

5.0 as a New Stakeholder Responsibility*

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Abstract

This research analyzes the 5.0 paradigm and its possible relationship with the Company Stakeholder Responsibility (CSR). After the 4.0 in “Hannover Messe”, the first use of this new number namely “5.0” regards industry sector and subsequently it is used in Japan with the concept “Society 5.0”. Industry 5.0 complements the existing Industry 4.0 paradigm by highlighting research and innovation as drivers for a transition to a sustainable, human-centric and resilient European industry. Industry 5.0 attempts to use the value of old and new technologies placing the wellbeing of industry workers at the core of production process. The practical implications are to allow scholars, researchers and entrepreneurs to more consciously regarding the human-centric approach and find tools in order to realize the goals of 5.0. This work shows a tool used within enterprise that can be represent a real application of 5.0 paradigm.

Keywords: Industry 5.0; Society 5.0; Company Stakeholder Responsibility; Artificial Intelligence; human-centric approach; Key Enabling Technologies; gamification.

1. What Means Industry 5.0?

Since the first introduction in 2011 during the Hanover Fair, Industry 4.0 has gained an exponential development (Brondoni, 2019). This new revolution (The Fourth Industrial Revolution) is composed by the key enabling technologies (KETs): Advanced manufacturing solutions, additive Manufacturing, Augmented Reality, Simulation, Horizontal/Vertical integration, Industrial Internet, Cloud, Cyber Security and Big Data and Analytics (Rüßmann et al., 2015; Schwab, 2016; Büchi et al., 2018). As is well known, industry 4.0 is characterized by "disruptive forces"(Christensen et al., 2015), this means with unpredictable application potential not only from the organizational but also from the ethical aspect (Brondoni & Zaninotto, 2018), not only within industry but in the whole society. The term Industry

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5.0 was coined by Michael Rada in 2015 within the social network LinkedIn (Martynov et al., 2019). For him “Industry 5.0” is a systematic waste prevention technique that remembers the lean production and follows the principles of Sustainable development. According to the European Commission (2021), Industry 5.0 is: “the power of industry to achieve societal goals beyond jobs and growth to become a resilient provider of prosperity, by making production respect the boundaries of our planet and placing the wellbeing of the industry worker at the center of the production process”. Industry 5.0 is a new paradigm where the aim is the worker well-being. Industry 5.0 is often proposed as a sustainable manner to increase productivity while not removing human workers. The role of the European Commission's Directorate-General for Research and Innovation is to support the development of new and emerging technologies that underpin this transition for European industry. Industry 5.0 is composed by three core elements: human-centricity, sustainability and resilience:

- human-centric approach in industry puts core human needs and interests at the heart of the production process. The aim is to use technology to adapt the production process to the needs of the worker;
- sustainability means reducing energy consumption and greenhouse emissions, to avoid depletion and degradation of natural resources;
- resilience has a double meaning. It refers to the need to develop a higher degree of robustness in industrial production against disruptions and support critical infrastructure in times of crisis, but also the ability to adapt to environmental change.

