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"Do-It-Together": towards the Factories of the Future (FoF)

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(Text based on the Call for papers – Special Issue Innovations. *Journal of Innovation Economics & Management For Cosmo-local Reader*)

Faced with the environmental and socio-economic limitations of the current production model, that has persisted for several years, the accelerated development of information and communication technologies has made it possible to explore new innovative fields in the productive sectors. New reflections are emerging on the transition towards a more sustainable and innovative production models. In this context, the emerging "Design Global, Manufacture Local" model (DGML), aims at transforming the global manufacturing industry so that the vast majority of products can be manufactured locally by globally exchanging the information flows on how to manufacture the product (information, knowledge, design, codes, models, drawings, etc.) over the physical flows.⁴ This model is based on the principles of commons-based peer production⁵ in which resources are shared with equal interest for all the involved stakeholder.⁶ It represents a form of democratization of the industrialization through processes in which the design is developed as a global common, while the manufacture of products takes place locally, considering the specificities of local ecosystems.

The mode of commons-based peer production, particularly digital commons, has mainly developed within the so-called Makers' movement, also known as the Do-It-Yourself (DIY) movement. The emergence and multiplication of spaces and networks of makers, hackerspaces, micro-factories, fab labs or other spaces equipped with digital manufacturing tools and technologies (3D printers, sensors...) has favoured the development of a more agile, democratized and distributed production.⁷ Such environments are conducive to distributed collective creativity,

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⁴ Kostakis, V., Latoufis, K., Liarokapis, M., & Bauwens, M. (2018). The Convergence of Digital Commons with Local Manufacturing from A Degrowth Perspective: Two Illustrative Cases. *Journal of Cleaner Production*, 197, 1684-1693. <https://doi.org/10.1016/j.jclepro.2016.09.077>

Waldman Brown, A. (2016). *Exploring The Maker-Industrial Revolution: Will The Future Of Production Be Local?* Berkeley Roundtable on the International Economy.

Kostakis, V., Niaros, V., Dafermos, G., & Bauwens, M. (2015). Design Global, Manufacture Local: Exploring The Contours of an Emerging Productive Model. *Futures*, 73, 126-135. <https://doi.org/10.1016/j.futures.2015.09.001>.

⁵ Bauwens, M. (2005). *The Political Economy of Peer Production*. 10.

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⁶ Ostrom, E. (1990). *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge University Press. 298.

⁷ Dupont, L. (2019). Agile Innovation: Creating Value in Uncertain Environments. *Journal of Innovation Economics Management*, n° 28(1), 1-5. <https://doi.org/10.3917/jie.028.0001>.

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which plays an important role in the emergence of new forms of innovation and entrepreneurial activities.⁸ Based on the customization, integration and involvement of users in the production processes and local production in small series, the DIY practices represent a source of the development of:

*"prosumption (local production with local materials by local people), innovation, and entrepreneurship by local populations in regions without industrial manufacturing infrastructure."*⁹

The confluence of ideas and technologies and the interconnection between digital and physical environments offer the potential for a transition to a new form of hybrid production that combines the scale and efficiency of high-volume manufacturing with the benefits that small local producers (SMEs and SMIs) bring to local economies.¹⁰ Nevertheless, supporting this hybrid production approach and disseminating the DIY principles among local producers requires the development of new production modes and strategies in a context where processes:

*"are less open, less distributed and less minimal than the new Do-It-Yourself processes."*¹¹

As a result, many actors, especially small producers, miss the opportunities of development and innovation offered by the DIY.

The new "Do-It-Together" (DIT) approach attempts to address these limitations. It is a participatory design and collaborative production strategy that allows "global design and local manufacturing" involving "prosumers" (consumers/producers)¹² in the manufacturing process. It

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Pearce, J. M. (2014). *Open-Source Lab How to Build Your Own Hardware and Reduce Research Costs*. <https://www.elsevier.com/books/open-source-lab/pearce/978-0-12-410462-4>.

