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Innovating and transforming during Covid-19: insights from Italian firms

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Objectives. During health emergencies actions are taken by a wide range of different actors (Anderson et al., 2005). Actions are started by ordinary/expected actors, such as national and regional governments, hospitals, volunteers' organisations, as well as by extraordinary/less expected actors, such as firms, universities, i.e. organisations whose institutional mission is not that of acting for the benefit of society in the case of a health crisis. Among these actors, it is particularly interesting to analyse how firms, i.e. profit organizations, operate and to know more about their motivations. Furthermore, the innovation literature suggests that different types of shocks, such as health emergencies, have the effect of stimulating firms to innovate. Within this type of innovations we also have the cases of firms which orient their innovative efforts towards the provision of products and services for the benefit of the society, going beyond profit objectives during an health emergency (Drabek and McEntire, 2003; Shepherd and Williams, 2014; Williams and Shepherd, 2016).

Covid-19 is an unprecedented health emergency which has caused, in the first months of 2020, a huge number of casualties, economic losses and disruption of daily activities all over the world. The situation has been and still is different in the various countries, according to many factors, such as the intensity of the pandemia, the decisions which were taken, the national health infrastructure, etc. However, beyond the "institutional" response to the pandemia, a number of other spontaneous initiatives have been taken, ranging from crowdsourcing actions to build new Covid-19 hospitals, to initiatives by firms and universities which perceived the gravity of needs in specific areas, which institutional actors could not fully respond to, etc. For example, the huge and sudden rise in the demand for medical devices (e.g. ventilators) and personal protective products (e.g. masks, hand sanitizers, gowns, lung ventilators) could not be satisfied in several countries, as fast as it was necessary, by institutional organizations (WHO, 2020) and this has stimulated actions by firms and universities (Baldwin & di Mauro, 2020; Kandri et al., 2020; Tognini, 2020).

As a matter of fact, it is notable that, worldwide, many firms have rapidly converted part of their manufacturing activities to provide medical or personal protective products in the worst moments of the Covid-19 emergency (Clark, 2020; Tognini, 2020). Italy, for example, has been very severely affected by Covid-19 and in this country a large number of high-tech and non high-tech firms, operating in different sectors (i.e. automotive, software, 3d printing, fashion, cosmetics, distilleries, and textiles), have rapidly increased or transformed their production to meet the demand for complex medical devices, personal protective equipment, surgical masks, ventilators, alcohol hand sanitizers, gowns or other components (Banks, 2020; Clark, 2020; Tognini, 2020).

Despite the existence of literature focuses on firms' reaction to health emergencies through innovations that reshape their business models (Buliga, 2016; Martì, 2018), not much has been written about the purpose-led, non-profit objectives that may drive firms' innovation efforts to support communities in the fight against a global emergency (Rey et al., 2019). This is why, in this paper, we try to answer the following research questions:

- (1) what kind of purposes have been driving firms' actions to support communities in the fight against Covid-19?
- (2) Do different patterns exist in the way firms implemented their purpose-led actions through their R&D and innovation projects during Covid-19?

To address these research questions, we reviewed both purpose-driven firms (Rey et al., 2019) and R&D management literature (Duran, 1988; Peeters and Martin, 2017) in relation to health emergencies. On the basis of this literature we argue that two main dimensions can be considered to characterize firms' actions. First of all, firms can choose to adopt short term or medium-long term purpose approaches. In other words, they can choose to launch purpose-led actions only in the short term or continue them after the peak of the health emergency. Secondly, their actions can be implemented through (mainly) existing R&D and manufacturing capabilities or (mainly) new ones, which therefore require new specific projects and initiatives. Consequently, we elaborated a conceptual framework that combines these two dimensions and applied it to 21 Italian firms that reacted to the Covid-19 emergency offering products and services related to the health domain (e.g. personal protective equipment), which were not part of their normal offering.

