

THE FUTURE OF WORK IN FASHION IN LIGHT OF EMERGING TECHNOLOGIES: PRELIMINARY STUDY

O FUTURO DO TRABALHO NA MODA SOB O VIÉS DAS TECNOLOGIAS EMERGENTES: ESTUDO INICIAL

EL FUTURO DEL TRABAJO EN LA MODA BAJO EL SESGO DE LAS TECNOLOGÍAS EMERGENTES: ESTUDIO INICIAL

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ABSTRACT

Despite the relevance of the clothing industry worldwide, there is a need for changes in the current scenario, given that it is permeated with imbalances in environmental, social, and economic aspects. With the covid-19 pandemic and the impossibility of in-person work, another problem emerged: the production chain was affected by the work stoppages. The solution found to carry it out was remote work. Furthermore, the focus on changing the traditional work format has been intensified. Therefore, this article aims to present the initial results of a research project designed to obtain guidelines for remote work in the fashion industry, in a distributed format, aided by emerging digital technologies. The results were obtained through a multiple case study approach, based on six fashion brands in Curitiba (PR), conducive to assessing the situation of each brand in relation to the core subjects of this research: sustainable fashion, distributed economy, emerging technologies, and remote work. Among the findings to date, it is evident that there is already a significant movement towards a more sustainable approach in fashion designing, producing, and consuming.

KEYWORDS

Design; Fashion; Sustainability; Emerging technologies; Remote work.

RESUMO

Apesar da relevância que a indústria do vestuário possui no mundo, há a necessidade de mudanças no cenário atual, visto que ele é permeado de desequilíbrios nos aspectos ambientais, sociais e econômicos. Com a pandemia da covid-19, ocasionando a impossibilidade do trabalho presencial, houve o surgimento de mais um problema, ou seja, a cadeia de produção foi afetada pela paralisação do trabalho. A forma encontrada para o exercício dele foi o trabalho remoto. Além disso, o olhar para as mudanças no formato de trabalho tradicional foi intensificado. Assim, o presente artigo objetiva trazer os primeiros resultados de uma pesquisa elaborada em prol de obter diretrizes para o trabalho remoto na moda, no formato distribuído, auxiliado pelas tecnologias digitais emergentes. Os resultados obtidos foram, através de um estudo de casos múltiplos, tomando como base seis marcas de moda de Curitiba (PR), a fim de avaliar a situação de cada uma em relação aos assuntos base da presente pesquisa, ou seja, moda sustentável, economia distribuída, tecnologias emergentes e trabalho remoto. Dentre aquilo o que resultou, até o presente momento, compreende-se que já há uma movimentação relevante em prol de um projetar, produzir e consumir mais sustentáveis.

PALAVRAS-CHAVE

Design; Moda; Sustentabilidade; Tecnologias emergentes; Trabalho remoto.



RESUMEN

A pesar de la relevancia que tiene la industria de la confección en el mundo, es necesario realizar cambios en el escenario actual, ya que está permeado de desequilibrios en aspectos ambientales, sociales y económicos. Con la pandemia del Covid 19, ante la imposibilidad del trabajo presencial, surgió otro problema, es decir, la cadena productiva se vio afectada por el paro laboral. La forma encontrada para llevarlo a cabo fue el trabajo remoto. Además, se intensificó la atención a los cambios en el formato de trabajo tradicional. Así, este artículo pretende traer los primeros resultados de una investigación diseñada para obtener pautas para el trabajo remoto en la moda, en un formato distribuido, ayudado por tecnologías digitales emergentes. Los resultados obtenidos se obtuvieron a través de un estudio de caso múltiple, basado en seis marcas de moda de Curitiba (PR), con el fin de evaluar la situación de cada una en relación con los temas básicos de esta investigación, es decir, la moda sostenible, la economía distribuida., tecnologías emergentes y trabajo remoto. Entre lo que ha resultado, hasta ahora, se entiende que ya existe un movimiento relevante hacia un diseño, producción y consumo más sostenibles.

PALABRAS CLAVE

Diseño; Moda; Sostenibilidad; Tecnologías emergentes; Trabajo remoto

1. INTRODUCTION

The fashion industry, more specifically, the clothing sector, is not only one of the most long-standing on the planet but it also represents 6% of global trade (Khajavi, 2021). Furthermore, it generates approximately 20 million formal jobs and 60 million informal jobs worldwide (Castaneda-Navarrete, Hauge, and López-Gómez, 2021).