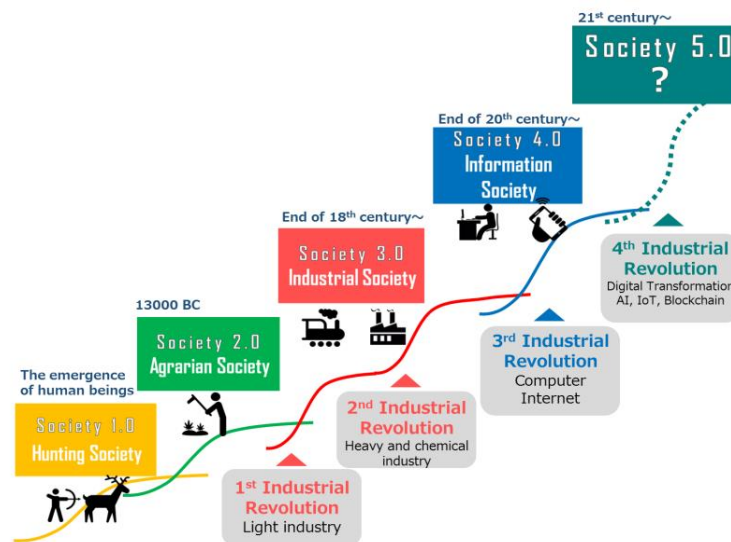
This means that industry 5.0 must be inclusive and fair, aiming to leave no one behind. It means making sure the use of new technologies does not impinge on workers' fundamental rights, such as the right to privacy, autonomy and human dignity. To achieve this, workers must be involved in the design and deployment of new industrial technologies, including robotics and AI (European Commission, 2021). The concept of industry 5.0 has not a unique meaning, not only for the contents but also regarding the temporal evolution idea. According to Frederico (2021), Industry 5.0 is still in an embryonic stage. It is a visionary concept which aims to include the human, social, and sustainability aspects amid the current and focused technological scope of Industry 4.0. Friedman & Hendry (2019) suggest that Industry 5.0 compels the various industry practitioners, information technologists and philosophers to focus on the consideration of human factors with the technologies in the industrial systems. In the fourth industrial revolution the man-machine approach is exploratory and initially based on a negative use of technology in relation to the human worker. In previous studies the fourth industrial revolution is based on the disruptive use of automation and artificial intelligence (Frey & Osborne, 2013), also the use of creativity leads a disruptive and dangerous approach (Paesano, 2021). Maddikunta et al. (2022), explains that Industry 5.0 is regarded as the next industrial evolution, its objective is to leverage the creativity of human in collaboration with efficient, intelligent and accurate machines. Industry 5.0 is a

concept that has been designed to harmonize the human-machine relationship within working space and their efficiency. The aim is to obtain resource-efficient and user-preferred manufacturing solutions respect to Industry 4.0 outcomes. The artificial intelligence, and the KETs are used in everyday life, industry, healthcare and other areas of human activities. Industry 5.0 refers to the integration of physical and virtual space to solve not only production problems, but also social problems (Martynov et al., 2019). In contrast to what Industry 4.0 imposes, Fifth Industrial Revolution will be combining humans and machines to increase creativity and efficiency (Nahavandi, 2019). Durmaz & Kitapçı (2021) talk about fifth industrial revolution where artificial intelligence is meant to work with humans, not replacing them. According to Roblek et al. (2021), Industry 5.0 is going beyond Industry 4.0. The focus of Industry 5.0 is on the interaction between machines and semi-finished products, individual machine parts, robots and people. For this process to succeed, the use of big data is essential. For other scholars Industry 5.0 is not the opposite of industry 4.0 but the upgrade. Doyle-Kent & Kopacek (2021) argue that industry 5.0 is the human-centered industrial revolution which consolidates the agile, data driven digital tools of Industry 4.0. It synchronizes them with highly trained humans working with collaborative technology resulting in innovative, customized, high value and environmentally optimized. At the heart of Industry 5.0 there is the symbiosis and harmony of automation and cobots, human and values, work and tasks and finally knowledge and skills. The concept of Industry 5.0 is proposed to complement the existing Industry 4.0 in order to better meet the industrial and technological goals without compromising the socio-economic and environmental performance. These are better considered and embedded in the smart logistics through the inclusion of human-robot collaboration, collaborative robots, and man-machine systems (Jafari et al., 2022). For Carayannis & Morawska-Jancelewicz (2022a), the concept of Industry 5.0 is not a simple chronological continuation or alternative to Industry 4.0 paradigm. Society 5.0 aims to place human beings at the midpoint of innovation, exploiting the impact of technology and Industry 4.0 results to improve quality of life, social responsibility and sustainability. Beyond the problem of man-machine relationship, other scholars focus their attention on the need for human touch factor in product development and mass personalization concepts. This mass personalization is leading to the integration of artificial intelligence into human life for boosted human capabilities (Martynov et al., 2019). Industry 5.0 sets about increasing collaboration between humans and manufacturing systems to meet the personalized demands of customers (Durmaz & Kitapçı, 2021). Within industry 5.0, the scholar Frederico (2021) analyzes the evolution of supply chain. The Supply Chain 4.0 has a highly technological environment focus, while Supply Chain 5.0 keeps this technological aspect, but also considers a balanced human-technological environment, mainly allowed by “cobots” (collaborative robots). Other scholars talk about the importance of lifelong learning in relation to the human-centric approach of industry 5.0 is emphasized as a future direction (Eriksson et al., 2022).

