Chapter 53

Transformation in the work of small agricultural producers in the context of the digitalization of agriculture

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ABSTRACT
Rapid and radical changes have been experienced by many workers, so the article aimed to discuss the new paradigms of work in the face of changes brought about by digitalization and, subsequently, the ways that this has affected the daily life of workers in agriculture. To achieve the objective, a literature review was carried out along with articles from the Scopus and Google Scholar platforms. The results reveal issues that bring up needs that have never been felt before, but which are incorporated into everyday life, making human beings dependent on technologies to address such needs in practically all areas of life.

Keywords: Transformation at work, small farmers, scanning, agriculture.

1 INTRODUCTION

Does work dignify or enslave man? How can one interpret the subjectivity that governs work relations today? These works have undergone major transformations due to digitization that permeates several fields of knowledge. Given this, workers are pressured to keep up with technological changes and adapt to them very quickly, what has this new reality caused workers? In this text, these issues will be discussed from the perspective of the human factor, involving sociological (LINHART, 2000) and psychological (PULIDO-MARTÍNEZ, 2015) subjectivity, more specifically on the reality of the farmer.

Papers that address concepts focused on the dynamics of work with a sociological and psychological approach in agriculture can contribute to the understanding of unique arrangements of organizations of work activities, involving the subjectivity and complexity of these relationships; in addition to helping to understand the meanings attributed to the different forms of work (DE MELO E SCOPINHO, 2015).

Agriculture is a vital sector, given that it meets a basic human need, that of providing food for humanity (ISSAD, AOUDJIT, AND RODRIGUES, 2019). However, people who deal directly with the planting, cultivation, and harvesting, live on the margins of society, and in many cases, work in slave-like regimes. The rural worker suffers from social, economic, and political abandonment (RIBEIRO, BRANT E PINHEIRO, 2015). Thus, the agricultural segment was chosen as the object of study given the importance of work and rural workers.

The urban population in general has a romanticized and distorted view of life in the context of agriculture, associating it with beautiful farms where almost everything families need at the table is produced. However, the reality is that today, agricultural properties are managed as companies and are focused on the technical production of food, seeking economic sustainability. Digitization has brought about many changes in the business world, and this has not been different in the agricultural sector. With digital agriculture, the producer can monitor his properties 24 hours a day (BORÉM, ET AL, 2022). Faced with these transformations, the article aimed to discuss the new work paradigms in the face of the changes brought about by digitalization and, subsequently, how this has affected the daily life of the worker in agriculture.

To achieve the objective, a literature review was carried out along with articles from the Scopus and Google Scholar platforms. The article goes on to present theoretical concepts about work in the face of digitization, followed by the analysis and discussion of these concepts in the context of agriculture, with conclusions.

2 DEVELOPMENT

2.1 COMPLEXITY OF THE NEW CONCEPT OF WORK IN THE FACE OF DIGITIZATION

The work became more complex and this brought difficulties for its understanding (LINHART, 2000). Rapid advances in scanning technologies are changing modern working conditions (KÖRNER ET AL, 2019). This reality has divided the opinion of sociologists, there is no consensus among them. Some seek to understand work from the perspective of the company, and others from the job. For some, professional activities have taken a richer direction in terms of promises, demanding involvement, and a feeling of autonomy on the part of the employee. For others, the multiple reforms at work continue to be based on the principles of control in the mechanized and hierarchical management of Taylorism (LINHART, 2000).

New forms of employment that integrate man, and machines of various natures, have brought transformations to the exercise of activities, to the point of questioning the concept of the job itself. In this sense, digitization emerges as a new system that becomes the link between the technical system and work (ZARIFIAN, 1990).

Given this, Wrzesrnewski and Dutton (2001) describe two contradictory trends toward which jobs are heading. The first refers to technologies called: Industry 4.0, which excels in the application of technologies to jobs, allowing extreme monitoring of workers' activities. On the other hand, there are cultural changes towards the flexibility of time and the job, making it less restrictive and more autonomous.