Brazil is one of the few countries with a complete production chain for clothing production (ABIT, 2022). Moreover, it generated a financial turnover of around R\$185.7 billion, as it was the case in 2021, with a production of 9.04 billion clothing items and 1.5 million workers involved in it. Despite all this relevance in its traditional format, this sector presents numerous problems.

In the social and economic spheres, these deficiencies are exemplified by the existence of poorly paid labor, which does not provide workers suitable conditions to live and support their families. Additionally, workers are often exposed to unhealthy and near-slavery conditions for more than twelve consecutive hours, with no real guarantee of labor rights. The existence of these practices is induced by the pressure to reduce production costs (Berlim, 2012). Concerning the environmental sphere, in addition to the use of chemical products in production, which are dumped into the environment, there is improper waste disposal and the environmental impact of product transportation and distribution in retail (Santos et al., 2021).

A type of work that has been suggested to address these and other problems for being more sustainable is remote work. This is possible because it can be done at a distance, by people connected to a network, sharing different information, materials, etc. (Perez, 2017). It also offers a higher quality of life, lower gas emissions (WRI BRASIL, 2020) due to the lack of commuting (SOBRATT, 2020), increased job retention (Nunes et al., 2019), and the maintenance of jobs (Zaman, 2021).

Remote work saw significant growth in practice during the Covid-19 pandemic (Durães, Bridi, and Dutra, 2015). In the fashion industry, this was driven by a 90% drop in fashion clothing production in 2020, which affected all other links in the textile chain (Gandra, 2020). Thus, there was a need for reinvention; that is, instead of producing clothing, the industry produced health items such as masks and aprons, as well as changing the design and sales of products.

The work in question can be done either at home or another location and it can be fully remote or partially

remote (hybrid). Furthermore, it can be carried out by micro-entrepreneurs as well as workers in conventional companies (Moço, Lopes, and Soares, 2020).

Therefore, all the aspects mentioned are important for the deepening of this research, hence it addresses fundamental core aspects. Foremost, how the distributed economy can implement sustainability in fashion. Secondly, the implications of using various technologies for the distributed economy in the clothing sector. Finally, the implications of remote work for sustainability in the clothing sector, using emerging digital technologies.

Thus, the aim of this article is to present the initial results of a research project concerning the development of guidelines for sustainable fashion work in a remote format, based on the distributed economy and the use of emerging technologies, in order to provide parameters for those who intend to carry out this type of work, and also provide changes to the current prevailing fashion scenario, which is characterized by significant inequality.

2. GENERAL CONTEXT REGARDING THE FUTURE OF WORK

The following themes are part of the fundamental structure of the research and contribute to its elaboration, which are sustainability, distributed economy, emerging technologies, and remote work.

2.1 FASHION AND SUSTAINABILITY

Fashion, according to the Michaelis Dictionary, is defined as the manner or style of acting or dressing, as well as the system of collective uses or habits that characterize clothing, footwear, accessories, etc., at a certain moment (Michaelis, 2022). Aligned with this, Svendsen's (2010) words are, fashion, which strengthened in the 18th century, "began with rapid changes and a constant challenge to the individual to keep up with their time"; about this passing period, certain types of clothing and accessories are in evidence and, afterwards, give way to others. According to Lipovetsky (2009), ephemerality ended up consecrating fashion as a system, during modernity, because before, that is, in the time when the Roman Empire dominated several parts of the world, including the East, brief uses and excessive concern with adornments were not seen, i.e., aesthetic fantasy.

Thus, the link between clothing and fashion became quite relevant, considering that fashion, as a symbol, has clothing as the instrument for each individual to express their identity, as well as to manifest their own emotions (Fletcher, 2014). All this led to the emergence of fashion design, an area that can aggregate the material and the immaterial aspect. This means the union of raw materials, form, functionality, and quality with the emotional needs that people have (Berlim, 2012). In addition, design intrinsically enables, through the realization of an idea, the effective satisfaction of those who use the product and designers themselves, for being able to create and materialize useful solutions (Papanek, 1995). In fashion, this aspect is important because design managed to bring behavioral and aesthetic considerations into it, which were translated into artifacts through contact with disciplines such as psychology, anthropology, and sociology (Berlim, 2012).

