Towards Discovering Employee-Robot Interaction: Aspects of Concluding the Psychological Contract

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Abstract

A psychological contract refers to presumed and subjective beliefs in relation to the exchange relationship, considered mainly between employees and employers. An immanent part of the psychological contract is its subjectivity and the relationship of exchange of expectations, promises or commitments of both parties to the employment relationship. The conditions in which modern organisations have to operate justify the use of the psychological contract for the analysis of employment relationships, but do not yet take into account the emerging new form of relationship at the workplace. Currently, thanks to the development of new technologies, including artificial intelligence, the role of robots in the workplace is growing. The aim of the article is to outline the framework for building the involvement of employees in technologically, socially, and emotionally advanced forms of artificial intelligence. The manifestations of workers' interactions with social robots within the framework of a contractual partnership will be defined. To this end, the arguments are reviewed for the possibility of concluding a psychological

contract between a human and a robot based on the theory of exchange and the standard of reciprocity, which can set new directions for research in this area.

Keywords: psychological contract, social and humanoid robots, social exchange theory, the norm of reciprocity, human-robot interaction in the workplace

JEL Classification Codes: M120, M510, G410

Introduction

Many aspects of human functioning are regulated by various contracts (Wellin, 2013). They are essential for the establishment of lasting, harmonious relations between the employee and the organisation. A psychological contract is defined as an unwritten agreement between the employee and the employer, an idiosyncratic set of mutual promises, expectations and obligations of the employee and the organisation (Rousseau, 1989). Unlike an economic contract, which covers selected legal and formal rules and specific employment solutions (various types of written contracts regulating the employment relationship) and financial benefits on the part of the employer, a psychological contract differs from other contracts in the degree of formalisation, detail, subject matter that it regulates and the way it is perceived, as it includes an option of exchange and reciprocity, referring to employees' relations (Wellin, 2013). The exchange relationship in a psychological contract provides important information on how employees think and act, and how they function in the organisation.

The literature studies conducted so far have shown a broad interest of researchers in the concept of psychological contract, shaping the employment relationship between the employee and the employer (Ma et al., 2020). When following the development of the concept of psychological contract, it was noted that its initial conceptualisation is related to the exchange between the patient and the psychotherapist (Menninger, 1958). However, over the last four decades, research has focused almost exclusively on the analysis of the employee-employer and employee-manager relationship (Rousseau, 2001; Meckler et al., 2003). Modern research is currently analysing a wider range of exchanges, such as the common perception of team-level contracts (Gibbard et al., 2017), different types of reciprocity being the basis for exchanges (Guest, 2007) and a range that includes both the immediate working environment, the so-called 'microenvironment', and in a broader sense – society, the 'macroenvironment' (Venter, Levy, 2011). Marx (2001) also suggests that the employees may enter into psychological contracts with various representatives, creating employee-client relationships (Ma et al., 2012).

There is currently a change noticed in the structure of the employee-employer relationship due to globalisation, rapid technological development, increasing economic competitiveness and the situation in the global and local labour markets. In recent years, new information and communication technologies as well as the development of networks and virtual and artificial intelligence have been of particular importance in building relations between employees and employers (Pocztowski, 2019). Over the last two decades, these changes have led to fundamental transformations in the nature of the relationship between the employer and the employee (De Cuyper et al., 2014). An interesting new aspect of the workplace is the emerging interaction between workers with increasingly advanced forms of technology known as artificial intelligence. The main focus of current research is on the technological achievements of social robotics, which aims to create humanoid robots capable of mimicking human-human interactions in order to create human-technology interactions (Breazeal, 2003). Thanks to the development of new technologies, organisations are getting closer to the widespread use of social robots. The user's individual characteristics and beliefs as well as their attitude towards robots are important factors influencing the worker-robot interaction (Komatsu et al., 2012). The attitude of employees towards robots is also changing, which goes beyond being impersonal tools under full human control, such as calculators, printers or computers, towards cooperation and creating new partnerships with intelligent agents (Gunkel, 2017).