2. Relationship Between Industry 5.0 and Society 5.0

To avoid the issues of industry 4.0 and the disruptive and uncontrolled use of AI, on January 2016, the Government of Japan released the 5th Science and Technology Basic Plan (Cabinet office, 2016). The topic of this plan is the idea of “Society 5.0,” like a vision of a future society guided by scientific and technological innovation. The aim of “society 5.0” is to promote an ethical and sustainable development model which puts human kind at the center of needs. The President of the University of Tokyo Gonokami and the Chairman of Hitachi Nakanishi use the term “supersmart society”. The aim is to go beyond a technologically driven society and achieve a human-oriented society”. Society 5.0 represents the fifth evolutionary stage of human society, after the hunter-gatherer society, the agricultural society, the industrial society and the information society (Fukuyama, 2018). “Super Smart Society”, is a society where cyberspace is merged with the physical space. This is achievable through the Key Enabling Technologies as Internet of Things (IoT), artificial intelligence (AI), Virtual Reality, Augmented Reality and Blockchain. This new social model represents an ideal form of society, in which anyone has the opportunity to enjoy high quality services and to live a comfortable life. Society 5.0 is based on the values of openness, sustainability and inclusiveness: everyone is called to participate” (H-UTokyo Lab, 2020). Industry 5.0 and Society 5.0 have many commonalities. Both are based on the human-centered approach, and their goal is to achieve a sustainable development. However, they are not perfectly overlapping. Society 5.0 represents the evolutionary stages of humans, while Industry 5.0 is related to industrial revolutions (Figure 1).

Figure 1: Relationship Between Society and Industrial Revolution



Source: Keidanren (2017).

For the founders of society 5.0, this is an improvement/update of the fourth industrial revolution. While for some scholars (Nahavandi, 2019; Doyle-Kent & Kopacek, 2021; Maddikunta et al., 2022) industry 5.0 represents the fifth industrial revolution. Society 5.0 is described as a data-driven society. This is a society where IoT-gathered data is converted into information and knowledge, which then drives the real world either indirectly (with the mediation of humans) or directly (through automation). Society 5.0 attempts to balance economic development with the resolution of societal and environmental problems. It is not restricted to the manufacturing sector but addresses larger social challenges based on the integration of physical and virtual spaces. Nakanishi and Gonokami said: “We recognized that we should not sit back and watch as technology reshapes society. Instead, we should actively seize the opportunity and lead the process. To this end, we would need to develop necessary technologies and services ahead of the rest of the world and highlight the tasks to tackle” (H-UTokyo Lab, 2020). For this, Society 5.0 is a society in which advanced technologies are used in everyday life, industry, healthcare and other spheres of activities, not primarily for economic advantage but for the benefit and convenience of each citizen (European Commission, 2021). In Society 5.0 the generation of knowledge will come from machines through Artificial Intelligence at the service of people (Carayannis et al., 2022b). A tool that can help this change is represented by gamification. According to Deterding et al. (2011), gamification is: “the use of game design elements in non-game contexts”. This definition of gamification was developed in 2011 and is still used internationally. Another definition of gamification is: “the process of using Game Thinking and Game Dynamics to Engage Audiences and Solve Problems” (Zichermann & Cunningham, 2011). For instance, many firms as Toyota use gamification for many different goals. In the following paragraphs is shown a game experiment promoted by Toyota Motors North America department. Society 5.0 will contribute also to delivering on United Nations Sustainable Development Goals (SDGs) (Nakanishi & Kitano, 2017). The two reforms have a common direction. The Keidanren Entrepreneurial Federation highlights nine different sectors in which Society 5.0 can be deployed to improve the SDGs (Keidanren, 2017): Cities and Regions, Energy, Disaster Prevention, Healthcare, Agriculture and Food, Logistics, Manufacturing and Services, Finance and Public Services. A growing public awareness of social, environmental and humanitarian issues has contributed to increasing stakeholders’ expectations regarding corporate social responsibility practices. This is a concept whereby companies integrate social, environmental, ethical human rights and consumer concerns not only into their business operations but also inside their core strategies (Testarmata et al., 2018).