However, both paths presented by Wrzesrnewski and Dutton (2001) are complex to understand from the perspective of the worker. Monitoring made possible by digitalization may seem beneficial to service outcomes. However, Kretschmer and Khashabi (2020) found that excessive vigilance can have negative effects on employee motivation, well-being, and even performance.

Flexibility, on the other hand, provides the notion of self-entrepreneurship, as a positive bias for the worker, however, the company is no longer responsible for its employees. Thus, stable definitions about the place and hours worked are eliminated, and the costs for the development of professional activities are now covered by the employees themselves. In this way, self-management seen in the context of flexibility as positive, shifts to the idea of self-deception (ABÍLIO, 2021).

Another aspect to be considered in flexibility is the will of the worker. No monitoring system is necessary to supervise the will of those who work for you, since this has already been achieved (PULIDO-MARTÍNEZ, 2015).

In this same bias, it can be considered that digitization has expanded its concept beyond the work institution. It becomes increasingly difficult to accurately identify the boundaries of the organization. When someone accesses LinkedIn, are they engaged in professional or social activities? Or the combination of both? In these terms, digitization makes organizations an increasingly informal and temporary concept (BEDNAR AND WELCH, 2020).

There is no point in transforming the work organization if employees are not willing to adapt to changes (BEDNAR AND WELCH, 2020). In this sense, Mintzberg (1993) is extremist when he calls the socialization of new members of an organization a process of indoctrination.

In all cases, the employee has become the main agent of the company, consequently, the sociology of work has changed. With the individual at the center, there is a work environment full of demands and requests of high complexity (LINHART, 2000).

It is in this context of dynamism that Pulido-Martínez (2015) talks about the plasticity of psychology, according to the author, throughout history, psychology has shown the ability to adapt to changes, and the logic of rationality of these changes, in the composition of the work. However, the human factor and its subjectivity have been little considered by organizations in the immediate pursuit of economic success. To illustrate this reality, digitization in agriculture was used as an object and study.

2.2 DIGITIZATION OF AGRICULTURE AND ITS IMPLICATIONS FOR WORK

The processes of planting, harvesting, and surviving from the land involve the rural worker and allow him to be seen by society as a productive and therefore useful being (RIBEIRO, BRANT E PINHEIRO, 2015). The executing subject is always the protagonist of his work, since it is his own life, and work is a necessary condition for his existence, which is directly linked to life in society (SZNELWAR, 2015).

In other words, the feeling of protagonism at work denotes a relationship with oneself, always dependent on and shaped by the social environment in which the worker is inserted (colleagues, bosses, and clients). Even in a context of digitization and a high level of automation, this protagonism is observed. No production system works completely autonomously without the need for human intervention, whether in the design, implementation, operation, maintenance, etc. phase (SZNELWAR, 2015).

In this context, digitalization has arrived in rural production regions. Some authors call this process agriculture 4.0, a neologism derived from the concept of industry 4.0 (BERTOGLIO ET AL, 2021; BOUALI ET AL, 2021; SYMEONAKI, ARVANITIS AND PIROMALIS, 2020). Faced with this new reality, the literature presents many changes in the work of the farmer, some positive and others negative.

Positively, we can consider the improvement in working conditions, since manual and repetitive interventions for small mechanical services are no longer necessary, being able to free farmers from routine work, and allowing them to dedicate themselves to essential tasks on the farm (example of some authors who illustrate this positive perspective: IDOJE, DAGIUKLAS AND IQBAL, 2021; MOHAMED ET AL, 2021; WANG, REN AND MENG, 2021; ZSCHEISCHLER ET AL, 2022).

In negative terms, the inequalities that digitization can accentuate between developed and developing regions stand out, this process can restrict the scope of participation of some countries considered less well-off, as well as limit their opportunities for updating at the global level, due to the relatively greater benefits for richer nations (MATTHESS AND KUNKEL, 2020; MONDEJAR ET AL, 2021). Small producers, especially those residing in developing countries, are the most affected by this reality.