Fox, S. (2013). Paradigm Shift: Do-it-yourself (DIY) Invention and Production of Physical Goods for Use or Sale. *Journal of Manufacturing Technology Management*, 24(2), 218-234. <https://doi.org/10.1108/17410381311292313>.

⁸ Boutillier, S., Capdevila, I., Dupont, L., & Morel, L. (2020). Collaborative Spaces Promoting Creativity and Innovation. *Journal of Innovation Economics Management*, n° 31(1), 1-9. <https://doi.org/10.3917/jie.031.0001>.

Capdevila, I. (2019). Joining A Collaborative Space: Is it Really a Better Place to Work? *Journal of Business Strategy*, 40(2), 14-21. <https://doi.org/10.1108/JBS-09-2017-0140>

Capdevila, I. (2015). Les différentes approches entrepreneuriales dans les espaces ouverts d'innovation. *Innovations*, n° 48(3), 87-105. <https://doi.org/10.3917/inno.048.0087>.

⁹ Fox, S. (2014). Third Wave Do-It-Yourself (DIY): Potential for Prosumption, Innovation, and Entrepreneurship by Local Populations in Regions without Industrial Manufacturing Infrastructure. *Technology in Society*, 39, 18-30. <https://doi.org/10.1016/j.techsoc.2014.07.001>.

¹⁰ Waldman Brown, A. (2016). *Exploring The Maker-Industrial Revolution: Will The Future Of Production Be Local?* Berkeley Roundtable on the International Economy.

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¹² Toffler, A. (1980). *The Third Wave*. Bantam Books.

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has recently been developed in the context of social manufacturing, which is a more open and democratic approach to traditional manufacturing, involving different levels of user participation in the production process.¹³ The social manufacturing approach aims to:

"seamlessly link the social manufacturing network consisting of the Internet, the Internet of Things, and the 3D printer, thus enabling social people to participate fully in the entire manufacturing process through outsourcing, facilitating personalized, real-time, and socialized modes of production and consumption".¹⁴

It integrates consumers in all the processes of customized product development, such as ideation, design and production, engaging them more actively in local production in a commons-based peer production context, inspired by the agile and distributed functioning of the DIY.¹⁵

The first studies on the collaborative creativity practices of the Do-It-Together have examined its impact on the creation of value in the fashion industry. Social, economic, environmental, knowledge, emotional and experiential values associated with the DIT were identified, generating positive externalities for all the involved stakeholders (customers, professionals and local producers).¹⁶ The DIT strategies are indeed adapted to small-scale production on local sites offering significant potential for new business opportunities and new innovative activities especially for SMEs that face many challenges to engage open innovation processes. The potential for open creativity generated by the DIT can provide competitive advantages for companies while limiting the costs and risks associated with the development of innovative products.¹⁷

Building on social manufacturing paradigms such as cyber-physical-social space that:

"involves human intelligences and social organizations (e.g. communities) to enable social interactions and organic connections between prosumers and socialized resources (e.g. machine tools,

¹³ Hirscher, A.-L., Niinimäki, K., & Joyner Armstrong, C. M. (2018). Social Manufacturing in the Fashion Sector: New Value Creation through Alternative Design Strategies? *Journal of Cleaner Production*, 172, 4544-4554. <https://doi.org/10.1016/j.jclepro.2017.11.020>.

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¹⁴ Mohajeri, B., Nyberg, T., Karjalainen, J., Tukiainen, T., Nelson, M., Shang, X., & Xiong, G. (2014). The Impact of Social Manufacturing on The Value Chain Model in The Apparel Industry. *Proceedings of 2014 IEEE International Conference on Service Operations and Logistics, and Informatics*, 378-381. <https://doi.org/10.1109/SOLI.2014.6960754>.

¹⁵ Hirscher, A.-L., Niinimäki, K., & Joyner Armstrong, C. M. (2018). Social Manufacturing in the Fashion Sector: New Value Creation through Alternative Design Strategies? *Journal of Cleaner Production*, 172, 4544-4554. <https://doi.org/10.1016/j.jclepro.2017.11.020>.