3. Company Stakeholder Responsibility and 5.0 Paradigm

Society 5.0 will be a Creative Society. Society 5.0 is characterized by problem solving and value creation, diversity, decentralization, resilience, and sustainability and environmental harmony (Nakanishi & Kitano, 2017). Society 5.0 is a concept

capable of channeling the potential of 4.0 technologies, towards the resolution of the needs of society and individuals. This technological and social evolution must be developed and implemented through a collaborative approach that involves all the potential actors of change, such as institutions, research centers, private actors and society. For this reason, 5.0 paradigm is linkable with Freeman's Theory of Stakeholders. Stakeholders can be a groups and individuals who have a valid interest in the activities and outcomes of a firm and whom the firm relies on in order to achieve its objectives (Freeman et al., 2018). The "stakeholder theory" promotes a practical, efficient, effective, and ethical way to manage organizations in a highly complex and turbulent environment (Freeman, 1984; Freeman et al., 2007). It is a practical theory because all firms have to manage stakeholders – whether they are good at managing them is another issue. It is efficient because stakeholders that are treated well tend to reciprocate with positive attitudes and behaviors towards the organization, such as sharing valuable information (all stakeholders), buying more products or services (customers), providing tax breaks or other incentives (communities), providing better financial terms (financiers), buying more stock (shareholders), or working hard and remaining loyal to the organization, even during difficult times (employees). It is effective because it harnesses the energy of stakeholders towards the fulfillment of the organization's goals. It is useful in a complex environment because firms that manage for stakeholders have better information upon which to base their decisions and, because they are attractive to other market participants, they have a degree of strategic flexibility that is not available to competitors that do not manage for stakeholders" (Harrison et al., 2015). Stakeholder theory aims to be useful, to provide tools that managers can use to better create value within their organizations, tools that constituencies can use to improve their dealings with managers, and tools that theorists can use to better understand how value creation and trade take place. An example of this can be represent by Gamification. This makes it easier for business executives and theorists to see business and ethics as integrated, rather than always in conflict (Freeman et al., 2012). The gamification has similarities with the theory of "nudges". these are elements that guide individual choices and behaviors without the use of orders and preserve the freedom of choice, like a "polite push" (Thaler & Sustein, 2008). In recent years, gamification is spreading in various sectors. Inside companies the main uses concern the human resources, the marketing function, the relationship among managers and employees and it is used also in the logistics sector (Chou, 2015). For instance, the firm Toyota decided to use gamification with an experiment. This is an app mobile game where employees learning the security inside departments and warehouse. In detail, Toyota Motors North America was looking for a fun and interactive way to promote Toyota Safety Celebration to promote safety awareness. The Toyota Cares team wanted to create a Web Augmented Reality face game that would allow their team members to learn about potential trip and fall hazards within Toyota offices and industrial locations. This is a game experience (with mobile devices) that allows team members to learn about potential trip and fall hazards in their environments (Groovejones, 2021; Toyota, 2021).

□ *The game is based on an endless path where you have to move your character, collecting positive items for points and avoiding safety or hazards along the way. Players control the game character with their face – tilt your head left or right to move from side to side to avoid hazards or pick up positive items. In this experiment there are many elements related to the game (Zichermann & Linder, 2010; Werbach & Hunter, 2012; Chou, 2015):*

Points: these are awarded for distance traveled and for picking up positive items.

Achievements: Power-ups were activated by picking up flashlights, first aid kits, and fire extinguishers and protective eyewear.

Virtual assets: In an industrial setting, team members should keep an eye out for oil spills, trash, screws, bolts, canisters, hoses, pallets, and brooms.

Rank: At the end of the game, players can submit their scores to an online leaderboard to see how they ranked against other team members.

Challenges: throughout Toyota Safety Celebration, the Toyota Safety team would highlight the daily and weekly winners.