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Methodology. *Given the explorative nature of our research question and our starting point, we validated the elements of our conceptual framework and their relations by conducting an inductive, exploratory approach in our empirical analysis (Lee et al., 1999). On the basic principles of theoretical sampling (Mason, 2002; Pettigrew, 1990), we searched for the units for research, based on characteristics or attributes that are important to the evaluation (Patton, 1990; Smith, 1983; Yin, 2002): firms that, in Italy, immediately reacted to the needs determined by Covid-19, offering products and services related to the health domain which were not part of their normal offering.*

To identify firms responding to these criteria, we divided our search of cases in three phases:

- *Phase 1: we collected Italian press releases that were published in March 2020 (which was the first very severe Covid-19 month in Italy) and which reported in Italian language “manufacturing transformation” and “Covid-19” or “Coronavirus” as keywords in their title. We used this time period because our research intent was to identify firms that immediately reacted to Covid-19. This research approach led us to collect 70 press releases reporting manufacturing transformation implemented by 35 firms.*
- *Phase 2: we used the information gathered in Phase 1 by searching for “manufacturing transformation” and “name of the firm” in the Lexis-Nexis database to collect additional information that were confirming the data gathered but also enriching our comprehension of each case. This research approach led us to collect additional 300 press releases and 36 firms.*
- *Phase 3: we verified the information collected in Phase 1 and Phase 2 by looking for what these firms reported in their websites. This enabled us to exclude 15 firms because of fake news and 26 firms because the manufacturing transformation was actually occurring in firms’ partners. As a net result, we selected the following 30 firms: AcquaFlex, Angelo Carrillo Spa, Armani, Baby2, Bc Boncar, Bulgari, Caffo Group, Canepa Group, Cifra, Davines, Dedem, Dreoni Giovanna, Erbolario, Grafica Veneta, Ferrari, Idea Sposa, Isinnova, Kontessa, Licofarma, Miroglio Group, Moda Impresa, Passaro, Pellemoda, Peuterey, Ramazzotti, Roncato, Toscano Alta Sartoria, Veralab, Waycap and Zucchetti Group.*

The data collection process lasted two months and multiple sources were used to benefit from the synergistic effects of triangulation (Eisenhardt, 1989; Gibbert et al., 2008; Jick, 1979). First, we integrated the 156 press releases used to identify the 30 firms by collecting other types of secondary data sources, including web interviews, speeches, and various other web sources that were useful to enrich our framework. More specifically, we developed a database reporting a number of qualitative data about each case. We started by categorising some aspects that pertain to general characteristics of the firm such as the firm’s location, year of foundation, key financial data, number of employees, and sector. After developing this initial understanding, we enriched the database by categorising some aspects related to the manufacturing conversion such as initiative source, scope of conversion and beneficiaries. Last, we collected some qualitative data with regards to the key aspects of our study: short term purpose; long term purpose; existing R&D, innovation and manufacturing capabilities; new and ad hoc R&D, innovation and manufacturing projects. After collecting these qualitative data about the cases, two of the authors have written a brief summary about the purpose orientation and about the R&D projects activated for each case and used it to contact the firms by mail in order to get their interest into our research.

Second, primary data were used to deepen our understanding of the manufacturing transformation that was implemented. Indeed, in May 2020, two of the authors contacted the firms by phone and shared interviews’ questions in order to identify the most suitable and knowledgeable informants for addressing our research questions. In most of the cases they were the founders, and in a few cases they were CEOs, CMOs or Head of Marketing. After the identification of the interviewees, we conducted 43 semi-structured interviews by Skype or phone with 21 of the 30 firms which had been selected. The interviews lasted from 30 to 40 minutes and were then transcribed.

The data were analyzed through an inductive approach (Gioia et al., 2013). The first and the second authors analyzed the interviews individually. This process brought out the key issues. Both data sorting and the in-depth analysis highlighted recurrent characteristics and emerging relations among themes, thus enabling subsequent conceptualizing (Taylor et al., 2015). Consequently, the authors separately identified the second-order themes. After carrying out the analysis of the quotations, the authors compared and shared their opinions about the interpretations.