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¹⁷ Cullmann, S., Guittard, C., & Schenk, E. (2015). Participative Creativity Serving Product Design in SMEs: A case study. *Journal of Innovation Economics Management*, n°18(3), 79-98. <https://doi.org/10.3917/jie.018.0079>.

L. Dupont, F. Kasmi, J. M. Pearce, and R. Ortt, "Do-It-Together": Towards the Factories of the Future," in *Cosmo-local reader*, J. Ramos, S. Ede, M. Bauwens, and J. G. Wong, Eds. Futures Lab, 2021, pp. 52–59. https://www.dropbox.com/s/64q6fn18wz4ewtt/CL_Reader.pdf?dl=0

*design software, measurement equipment and sensors) to co-create individualized products and services*¹⁸,

the DIT strategies would enable the development of connected open innovation networks coordinated by multi-sided digital platforms. These platforms support co-creative communities in the form of distributed value networks in a collaborative economy context.¹⁹ The DIT networks link consumers, makers, micro-factories and small local producers, making their production capacities available to the local ecosystem and forming regional poles of industrial innovation that could disrupt the functioning of the current production systems.

The emergence of the Do-It-Together approach could be integrated within the EU's Factories of the Future (FoF) strategy that aims at a transition of the European manufacturing industry towards a more flexible, digital and demand-oriented industry. It is in this context that the INEDIT²⁰ H2020 research project seeks to set the conceptual and experimental basis for the understanding of the DIT concept and to explore its potential for the transition of the industrial systems towards a disruptive change inducing radical innovations.²¹ To this purpose, a special issue of the *Journal of Innovation Economics & Management* calls for interdisciplinary research to deepen the analysis of this novel approach and will be published at the end of 2021.

References

- Bauwens, M. (2005). *The Political Economy of Peer Production*. 10.
- Boutillier, S., Capdevila, I., Dupont, L., & Morel, L. (2020). Collaborative Spaces Promoting Creativity and Innovation. *Journal of Innovation Economics Management*, n° 31(1), 1-9. <https://doi.org/10.3917/jie.031.0001>.
- Capdevila, I. (2015). Les différentes approches entrepreneuriales dans les espaces ouverts d'innovation. *Innovations*, n° 48(3), 87-105. <https://doi.org/10.3917/inno.048.0087>.
- Capdevila, I. (2019). Joining A Collaborative Space: Is it Really a Better Place to Work? *Journal of Business Strategy*, 40(2), 14-21. <https://doi.org/10.1108/JBS-09-2017-0140>
- Cullmann, S., Guittard, C., & Schenk, E. (2015). Participative Creativity Serving Product Design in SMEs: A case study. *Journal of Innovation Economics Management*, n°18(3), 79-98. <https://doi.org/10.3917/jie.018.0079>.
- Dedehayir, O., Ortt, J. R., & Seppanen, M. (2014). Reconfiguring the Innovation Ecosystem: An Explorative Study of Disruptive Change. *2014 International Conference on Engineering, Technology and Innovation (ICE)*, 1-9. <https://doi.org/10.1109/ICE.2014.6871553>

¹⁸ Jiang, P., Leng, J., & Ding, K. (2016). Social Manufacturing: A Survey of the State-Of-The-Art and Future Challenges. *2016 IEEE International Conference on Service Operations and Logistics, and Informatics (SOLI)*, 12-17. <https://doi.org/10.1109/SOLI.2016.7551654>.

¹⁹ Gandia, R., & Parmentier, G. (2020). Managing Open Innovation through Digital Boundary Control: The Case of Multi-Sided Platforms in the Collaborative Economy. *Journal of Innovation Economics Management*, n° 32(2), 159-180. <https://doi.org/10.3917/jie.032.0159>.

²⁰ open INnovation Ecosystems for Do It Together process, European Union's H2020 research program - Agreement N 869952, <http://www.inedit-project.eu/>

²¹ Dedehayir, O., Ortt, J. R., & Seppanen, M. (2014). Reconfiguring the Innovation Ecosystem: An Explorative Study of Disruptive Change. *2014 International Conference on Engineering, Technology and Innovation (ICE)*, 1-9. <https://doi.org/10.1109/ICE.2014.6871553>.