In these countries, most farmers live in rural areas and do not have sufficient instructions to operate technological instruments, which puts them in a state of vulnerability (EITZINGER ET AL., 2019; FRIHA ET AL, 2021). Added to this is the difficulty of accessing an adequate internet network in agricultural regions. This infrastructure is a crucial factor for the proper functioning and implementation of digitization (MOHAMED ET AL, 2021). Thus, at the same time that many farmers perceive the need for change, they do not know what to do to adapt.

Small farmers, in addition to being the most affected by this lack of infrastructure, are also the main food producers in the world, about 80% of the food grown is produced by family farming (SIMS AND KIENZLE, 2017). There are over 500 million family farmers in the world and they occupy between 70 and 80 percent of agricultural land (FAO, 2014), so it is important to assist them to understand and support labor activities in the new emerging context.

The arrival of digitization in the countryside has caused a great social and cultural impact on farmers, requiring adaptive capacities to deal with technological transformations (ZSCHEISCHLER ET AL, 2022). Such an adaptation process is a great challenge for those who consider themselves "digitally illiterate" (MONDEJAR ET AL, 2021).

In the context of adaptation needs, Linhart (2000) reports the efforts of companies in the quest to establish a relationship of trust with their employees reciprocally. For the company to be able to adapt to its competitive environment, it is necessary to ensure the reliability of the worker's receptiveness to changes.

This relationship of trust needs to be cultivated by organizations, but this can present some gaps. An example of this is data management in agriculture: To feed the information networks installed on farms, various data are collected, most of them automatically, by the machines and/or agricultural robots

themselves, but in many cases, farmers have little or no access to data collected on their lands (JAYASHANKAR ET AL., 2018).

Therefore, if there is no mutual trust based on a secure basis in the relationship, there is no prospect for the future, and work relationships are compromised by mistrust. What hinders the healthy construction of a partnership and real participation of the worker in the activities (DE MELO E SCOPINHO, 2015)

Another aspect to consider is the implicit knowledge of farmers, they act according to customs, knowledge, and learning passed from generation to generation. Faced with this knowledge, farmers know how to act in various situations and are always looking to anticipate known facts that could cause them some harm, such as rework, loss of production and equipment (SZNELWAR, MONTEDO AND SIGAHI, 2021). However, with the recent digitization and the gradual use of digital farm models, changes are observed in the farmer's skills profile (ZSCHEISCHLER ET AL, 2022).

The farmer who previously had different degrees of autonomy at work (SZNELWAR, MONTEDO, SIGAHI, 2021), now has gone through a process of limitations in decision-making as the stages of the digitized production chain are transferred to third parties. This has caused a reversal of roles, making external actors have more decision-making power than the farmer who owns the land (ZSCHEISCHLER ET AL, 2022).

It must also be considered that highly automated working conditions are a potential source of stress because of the demands for high qualifications and knowledge about new technologies at work. This can harm psychological well-being, and may even lead to a state of frustration, especially for employees with activities considered less qualified (KÖRNER ET AL, 2019), such as agriculture.

3 DISCUSSIONS

n Throughout the article, some benefits that the literature presents regarding digitization in rural areas were pointed out. It has the potential to bring ergonomic improvements to the worker's quality of life. But for this to happen, it is necessary to rethink some technologies taking into account their limitations.

Given this, a series of difficulties for the work of small farmers were detected in the literature read: The lack of infrastructure in the field; lack of equity in access to information; and limitations of knowledge and skills to operate technological tools. In social terms, these difficulties have pressured cultural and behavioral changes at work; and in psychological terms, digitalization has offered new occupational risks and stressors that are being known and studied as they are presented by users.

Because of this, it is observed that along with digitization, new demands related to illness at work arise. The subjectivity that surrounds the notion of time in activity; a place to work in the service; and ways of carrying out work are examples of new circumstances that may pose occupational risks (GARCÍA, 2021).

Thus, it is necessary to reinforce protection against this new reality, considering that a safe and healthy workplace is a worker's right, and is an intrinsic part of an occupation with dignity and quality.

Thus, this context of energetic work has been expanding the range of action of the norms aimed at identifying and acting on the prevention of risks that affect professional activities (GARCÍA, 2021).