Findings. *The variables that we identified led us to a matrix through which we mapped firms’ manufacturing transformations implemented to contribute to society during Covid-19 (Figure 1). Four different types of interventions have been identified:*

- *“Reaction”. In this case, firms were moved by the purpose of helping the local communities as soon as possible because they were aware of the difficulties they were facing. The five firms that are categorised in this quadrant of the matrix were equipped for the need identified and intervened immediately, for example by creating simple and effective masks to alleviate the panic that was proliferating in some areas where these types of medical protective devices were lacking. “My first thought was to calm the panic ... so I did the simplest and fastest thing ... produce some masks” (BC BONCAR, an industrial packaging firm operating in Busto Arsizio, a few kilometers away from the epicenter of the pandemic). Firms in this quadrant have a second element in common. They acted quickly, almost in real time: “We acted immediately because in our hearts we wanted to do something” (IDEASPOSA, historical manufacturer of wedding dresses in Lecce where pandemic was less aggressive). To be helpful for the local community, the manufacturing conversion plans for these firms took place very quickly, from two to five days. If the goal was to buffer in real time, the only solution was to use internal capabilities. The goal of these firms was to intervene with an immediate response, activating manufacturing projects based on the company’s*

internal skills, abilities (and in some cases material): “We made a quick fix when the emergency required intervention ... we recovered the TNT from our bags for wedding wear .. and thanks to our seamstresses we made some masks that we distributed”(Passaro, a historical wedding dress firm in Salerno, South of Italy). “We activated quickly... and we made an unrefined mask with our machinery” (Canepa Group, a firm from Como, leader in the textile sector that converted his laboratory of ties and scarves in Salento to serve the community of Como). Regardless of geographic location, these firms reacted immediately because it was inherent in their internal capabilities.

- “Involvement”. In this case, firms decided to implement “purpose-oriented” actions that could continue even after the peak of the emergency. Although they all shared a similar “purpose”, the six firms in this quadrant adopted different types of involvement. On the one hand, SMEs have for example involved their existing customers through the production of gel sanitizers: “This started as a kind of service that we had to give to our customers. There was no desire to make economic speculation” (Licofarma, an Italian firm specialized in the production of food supplements and functional cosmetics). Moreover, SMEs have done so by involving their employees in the development of new production lines at a very low price. This insight was evident, for instance, in the interview with CIFRA, a firm located in Verano Brianza that uses WKS (Warp Knit Seamless) technology to produce garments for major international brands: “The price of the masks is low, but it has allowed me to pay employees and not to ask for government funding”.





On the other hand, larger firms such as Ramazzotti or Dedem, aware of being able to provide community support, have implemented a more extensive goal-oriented conversion. These firms continue to support the community today on the basis of requests. In fact, as it emerged during an interview “on the basis of requests we donate our masks, fans, and face shields because the cost of construction is very low for us” (Dedem, a 3D printing firm located in Rome). Their goal was also to protect employees and subsequently extend this type of aid for the local community: “Our employees needed a disinfectant gel and being alcohol producers we made it .. then we donated it to the community of the Piedmont region” (Ramazzotti, an historical and well-known Italian liquor brand). This involvement, although not radical, has started in some cases from a good knowledge of internal competencies of the firm: “What we know how to do is work the fabrics. We therefore decided to face the emergency, converting part of our production to make masks” (Angelo Carrillo, historical manufacturer of textiles in Naples, South of Italy). “My sister is a model maker and she made the model of the mask ... Today we have a particular mask coordinated with our fashion collection and that we have certified”, Ceo of Kontessa, a clothing company in Tuscany; and in other cases from a good knowledge in the use of existing machines: “We made the disinfectant gel using machines for cosmetic products ... we adapted these machines to make the disinfectant gel” (Licofarma).
- “Intervention”. In this case, firms were moved by the purpose of helping the communities as soon as possible, but the four firms that are positioned in this quadrant could not do so only with their internal capabilities. A fast but relevant effort in R&D and/or innovation and/or manufacturing was necessary from the firm’s side. In this case, in fact, the firms intervened, for example, by conducting R&D projects to help the community with frontline operators (doctor and hospitals): “The problem has been identified from the hospital in Lodi. We have developed a telemedicine solution from scratch that would allow remote patient management” (Zucchetti Group, an Italian company, based in Lodi, which produces software, hardware and services solutions); or by developing new competences: “We had to develop a new formula and then we went to an external company for packaging” (Acquaflex, a chemical company located near the epicenter of pandemia that deals with providing solutions for water treatments, paper production, cleaning and disinfection in the food industry); or by purchasing new machinery to improve their production: “We have purchased machinery that allow us to speed up the production phase of the mask sewing” (Pellemoda, a Tuscan manufacturing firm of leather and fabric garments). In other cases, a new partnership had to be activated to develop new competences for the creation of new products that were distant from traditional offering: “We have developed skills on the respiratory system that we did not know before. We attended some courses at the hospital of Chiari, we made the first prototype and tested it with them and then we have tried to learn their knowledge that we can also share with other hospitals and the companies that wanted to produce these valves” (Isinnova, a 3D printing firm that had the idea of transforming Decathlon diving masks into respirators for coronavirus patients). The new partnerships led to the generation of new codified knowledge: “In one week we filed the patent application... The goal was to put the file in open source. In this way others were able to print our valves for free for the community” (Isinnova). The goal in this case was to spread the knowledge created and avoid possible unjustified gains. The new partnerships were not the only way to support the community. In fact, some firms have acted as tutors, using their network in order to develop new knowledge. “We asked to convert not only our production line, but also the production line of anyone who wanted to convert ... We acted as coordinators and as free consultants for anyone who wanted to start a conversion project” (Waycap, Italian leader in high fashion hats). Aware of the virtuous circle they would generate, the firms intervened as promoters of purpose-oriented actions, involving external companies not necessarily related to their ecosystem. In all the identified cases, the firms in this quadrant will most likely not continue with this activity, since the objective has been to implement a very fast goal-oriented action. “We want to stay focused on our original core business” (Acquaflex).
- “Evolution”. In this case, firms decided to implement purpose-oriented actions that could continue even after the moment of greatest emergency and they have done it in three different ways. First, by leveraging on their existing competences, they have started new production lines: “We had already produced hand sanitizing gels in the past