Within industry the fusion of gamification and KETs like augmented reality can be a support for workers in their everyday activities. Gamification is a tool for increasing motivation, positively influence job satisfaction and behavior and subsequently increase performance and productivity. Ethics shapes economic choices and, as a consequence, judgements may be founded on the overall enterprise aims. This leads to an extended concept of maximization taking into consideration a complex system of well-being conditions (Signori & Rusconi, 2009). A work of Seiffert-Brockmann et al. (2018) shows that a gamer positively influences psychological stakeholder engagement toward gamified content, and indirectly, behavioral stakeholder engagement toward the communication instrument (like the app used in the survey). In Society 5.0 all stakeholders as citizens, governments, academia will jointly benefit from man-machine collaboration. Society 5.0 promotes a human-centered society that integrates virtual and real spaces to resolve social problems, as well as, Industry 5.0 promotes intelligent manufacturing processes through collaboration between humans and cyber-physical systems (Mondal & Wong, 2022). The current concept of Industry 5.0 is to harness the unique creativity of human experts. It will increase manufacturing efficiency, creating versatility between humans and machines, enabling interaction and responsibility for continuous monitoring of activities (Lv et al., 2022). Society 5.0 can broaden the perspective of stakeholder theory. This shifts the focus to the industry and the society that firms, customers, employees, partners, suppliers, governments, communities, and shareholders live and make decisions in. According Civera & Freeman (2019), this is not as anti-capitalism where too many

stakeholders take part in the relationship in a way that might undermine the company's purposes. This is an idea of "new capitalism" correcting its excesses, which could continue to thrive only if fair, inclusive, and sustainable. Industry 5.0 shifts the focus from technology-driven progress to a thoroughly human-centric approach. A profit-driven approach has become old and untenable. Ethical duties are considered to be strictly linked to the management of the firm system such as production, marketing, finance (Rusconi, 2019). Currently, a narrow focus on profit fails to account correctly for environmental and societal costs and benefits. This concept moves focus from solely shareholder value to stakeholder value (European Commission, 2021). The extension of wide categories of relevant stakeholders led companies to run their corporate governance with the aim to achieve their mission respecting the conditions of effectiveness, efficiency and sustainable development (Salvioni & Gennari, 2019). The creation of shareholder value is not in contrast with the satisfaction of other stakeholders' interests (Brondoni & Boccardelli, 2019). The rise of multi-stakeholder initiatives (MSIs) is both a response to urgent claims and an opportunity for individuals and organizations to strengthen their relationships. This integrated stakeholder view entails a higher sense of responsibility (Brondoni et al., 2019). The MSIs represent the integration between stakeholder theory and company stakeholder responsibility. Firms can indirectly benefit from multi-stakeholder actions aimed at improving some aspects and conditions within industries and societies (Civera & Freeman, 2019).

4. Concluding Remarks and Emerging Issues

Based on the results, it is possible to say that the 5.0 paradigm creates a synergy of goals that include:

- human centric approach;
- sustainable development;
- company stakeholder responsibility.

Many scholars have started to develop 5.0 paradigm in business and management fields. The development of sustainability and the Covid pandemic are revolutionizing Risk Management, for this reason Carayannis et al. (2022b) speak of "risk management 5.0" others discuss about Marketing 5.0 (Kotler et al., 2021) and supply chain 5.0 (Frederico, 2021). This is a trend which embraces three different perspectives: collaborative work between humans and robots, mass customization, and personalization to customers, and a super smart society. The culture of companies in a network of global supply chains creates a dimension that expresses the corporate personality in relations internal and external stakeholders (Brondoni & Pepe, 2007). Enterprises may also engage with suppliers and other entities to improve their performance, in co-operation with other stakeholders (Risso, 2018). A tool that can combine the super smart society with the concept of Company Stakeholder Responsibility is represented by the use of gamification. An example of human-

centric approach lead by the fusion of industry 5.0 and gamification is the experiment promoted by Toyota shown in the previous paragraph. Regarding the guidelines for achieving 5.0 paradigm, the work of the European Commission is an excellent starting point. Expert groups (scholars, researchers and entrepreneurs) should meet to discuss the implementation of other tools. Society 5.0 recognizes the centrality of all stakeholders, the importance of purpose, values and ethics, and the complexity of human beings, and relies on honesty, kindness, and business integration in society and with stakeholders (Civera & Freeman, 2019).