Ouafiq, Saadane & Chehri (2022) report that when mechanization arrived in the countryside, with machines such as tractors and harvesters, many farmers viewed them with distrust, however, today it is difficult to imagine what agriculture would be like without these tools. Given this, it is worth reflecting: Is humanity moving towards a future of total dependence on digitization technologies at work? What are the implications of all this?

In any case, the institutionalization of agricultural work with or without technology has the symbolic role of dignifying these rural workers, whose life trajectories carry the marks of exclusion before society (DE MELO E SCOPINHO, 2015).

4 CONCLUSION

The new work paradigms in the face of typing have shown some contradictions. On the one hand, digital technologies propose to enable ergonomic improvements for the worker; on the other hand, they can cause damage to their users, especially to small farmers who, in general, are characterized by having limitations in accessing and operating technologies.

In any case, digitization is already a reality in the daily lives of workers in all fields of society, technology has become a target strongly pursued to the point of seeking in it, the solution to most of humanity's problems.

Given the reported context, it is concluded that there is great complexity in understanding work during the digital age. Digitization is a reality, which is emerging and which has presented a series of uncertainties, bringing about changes in various aspects of work. In addition, it reveals issues that bring up needs that have never been felt before, but which are incorporated into everyday life, making human beings dependent on technologies to address such needs in practically all areas of life.

Finally, future work can be done through empirical observations of the daily life of small farmers to understand in practice the problem theoretically exposed in this research.

REFERENCES

ABÍLIO, Ludmila Costhek. Empreendedorismo, autogerenciamento ou viração?: Uberização, o trabalhador just-in-time e o despotismo algorítmico na periferia. Contemporânea-Revista de Sociologia da UFSCar, v. 11, n. 3, 2021.

BEDNAR, Peter M.; WELCH, Christine. Socio-technical perspectives on smart working: Creating meaningful and sustainable systems. Information Systems Frontiers, v. 22, n. 2, p. 281-298, 2020.

BERTOGLIO, Riccardo et al. The digital agricultural revolution: A bibliometric analysis literature review. 2021. IEEE Access, 9, DOI: 10.1109/ACCESS.2021.3115258

BORÉM, A. et al. (Ed.). Agricultura digital. Oficina de Textos, 2022.

BOUALI, Et-Taibi et al. Renewable Energy Integration Into Cloud & IoT-Based Smart Agriculture. IEEE Access, v. 10, p. 1175-1191, 2021.

DE MELO, Thainara Granero; SCOPINHO, Rosemeire Aparecida. Sentidos do trabalho e formas de participação: o caso de uma cooperativa de trabalhadores rurais do Assentamento Mário Lago, Ribeirão Preto (SP). Cadernos de Psicologia Social do Trabalho, v. 18, n. 2, p. 123-136, 2015.

EITZINGER, Anton et al. GeoFarmer: A monitoring and feedback system for agricultural development projects. Computers and electronics in agriculture, v. 158, p. 109-121, 2019.

FAO, TFAAOOTUN. The state of food and agriculture: Innovation in family farming. Rome FAO, 2014.

FRIHA, Othmane et al. Internet of things for the future of smart agriculture: a comprehensive survey of emerging technologies. IEEE/CAA Journal of Automatica Sinica, v. 8, n. 4, p. 718-752, 2021.

GARCÍA, Yolanda Valdeolivas. Trabajo seguro y saludable: centralidad en el acervo internacional y europeo en materia social y respuestas frente a las transformaciones del siglo XXI. Revista del Ministerio de Trabajo y Economía Social, n. 151, p. 195-225, 2021.

IDOJE, Godwin; DAGIUKLAS, Tasos; IQBAL, Muddesar. Survey for smart farming technologies: Challenges and issues. Computers & Electrical Engineering, v. 92, p. 107104, 2021.

ISSAD, Hassina Ait; AOUDJIT, Rachida; RODRIGUES, Joel JPC. A comprehensive review of Data Mining techniques in smart agriculture. Engineering in Agriculture, Environment and Food, v. 12, n. 4, p. 511-525, 2019.

