‘cluster’ (i.e., when they prevail in an organisation, they tend to reinforce each other, increasing the impact on an employee), these are buffered by the job resources (the green nodes). We can also derive from this network that the job challenges (the orange nodes, e.g., cognitive demands, work pace and amount, and job complexity), also form a ‘community’, together with emotional demands. When an employee experiences cognitive demands, they also encounter more difficulty understanding their role, and their job feels more complex, thereby heightening emotional demands. In addition, we find that job complexity is linked to skill utilisation and is associated with work engagement through learning opportunities. The results of the network analysis show that challenges indeed exhaust and motivate simultaneously, as suggested in the scientific literature. To keep an employee more engaged, learning opportunities, skill utilisation and meaningfulness seem to be crucial, as they strengthen each other’s prevalence.

We conducted an additional analysis to identify the work characteristics that are most important for managerial interventions (see Figure 2).

Firstly, based on the strength parameters, it is advisable for managers to address role conflict, given its strong connection to other nodes in the system. Deactivating this node would subsequently deactivate other nodes linked to it. Secondly, the betweenness parameters, which calculate the shortest path between all pairs of nodes in a graph and thus identify nodes serving as ‘bridges’ to others in the system, suggest boosting skill utilisation to promote work engagement. Thirdly, the closeness parameters can help identify nodes best positioned to influence the entire network rapidly. In this case, the advice would be to reduce role conflict and increase learning opportunities.

In conclusion, network analysis can serve as a compelling analytical tool for organizations to unravel complex interrelationships between job characteristics. It aids managers in formulating targeted intervention strategies to enhance the work environment and offers a personalized visualization for the company undergoing the analysis.

This study was conducted as part of the Wellbeing@Work chair. The Wellbeing@Work chair was established to use scientific research to support policymakers in identifying the causes and consequences of work-related well-being and developing interventions to improve well-being at work. The chair is part of the Faculty of Social Sciences and Solvay Business School. We are grateful to Vitamins@Work BV, Dstny NV, Obelisk NV, Metiselect NV, SBS Skill BuilderS NV, and Projective Group NV for sponsoring the chair. If your company is interested in a partnership, please contact bert.schreurs@vub.be