during the SARS crisis; we took that tested formula, worked on it in our laboratory and made it even more performing” (L’Erbolario, a well-known herbal firm located in Lodi, the epicenter of the pandemia). In other cases, firms have made specific investments to increase their production capacity: “We have created the structures that could support our activities ... We have made an investment and we will open a factory that will produce personal protective medical devices” (Miroglio, a well-known textile firm in Cuneo, near the epicenter of the pandemia).

In some cases new employees have been hired to guarantee the prosecution of the projects. “Another 14 employees were hired, because we had an important request for the masks that we had started to make” (Toscano Alta Sartoria, a well-known brand of handmade clothes in Tuscany). In other cases, the knowledge generated will be transferred to new business projects: “Now we are evaluating the possibility of starting a spin-off for this activity and create a related company that deals only with the medical equipment” (Moda Impresa, one of the first firms in Italy that responded to the emergency with the conversion of its laboratory).

In all the cases highlighted, the goal was not to generate turnover, but these firms were driven by the purpose of solving problems and contributing to the needs of the community. “Our goal was to do something useful and keep our workers busy. Surely the sale of the masks did not represent a business opportunity to face the economic crisis. We are covering some expenses but it certainly does not compensate for the drop of turnover that we had. We did it for people, not for the turnover” (Roncato, one of the largest Italian suitcase manufacturers).

Fig. 1: Purpose and Innovation, R&D and manufacturing capabilities for Covid-19

		Purpose-Led Actions	
		Short term actions	Long term actions
R&D, Innovation and Manufacturing Capabilities	Leveraging existing capabilities	<p><i>REACTION</i></p> 	<p><i>INVOLVEMENT</i></p> 
	Developing ad hoc capabilities	<p><i>INTERVENTION</i></p> 	<p><i>EVOLUTION</i></p> 

Source: authors elaboration

Research limits. First, we acknowledge that purpose-driven innovation that builds the groundwork for our research has not yet reached the state of a theory and that purpose research is perhaps in its infancy because of its novelty in academic research. However, our utilization of the purpose concept in this study is in line with the works of several other researchers who consider purpose as an expression of firms’ new orientation (Rey et al., 2019). Second, we recognize that our empirical study is only centered on Italian firms that reacted to Covid-19. Albeit Italy is a representative empirical setting to study as it is one of the most affected countries by global health emergencies caused by the Covid-19 (Banks, 2020; Clark, 2020; Tognini, 2020). Third, we are aware that the generalizability of our findings can be enriched by conducting more interviews with the cases we analyzed. Last but not least, we analysed purposes that drove firms to provide societal benefits in response to Covid-19. However, since other benefits, more inherent to firms’ business model, can be achieved by firms’ manufacturing transformation, future studies might unveil what profit purposes can lead firms to transform their manufacturing laboratories in the fight against Covid-19.