Darling (2012) describes the definition of a social robot as a materially incarnated, autonomous actant that communicates and interacts with humans on an emotional level. The author believes that it is important to distinguish social robots from inanimate computers, as well as from industrial and service robots, which are not designed to influence human feelings and imitate social signals. In addition, social robots follow the rules of social behaviour, have different 'states of mind' and adapt to what they have learned through interaction. Social robots as personal/virtual assistants can be increasingly found in the working environment, some of which are designed to promote teamwork (Yunkyung & Bilge, 2014). The transition from the subjective treatment of robots in the workplace to perceiving them as partners in the performance of their professional duties poses a challenge for researchers exploring the phenomenon of psychological contract, examining the emerging 'artificial relationships' or exchanges between humans and robots in the workplace.

Therefore, the purpose of the article is to outline a theoretical framework aimed at determining the ways in which employees will shape psychological contracts with social robots in the workplace. For this purpose, a synthesis of research on worker-robot interaction will be made. It will indicate how this exchange can be experienced by employees and emphasise the feeling of attachment that an employee can create

within the exchange. This is an important conceptual step in establishing a workforce exchange with other more complex forms of smart technology in the workplace, such as social robots.

Is human-robot interaction possible?

The conducted research in the field of human interaction with technological agents, especially in the field of employee-robot relations, shows an innate human ability to recognise people and carry out human interactions. The human brain does not react emotionally to the sight of artificial objects such as computers or telephones. However, it has many associations with the human face and the possibility of interacting positively due to this similarity (Kanda & Ishiguru, 2013). As a result, people can interact with technology by using the same social scenarios, patterns and rules, such as courtesy, which are used in human-human interaction (Reeves & Nass, 1996). Research by Lee and Liang (2016) shows that humans are more likely to reciprocate a robot by performing a task at its request when the robot is perceived as helping the human to complete the task. This lays the foundation for understanding why people anthropomorphise technology.

Anthropomorphism is defined as assigning robots human characteristics, emotions, intentions, motivations, and goals. Assigning human traits to robots is based on observation of a robot's behaviour and anthropocentric knowledge (e.g. self-awareness and knowledge of other people's traits and behaviour) that are available at the time of the opinion (Epley et al., 2007). The ability to assign human characteristics to robots is considered to be a key property which is an indicator of the quality of human-robot relationship. Taking into consideration the interactions between the worker and the robot, it has been shown that the human tendency to anthropomorphise robots is all the stronger the more socially interactive and human-like a robot is (Fink, 2012). However, there are boundary conditions to implement anthropomorphism. One of them is the belief in the uniqueness of human nature. Essentialism assumes that human nature is unique, and that humans and robots are deeply qualitatively different (Demoulin et al., 2006). This can have a significant impact on people's attitude towards robots and their acceptance and positive perception of them. It has been shown that essentialism is associated with prejudice, perceiving divisions between groups, and stereotyping (Demoulin et al., 2006). There is a high probability that people who believe that a human being is a unique, individual being will have a stronger negative attitude towards robots with human-like characteristics. The second boundary condition for introducing anthropomorphism into human-robot relations is the phenomenon of the 'amazing

valley' developed by Mori (1970). As the robot becomes more and more human in appearance, a person experiences a disturbing feeling that reduces the perception of affection. However, the perception of sympathy and empathy increases as the robot approaches similarity to humans. The phenomena described above clearly emphasise the complex nature of human reactions to social robots and at the same time demonstrate the existence of such relationships.

The use of social robots in organisational practice is not yet widespread. Many questions remain as to how these interactions develop in natural conditions. Applying the theory of social exchange and the rule of reciprocity can be helpful in designing and explaining the interaction between the workers and the robots. However, while the principle of reciprocity between the worker and the robot is fundamental to understanding this interaction, the obligations generated by the social exchange are dispersed, non-specific, and emerge from other ongoing interactions, making them difficult to grasp.

The employee-robot relationship under a psychological contract

As mentioned earlier, a psychological contract in its definition means an idiosyncratic set of mutual promises, expectations and obligations between the employee and the organisation (Rousseau, 1989). This term suggests that a psychological contract is an exchange of organisational incentives (e.g. salary, wages, training, etc.) for employee input (e.g. work effort, time, performance, loyalty to the company, etc.) (Tsui & Wang, 2002). Since the theoretical framework clarifying the scope of a psychological contract is social exchange and the accompanying norm of reciprocity, it is important to prove whether they are sufficient for the implementation of the psychological contract between the worker and the robot. Assuming that the employee-robot contract goes beyond vertical labour relations such as employer-employee, horizontal contracts based on a shared perception of team-level relations will be analysed (Laulié, Tekleab, 2016).