Bibliography

- Brondoni, S. M., & Pepe, C. (2007). Ouverture de 'Ethics in Global Supply Chains'. *Symphonya. Emerging Issues in Management (symphonya.unimib.it)*, (2), 1-4.
<https://dx.doi.org/10.4468/2007.2.01ouverture>
- Brondoni, S. M., & Zaninotto, E. (2018). Ouverture de 'The 4th Industrial Revolution. Business Model Innovation & Global Competition'. *Symphonya. Emerging Issues in Management (symphonya.unimib.it)*, (2), 1-7.
<https://dx.doi.org/10.4468/2018.2.01ouverture>
- Brondoni, S. M. (2019). 4.0 IR, Oversize Economy and the Extinction of Mammoth Companies. *Symphonya. Emerging Issues in Management (symphonya.unicusano.it)*, (2), 8-24.
<https://dx.doi.org/10.4468/2019.2.02brondoni>
- Brondoni, S. M., & Boccardelli, P. (2019). Ouverture de 'IR 4.0, Network Economies & Stakeholder Engagement'. *Symphonya. Emerging Issues in Management (symphonya.unicusano.it)*, (2), 1-7.
<https://dx.doi.org/10.4468/2019.2.01ouverture>
- Brondoni, S. M., Bosetti, L., & Civera, C. (2019). Ouverture de 'CSR and Multi-Stakeholder Management. *Symphonya. Emerging Issues in Management (symphonya.unicusano.it)*, (1), 1-15.
<https://dx.doi.org/10.4468/2019.1.01ouverture>
- Büchi, G., Cugno, M., & Castagnoli, R. (2018). Economies of Scale and Network Economies in Industry 4.0. *Symphonya. Emerging Issues in Management (symphonya.unimib.it)*, (2), 66-76.
<https://dx.doi.org/10.4468/2018.2.06buchi.cugno.castagnoli>
- Cabinet Office (Council for Science, Technology and Innovation) (2016). The 5th Science and Technology Basic Plan.
- Carayannis, E. G., & Morawska-Jancelewicz, J. (2022a). The Futures of Europe: Society 5.0 and Industry 5.0 as Driving Forces of Future Universities. *Journal of the Knowledge Economy*, 13, 3445-3471.
<https://dx.doi.org/10.1007/s13132-021-00854-2>
- Carayannis, E. G., Christodoulou, K., Christodoulou, P., Chatzichristofis, S. A., & Zinonos, Z. (2022b). Known Unknowns in an Era of Technological and Viral Disruptions – Implications for Theory, Policy and Practice. *Journal of the Knowledge Economy*, 13(1), 587-610.
<https://dx.doi.org/10.1007/s13132-020-00719-0>
- Chou, Y. K. (2015), Actionable Gamification: Beyond Points, Badges and Leaderboards, Createspace.
- Christensen, C. M., Raynor, M., & McDonald, R. (2015). What is disruptive innovation? *Harvard Business Review*, 93(12), 1-13.
- Civera, C., & Freeman, R. E. (2019). Stakeholder Relationships and Responsibilities: A New Perspective. *Symphonya. Emerging Issues in Management (symphonya.unicusano.it)*, (1), 40-58.
<https://dx.doi.org/10.4468/2019.1.04civera.freeman>

- Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). *From Game Design Elements to Gamefulness: Defining "Gamification"*. Proceedings of the 15th International Academic MindTrek Conference, 9-15.
<https://dx.doi.org/10.1145/2181037.2181040>
- Doyle-Kent, M., & Kopacek, P. (2021). Adoption of Collaborative Robotics in Industry 5.0. An Irish industry case study. *IFAC-PapersOnLine*, 54(13), 413-418.
<https://dx.doi.org/10.1016/j.ifacol.2021.10.483>
- Durmaz, A., & Kitapçı, H. (2021). Revisiting Customer Involved Value Chains Under the Conceptual Light of Industry 5.0. *Proceedings on Engineering Sciences*, 3(2), 201-210.
<https://dx.doi.org/10.24874/PES03.02.008>
- Eriksson, K., Chirumalla, K., Myrelid, P., Ericsson, M., Granlund, A., Håkansson, L., & Johansson, D. (2022). Experiences in Running a Professional Course on Digitally-Enabled Production in Collaboration Between Three Swedish Universities. *Advances in Transdisciplinary Engineering*, 21, 653-664.
<https://dx.doi.org/10.3233/ATDE220184>
- European Commission (2018). The European Commission's, High-Level Expert Group on Artificial intelligence, *Draft Ethics Guidelines for Trustworthy AI*. Working document for stakeholders' consultation, Brussels, 18 December.
- European Commission (2021). *Industry 5.0, Towards a Sustainable, Human-Centric and Resilient European Industry*. Luxembourg: Publications Office of the European Union.
<https://dx.doi.org/10.2777/308407>
- Frederico, G. F. (2021). From Supply Chain 4.0 to Supply Chain 5.0: Findings from a Systematic Literature Review and Research Directions. *Logistics*, 5(3), 49.
<https://dx.doi.org/10.3390/logistics5030049>
- Freeman, R. E. (1984). *Strategic Management: A Stakeholder Approach*. Boston: Pitman Publishing Inc.
- Freeman, R. E., Harrison, J. S., & Wicks, A. C. (2007). *Managing for Stakeholders: Survival, Reputation and Success*. New Haven, CT: Yale University Press.
- Freeman, R. E., Rusconi, G., Signori, S., & Strudler, A. (2012). Stakeholder Theory(ies): Ethical Ideas and Managerial Action. *Journal of Business Ethics*, 109, 1-2.
<https://dx.doi.org/10.1007/s10551-012-1374-7>
- Freeman, R., E., Harrison, J. S., & Zyglidopoulos, S. (2018). *Stakeholder Theory. Concepts and Strategies*. Cambridge: Cambridge University Press.
<https://dx.doi.org/10.1017/9781108539500>
- Frey, C. B., & Osborne, M. A. (2013). The Future of Employment: How Susceptible Are Jobs to Computerisation? *Technological Forecasting and Social Change*, 114, 254-280.
<https://dx.doi.org/10.1016/j.techfore.2016.08.019>
- Friedman, B., & Hendry, D. G. (2019). *Value Sensitive Design: Shaping Technology with Moral Imagination*. MIT Press.
- Fukuyama, M. (2018), Society 5.0: Aiming for a New Human-Centered Society. *Japan Spotlight*, July-August, 47-50.
- Groovejones (2021), *Toyota Uses WebAR Face Game to Promote Safety and Awareness*. Available online: <https://www.groovejones.com/toyota-uses-webar-face-game-to-promote-safety-and-awareness> (accessed on 3rd October 2022).
- Harrison, J. S., Freeman, R. E., & Cavalcanti Sá de Abreu, M. (2015). Stakeholder Theory as an Ethical Approach to Effective Management: Applying the Theory to Multiple Contexts. *Review of business management*, São Paulo, 17(55), 858-869.
<https://dx.doi.org/10.7819/rbg.v17i55.2647>