JAYASHANKAR, Priyanka et al. IoT adoption in agriculture: the role of trust, perceived value and risk. Journal of Business & Industrial Marketing, 2018.

KRETSCHMER, Tobias; KHASHABI, Pooyan. Digital transformation and organization design: An integrated approach. California Management Review, v. 62, n. 4, p. 86-104, 2020.

KÖRNER, Ulrike et al. Perceived stress in human–machine interaction in modern manufacturing environments—Results of a qualitative interview study. Stress and Health, v. 35, n. 2, p. 187-199, 2019.

LINHART, Danièle. O indivíduo no centro da modernização das empresas: um reconhecimento esperado, mas perigoso. Trabalho & Educação, v. 7, p. 24-36, 2000..

MATTHESS, Marcel; KUNKEL, Stefanie. Structural change and digitalization in developing countries: Conceptually linking the two transformations. Technology in society, v. 63, p. 101428, 2020.

MINTZBERG, Henry. Structure in fives: Designing effective organizations. Prentice-Hall, Inc, 1993.

MOHAMED, Elsayed Said et al. Smart farming for improving agricultural management. The Egyptian Journal of Remote Sensing and Space Science, 2021.

MONDEJAR, Maria E. et al. Digitalization to achieve sustainable development goals: Steps towards a Smart Green Planet. Science of the Total Environment, v. 794, p. 148539, 2021.

OUAFIQ, El Mehdi; SAADANE, Rachid; CHEHRI, Abdellah. Data Management and Integration of Low Power Consumption Embedded Devices IoT for Transforming Smart Agriculture into Actionable Knowledge. Agriculture, v. 12, n. 3, p. 329, 2022.

PULIDO-MARTÍNEZ, Hernan Camilo. Del empleo al post-empleo: O de la plasticidad de la psicología en la produccion de la subjetividad laboral. Revista Psicologia Organizações e Trabalho, v. 15, n. 3, p. 322-331, 2015.

RIBEIRO, Luiz Paulo; BRANT, Fátima Lúcia Caldeira; PINHEIRO, Tarcísio Márcio Magalhães. Saúde, trabalho e adoecimento: o trabalho como mediador das representações sociais de agricultores familiares. Rev Med Minas Gerais, v. 25, n. 4, p. 493-501, 2015.

SIMS, Brian; KIENZLE, Josef. Sustainable agricultural mechanization for smallholders: what is it and how can we implement it?. Agriculture, v. 7, n. 6, p. 50, 2017.

SYMEONAKI, Eleni; ARVANITIS, Konstantinos; PIROMALIS, Dimitrios. A context-aware middleware cloud approach for integrating precision farming facilities into the IoT toward agriculture 4.0. Applied Sciences, v. 10, n. 3, p. 813, 2020.

SZNELWAR, Laerte Idal. Quando trabalhar é ser protagonista e o protagonismo do trabalho. Editora Blucher, 2015.

SZNELWAR, Laerte Idal; MONTEDO, Uiara Bandineli; SIGAHI, Tiago Fonseca Albuquerque Cavalcanti. A complexidade em diálogo com a ergonomia e a engenharia–contribuições de Edgar Morin. EccoS–Revista Científica, n. 57, p. 20269, 2021.

WANG, Hao; REN, Yaxin; MENG, Zhijun. A Farm Management Information System for Semi-Supervised Path Planning and Autonomous Vehicle Control. Sustainability, v. 13, n. 13, p. 7497, 2021.

WRZESNIEWSKI, Amy; DUTTON, Jane E. Crafting a job: Revisioning employees as active crafters of their work. Academy of management review, v. 26, n. 2, p. 179-201, 2001.

ZARIFIAN, Philippe. As novas abordagens da produtividade. Gestão da empresa: automação e competitividade. Brasília: IPEA, p. 73-97, 1990.

ZSCHEISCHLER, Jana et al. Perceived risks and vulnerabilities of employing digitalization and digital data in agriculture–Socially robust orientations from a transdisciplinary process. Journal of Cleaner Production, v. 358, p. 132034, 2022.