Practical implications. Our study offers contributions to the academic literature as well as some managerial implications. First, an abundant literature provides insights about firms’ reaction to global emergencies and suggests that firms can reshape their business models and launch product and service innovations (Buliga, 2016; Marti, 2018), but only a few studies examine purpose-led, non-profit objectives driving firms’ innovation efforts to provide societal benefits in the fight against a global emergency (Rey et al., 2019). Therefore, this study advances existing research by proposing that two main types of purpose-led actions - i.e. short term and long term - may drive firms to convert part of their activities in order to provide societal benefits in the fight against Covid-19.

Second, the paper addresses how purpose-led actions are in some cases immediately translated into concrete R&D and manufacturing projects offering products and services needed during the Covid-19 crisis. The R&D management literature has shown that firms willing to offer a new product or a service may use their capabilities, initiate a new internal research project, acquire knowledge from external sources or even combine the previous options (Peeters and Martin, 2015), but no one has analyzed their behavior by observing the speed of change to contribute of society's needs. In the case of the response to Covid-19 needs, the main characteristic was to respond very quickly. There was no time to start new projects or start collaborations with external partners (Sims et al., 2019) unless they were extremely fast, almost real time. Therefore, this paper contributes to this literature by suggesting that firms answering generously to solve problems and contribute to society's needs related to Covid-19 have made so either leveraging (mainly) on existing R&D, innovation and manufacturing capabilities, or (mainly) developing new ad hoc ones. In doing so, our interviews highlighted a different view of the firm as seen usually. During this crisis, firms joined together towards a single "purpose" trying to be part of the solution when things had become difficult (Capezzoli and Jolly, 2019). This result is one of the first empirical evidence in the purpose corporation literature.

Third, by empirically investigating the elements of this framework in 21 Italian firms that reacted to the Covid-19 emergency by converting part of their manufacturing activities and offering products and services related to the health domain which were not part of their normal offering, this paper offers some nuances about how these short-term actions are related to medium-long term R&D, innovation and manufacturing strategies. As a matter of fact, the analysis emerging from the discussion of these Covid-innovation cases shows that in relation to a medium-long term purpose strategy, firms have adopted two types of behavior. On the one hand, companies have tried to transfer company created skills. This evidence is in line with the literature which shows how companies generate new businesses to support the community during times of crisis (Williams and Shepherd, 2016). On the other hand, companies have been directly involved in supporting the activities of employees or local communities.

Our study offers some practical implications. First, the results of this study suggest that two purposes approaches - i.e. short term purpose-led actions and long term purpose-led actions - may drive firms to convert part of their manufacturing laboratories to provide medical or personal protective equipment and thus societal benefits in the fight against Covid-19. Second, we found that these purposes may be reflected in different R&D and innovation projects - i.e. firms convert part of their manufacturing laboratories by leveraging existing R&D and innovation competences or developing ad hoc new ones. Thus, firms need to be aware that different purposes and uses of R&D and innovation competences can lead their manufacturing transformation. Third, the findings of this study propose best practices for firms that are likely to transform their manufacturing transformation in response to Covid-19.

Originality of the study. Covid-19 has determined a sudden rise in the demand for products directly needed for health services, such as diagnostic tests, personal protective equipment for hospitals, firms and daily life, medical devices such as ventilators, apps/software for tracing people with and without the infection (FDA, 2020), etc. Such needs have stimulated firms which have promptly taken action to provide goods and services dramatically needed in the peak of the crisis (WHO, 2020). Albeit it is out of the scope of this paper to provide a solution to this situation, we believe that it is interesting to investigate this specific phenomenon. In doing so, we review what has been written about purpose and about R&D/innovation management in relation to health emergencies in order to understand why and how firms' innovation efforts have been implemented and describe the evolution of the situation after the peak of the health crisis. Thus, in this paper, we try to understand why and how some firms converted part of their manufacturing activities to provide new products or services for the societal benefit in the fight against Covid-19.

Key words: Covid-19; purpose; R&D innovation; manufacturing transformation; Italy;

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