- H-UTokyo Lab (2020), *Society 5.0, A People-centric Super-smart Society*. Hitachi and The University of Tokyo Joint Research Laboratory. Singapore: Springer.
<https://dx.doi.org/10.1007/978-981-15-2989-4>
- Jafari, N., Azarian, M., & Yu, H. (2022). Moving from Industry 4.0 to Industry 5.0: What Are the Implications for Smart Logistics? *Logistics*, 6, 26.
<https://dx.doi.org/10.3390/logistics6020026>
- Keidanren (2017), *Society 5.0, Co-creating the future - (Excerpt)*.
- Lv, Z., Wang, N., Ma, X., Sun, Y., Meng, Y., & Tian, Y. (2022). Evaluation Standards of Intelligent Technology based on Financial Alternative Data. *Journal of Innovation and Knowledge*, 7(4), art. no. 100229.
<https://dx.doi.org/10.1016/j.jik.2022.100229>
- Maddikunta, P. K. R., Pham, Q.-V., B, P., Deepa, N., Dev, K., Gadekallu, T. R., Ruby, R., & Liyanage, M. (2022). Industry 5.0: A Survey on Enabling Technologies and Potential Applications. *Journal of Industrial Information Integration*, 26, art. no. 100257.
<https://dx.doi.org/10.1016/j.jii.2021.100257>
- Martynov, V. V., Shavaleeva, D. N., & Zaytseva, A. A. (2019). *Information Technology as the Basis for Transformation into a Digital Society and Industry 5.0*, in 2019 International Conference “Quality Management, Transport and Information Security, Information Technologies” (IT&QM&IS). Institute of Electrical and Electronics Engineers, 539-543.
- Mondal, S., & Wong, E. (2022). Global-Local AI Coordinated Learning over Optical Access Networks for Scalable H2M/R Collaborations, *Institute of Electrical and Electronics Engineers Network*, 36(2), 124-130.
<https://dx.doi.org/10.1109/MNET.003.2100602>
- Nahavandi, S. (2019). Industry 5.0 – A Human-Centric Solution. *Sustainability*, 11(16), 4371.
- Nakanishi, H., & Kitano, H. (2017). *Society 5.0: Co-creating the Future*, Japan Business Federation (Keidanren), 1-12.
- Paesano, A. (2021). Artificial Intelligence and Creative Activities Inside Organizational Behavior, *International Journal of Organizational Analysis*.
<https://dx.doi.org/10.1108/IJOA-09-2020-2421>
- Risso, M. (2018). Business Coalitions for Sustainable Global Procurement, in Brondoni, S. M. (ed.). *Competitive Business Management. A Global Perspective*. Routledge-Giappichelli Studies in Business and Management.
- Rusconi, G. (2019). Ethical Firm System and Stakeholder Management Theories: A Possible Convergence. *European Management Review*, 16(1), 147-166.
<https://dx.doi.org/10.1111/emre.12162>
- Roblek, V., Meško, M., & Podbregar, I. (2021). Mapping of the Emergence of Society 5.0: A Bibliometric Analysis. *Organizacija*, 54(4), 293-305.
<https://dx.doi.org/10.2478/orga-2021-0020>
- Rüßmann, M., Lorenz M., Gerbert P., Waldner M., Justus J., Engel P., & Harnish M. (2015). Industry 4.0: The Future of Productivity and Growth in Manufacturing Industries, The Boston Consulting Group, 1-20.
- Salvioni, D. M., & Gennari, F. (2019). Stakeholder Perspective of Corporate Governance and CSR Committees. *Symphonya. Emerging Issues in Management (symphonya.unicusano.it)*, (1), 28-39.
<https://dx.doi.org/10.4468/2019.1.03salvioni.gennari>
- Schwab, K. (2016). *The Fourth Industrial Revolution*. World Economic Forum, Cologny, Switzerland.
- Seiffert-Brockmann, J., Weitzl, W., & Henriks, M. (2018). Stakeholder Engagement Through Gamification: Effects of User motivation on Psychological and Behavioral Stakeholder Reactions. *Journal of Communication Management*, 22(1), 67-78.

<https://dx.doi.org/10.1108/JCOM-12-2016-0096>

Signori, S., & Rusconi, G. (2009). Ethical Thinking in Traditional Italian Economia Aziendale and the Stakeholder Management Theory: The Search for Possible Interactions. *Journal of Business Ethics*, 89, 303-318.

<https://dx.doi.org/10.1007/s10551-010-0391-7>

Testarmata, S., Fortuna, F., & Ciaburri, M. (2018). The Communication of Corporate Social Responsibility Practices Through Social Media Channels. *Corporate Board: Role, Duties and Composition*, 14(1), 34-49.

<http://dx.doi.org/10.22495/cbv14i1art3>

Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving Decisions about Health, Wealth, and Happiness*. New Haven: Yale University Press.

Toyota (2021), *Toyota Cares*. Available online: <https://preventthefall.app/> (accessed on 10th September 2022).

Werbach, K., & Hunter, D. (2012). *For the Win. How Game Thinking Can Revolutionize Your Business*, Wharton Digital Press, Philadelphia.

Zichermann, G., & Linder, J. (2010). *Game-Based Marketing: Inspire Customer Loyalty Through Rewards, Challenges, and Contests*. Hoboken: Wiley.

Zichermann, G., & Cunningham C. (2011), *Gamification by Design: Implementing Game Mechanics in Web and Mobile Apps*. Sebastopol, CA: O'Reilly Media, Inc.