In a horizontal psychological contract, team-level commitments can develop, creating a basis for team reciprocity, and the common perception of team members' commitments can vary depending on the content of the contract (e.g. quality of work, effort put into work) and characteristics (e.g. hidden and rigid; clear and loose) (Sverdrup & Schei, 2015). Laulié and Tekleab (2016) argue that the realisation of a horizontal psychological contract occurs when there is a similarity of ideas of team members about fulfilling promises made to the whole team as well as to individual team members.

As Gibbard and colleagues (2017) point out, a psychological contract is a multi-entity exchange agreement that can involve any person with whom an employee interacts and creates relationships. Focusing on a wider range of contracts, therefore, requires an analysis of how different forms of reciprocity justify them. This direction shows how important it is to look beyond a vertical contract that only considers the employer-employee relationship towards a horizontal contract that considers various relationships, including the employee-robot relation.

The possibility of concluding a psychological contract between an employee and a social robot is a prerequisite for the employee to develop a belief in mutual exchange obligations. In other words, the employee should start to see a social robot as an agent (acting on the basis of observations of the environment it later influences) (Darling, 2012). Other studies also support this view, showing that robots are responsible for their actions and omissions, and that humans can praise and blame robots equally and even more than humans (Komatsu et al., 2012). Therefore, it can be assumed that if workers perceive social robots that act autonomously in an intelligent and socially sensitive way as agents, they will become partners for workers to conclude a psychological contract.

For a psychological contract to be concluded between the worker and the robot, three conditions must be met concerning the existence of a mutual exchange. Firstly, the exchange must occur in time; secondly, a sense of reciprocity must entail some uncertainty as to whether a partner will reciprocate; thirdly, reciprocity is voluntary as long as each partner has some freedom as to whether it should reciprocate (Molm et al., 2007).

The emergence of social robots as workers' partners in the workplace shows that, over time, there may be a mutual relationship between them that is necessary for social exchange. This is a consequence of the fact that the robots, thanks to their advanced technological solutions, are able to achieve common goals together with their employees. Social robots may also have survival, productivity and learning needs that require interaction with humans, while humans may have different needs that can be met by social robots, such as providing information or services (Kanda & Ishiguro, 2013). While workers are clearly able to subordinate robots to a range of work responsibilities, social robots may have equivalent beliefs in relation to workers by programming them to refrain from reciprocating with the worker if, for example, a person acts aggressively, carelessly or offensively towards them (Darling, 2014). This uncertainty also arises because, given the complexity of social robots, it may not be entirely clear what types of human behaviour will cause a robot to be non-reciprocal and how severe it will be. In addition, the use of machine learning within the framework of artificial intelligence means that the robot's behaviour can evolve and adapt according to its experiences and interpretations of its environment, which

again adds an element of uncertainty to any worker-robot exchange. Therefore, these three conditions of mutual exchange can benefit the existence of an employee-robot relationship, thus forming the basis for a psychological contract.

The emergence of mutual relations, and thus expectations and obligations between a worker and a robot may be associated with a sense of power, which, although important from the point of view of the theory of social exchange, often remains hidden in the contracts being entered into. This is confirmed by Carter and his colleagues (2012), pointing to the lack of significant correlation between the level of power and the acceptance of more active or passive reactions to a breach of a psychological contract. Within the framework of the modern exchange theory, Emerson stated that every exchange is based on the so-called power-dependence (Emerson, 1972). Dependency relationships are that the more people in an organisation are dependent on each other, the more likely they are to create dependency relationships within a group. A higher level of power can be achieved when the level of dependency increases with a decrease in the number of alternatives related to exchange reactions or reduced social status.

Power-based relationships are built on three conditions: first of all, one side of the relationship must achieve the results desired by the other side; secondly, one side must provide the other with all the resources to achieve the desired results; and thirdly, one side of the relationship must clearly define to the other one the extent to which power is used to achieve the desired results (Blau, 2006). With reference to the employee-robot relationship, it can be assumed that the first two conditions can be met.