- L. Dupont, F. Kasmi, J. M. Pearce, and R. Ortt, "Do-It-Together": Towards the Factories of the Future," in *Cosmo-local reader*, J. Ramos, S. Ede, M. Bauwens, and J. G. Wong, Eds. Futures Lab, 2021, pp. 52–59. https://www.dropbox.com/s/64q6fn18wz4ewtt/CL_Reader.pdf?dl=0
- Dupont, L. (2019). Agile Innovation: Creating Value in Uncertain Environments. *Journal of Innovation Economics Management*, n° 28(1), 1-5. <https://doi.org/10.3917/jie.028.0001>.
- Fox, S. (2013). Paradigm Shift: Do-it-yourself (DIY) Invention and Production of Physical Goods for Use or Sale. *Journal of Manufacturing Technology Management*, 24(2), 218-234. <https://doi.org/10.1108/17410381311292313>
- Fox, S. (2014). Third Wave Do-It-Yourself (DIY): Potential for Prosumption, Innovation, and Entrepreneurship by Local Populations in Regions without Industrial Manufacturing Infrastructure. *Technology in Society*, 39, 18-30. <https://doi.org/10.1016/j.techsoc.2014.07.001>
- Gandia, R., & Parmentier, G. (2020). Managing Open Innovation through Digital Boundary Control: The Case of Multi-Sided Platforms in the Collaborative Economy. *Journal of Innovation Economics Management*, n° 32(2), 159-180. <https://doi.org/10.3917/jie.032.0159>.
- Hirscher, A.-L., Niinimäki, K., & Joyner Armstrong, C. M. (2018). Social Manufacturing in the Fashion Sector: New Value Creation through Alternative Design Strategies? *Journal of Cleaner Production*, 172, 4544-4554. <https://doi.org/10.1016/j.jclepro.2017.11.020>
- Jiang, P., Leng, J., & Ding, K. (2016). Social Manufacturing: A Survey of the State-Of-The-Art and Future Challenges. *2016 IEEE International Conference on Service Operations and Logistics, and Informatics (SOLI)*, 12-17. <https://doi.org/10.1109/SOLI.2016.7551654>
- Kohtala, C., & Hyysalo, S. (2015). Anticipated Environmental Sustainability of Personal Fabrication. *Journal of Cleaner Production*, 99, 333-344. <https://doi.org/10.1016/j.jclepro.2015.02.093>
- Kostakis, V., Latoufis, K., Liarokapis, M., & Bauwens, M. (2018). The Convergence of Digital Commons with Local Manufacturing from A Degrowth Perspective: Two Illustrative Cases. *Journal of Cleaner Production*, 197, 1684-1693. <https://doi.org/10.1016/j.jclepro.2016.09.077>
- Kostakis, V., Niaros, V., Dafermos, G., & Bauwens, M. (2015). Design Global, Manufacture Local: Exploring The Contours of an Emerging Productive Model. *Futures*, 73, 126-135. <https://doi.org/10.1016/j.futures.2015.09.001>
- Mohajeri, B., Nyberg, T., Karjalainen, J., Tukiainen, T., Nelson, M., Shang, X., & Xiong, G. (2014). The Impact of Social Manufacturing on The Value Chain Model in The Apparel Industry. *Proceedings of 2014 IEEE International Conference on Service Operations and Logistics, and Informatics*, 378-381. <https://doi.org/10.1109/SOLI.2014.6960754>
- Ostrom, E. (1990). *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge University Press.
- Pearce, J. M. (2014). *Open-Source Lab How to Build Your Own Hardware and Reduce Research Costs*. <https://www.elsevier.com/books/open-source-lab/pearce/978-0-12-410462-4>
- Toffler, A. (1980). *The Third Wave*. Bantam Books.
- Waldman Brown, A. (2016). *Exploring The Maker-Industrial Revolution: Will The Future Of Production Be Local?* Berkeley Roundtable on the International Economy.