Both the employer and the robot may be dependent on each other in terms of their joint tasks and for access to certain resources or data. On the other hand, an employee may obtain at least some of these resources from other sources, such as another employee or another robot. Similarly, a robot may be dependent on an employee for information and task assignment, but if programmed to do so, it may receive the same benefits from another employee. In addition, the robot's attitude and motivation can be designed to match the attitude and motivation of the organisation that owns it, which means that the wider context of the power relationship between workers and employers is likely to infiltrate the power relationship between the worker and the robot (Komatsu et al., 2012). All this means that the relationship between the worker and the robot does not have to be equal in every case, which differentiates the third condition for the existence of a power relationship between the worker and the robot. According to the theory of exchange, people tend to use power differences to their advantage (Emerson, 1972; Blau, 2006). This is not possible with robots because they do not have the same motivational structures as humans, for example, they do not care about money, high social status or prestige in the way

people generally do. Moreover, it is unlikely that a robot would use power differentials to obtain unequal benefits for itself, and if a worker tries to take advantage of it, it will not necessarily react negatively in the way a person would probably do.

The next step, once the actual occurrence of workers' interactions with social robots has been determined, is to clarify what kind of mutual obligations may arise in such relationships. The content of psychological contracts can be conceptualised and measured broadly (Guest, 2004), considering potential differences in the content of contracts between workers and social robots. Flandorfer (2012) notes that social robots work with people through two-way communication and provide personal assistance in everyday activities such as reminding the elderly to take medication, preparing food, eating a meal and washing themselves. In return, those under the robot's 'care' believe that they are obliged to reciprocate by obediently following their instructions. These robots also work with nursing staff and family members to create a support system for the elderly by offering emotional and physical help. Animal-shaped robots are also used to comfort and entertain children and the elderly (Moyle et al., 2013).

Based on the theory of social exchange and the norm of reciprocity constituting the basis for establishing psychological contracts, and on the above-mentioned studies on employee-robot interactions, it can be assumed with a high degree of probability that psychological contracts between a worker and a social robot may exist (Kanda & Ishiguro, 2013) and their nature is specific.

To sum up the above considerations, the nature of the employee-robot contract can be considered through: the form of reciprocity (balanced, generalised, negative); the robot's level of human anthropomorphism (low-high); and the level of power in relation to the robot (low-high). Although this is not exhaustive, the review of the literature on worker-robot interaction suggests that these characteristics will be relevant and likely to influence the content and subject matter of the psychological contract.

Conclusion

The purpose of this article was an attempt to fill the information gap concerning the possibility of establishing relations between employees and social robots under a psychological contract. From the perspective of a psychological contract, a new kind of relationship is created that expands the existing theories of human-human interaction. As advanced forms of artificial intelligence technology, such as social robots, are becoming increasingly common in the workplace, they are changing the existing relationship between workers and introducing new, state-of-the-art worker-robot relations.

Social robots are specifically designed to assist people in their professional duties. Social robotics is undergoing a major transformation of its goals and scope (Darling, 2014). From the dominant industrial mindset, robotics quickly entered the human environment and dynamically created new challenges there. The robots that appear in the workplace affect people and their lives, influencing, supporting and serving them. The existence of a relationship between an employee and a social robot and the establishment of a psychological contract in this relationship is supported by the fact that human-robot interactions will become common. Japanese companies are working on humanoids and androids with the strong belief that these machines, with their human appearance, can assist in work and even replace human's most natural communication partners, that is, other people (Griep et al., 2019). Arguments about the existence of contractual relations between the workers and social robots can only be made if there is a certain level of anthropomorphisation of robots. Moreover, where psychological contracts are created between employees and social robots, it potentially changes existing team relationships, as suggested by Yunkyung and Bilge (2014). Employers should, therefore, consider whether they implement robots as partners for individual employees or as colleagues in the team. Employers are increasingly encouraged to view their future workforce as an employee-robot hybrid, meaning that the way employees engage with work and robot relationships is critical to understand the meaning of a psychological contract between these parties.

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