Following the path of bringing products aiming to satisfy people's desires, design, through the union with marketing (advertising/publicity), has been used to provoke continued demand for artifacts with increasingly shorter life cycles (Pantaleão, Pinheiro, and Menezes, 2016). On the other hand, since around the 1960s, more strongly, Design and Designers have been responding to the call of environmentalists, starting to worry about designing artifacts and materializing them in a more conscious way. With an emphasis initially restricted to the environmental dimension, these efforts sought to reduce the impact caused to the environment (devastation of planet Earth) by consuming environmental resources above the planet's resilience levels. This began with ecodesign, seeking to avoid environmental impacts throughout the life cycle of fashion products (GWILT, 2014, P. 19). Currently, with the expanded focus of sustainable design, which also takes into account social and economic impacts, in order to adopt a holistic approach to sustainability, the designer projects with a view to production, use, repair, recycling and, when the latter is not possible, product disposal (Gwilt, 2014). Contemporarily, sustainable design, through approaches such as social innovation and product+service systems design, has sought to change lifestyles, business models, and consumption patterns in order to reduce consumption levels or, at least, promote a circular economy.

Therefore, it is necessary to better define what sustainability is, to understand its influence on design, which is possible through the definition introduced by the World Commission for Environment and Development

Our Common Future (WCED), which emphasizes the environmental context and refers to:

The systemic conditions according to which, at the regional and planetary levels, human activities should not interfere with the natural cycles on which everything the planet's resilience allows is based, and at the same time, should not deplete its natural capital, which will be passed onto future generations (MANZINI; VEZZOLI, 2016, P. 27).

To this concept, which refers to a physical perspective, it is important to associate an ethical perspective, that is, according to the principle of equity, the same amount of natural resources should be available to all people (Manzini and Vezzoli, 2016). Furthermore, it is also important to observe the economic and social aspects, in order to achieve real sustainability, because

the eradication of poverty, the shift from unsustainable to sustainable consumption and production patterns, as well as the protection and management of natural resources, which underpin economic and social development, are fundamental objectives and essential requirements for sustainable development. (...) to achieve sustainable development, it is necessary to: promote sustained, inclusive and equitable economic growth; create greater opportunities for all; reduce inequalities; improve the basic living conditions; promote equitable social development for all; promote integrated and sustainable management of natural resources and ecosystems, which notably contributes to social and human development, without neglecting the protection, regeneration, restoration, and resilience of ecosystems in the face of challenges, whether new or existing (UNCSD, 2012, p. 3).

Taking into consideration not only the environmental aspect but also the social and economic aspects, or at least moving towards it, is sustainable fashion. It can be defined as one that pays attention to all phases of the clothing cycle and, by designing holistically and systematically, seeks to reduce negative impacts. In the social aspect, it improves working conditions and employment in fashion, favors the inclusion of everyone in fashion; improves social cohesion in fashion; values local resources and competencies; promotes education

in sustainability in fashion (Santos et al., 2019); promotes responsible consumption in fashion. In the economic aspect, it promotes local fashion entrepreneurship; values local infrastructure and culture; promotes economic equity among actors; promotes economic inclusion through fashion for the weak and marginalized; promotes network organizations; values the reintegration of fashion product waste; promotes education for sustainable economy (Nunes et al., 2019).

2.2 DISTRIBUTED ECONOMY

Distributed Economies, according to Santos et al. (2021), comprise units of added value, on a small scale, whether in manufacturing or services, in which the user and/or client have control over the activities. This happens because these units, organized in a network format, serve local needs. Such needs correspond to artifacts and services, concerning the product lifecycle and the business process. Therefore, these units are most capable of offering on-demand solutions and having real participation from various users, including when they take on the role of manufacturer or service provider. Additionally, they share products, resources, knowledge/information, and other types of services.

Within the distributed economy are distributed systems, which can be defined as those in which agents are connected both closely and more distantly, generating a global connection. Therefore, they are more flexible systems. They also "reduce environmental impacts related to product transportation; allow the local community to have greater control over the means of production; enable individuals to become aware of social and environmental issues" (PEREZ, 2017, P. 46). Two of these systems stand out and are relevant to the present work: Distributed Design (DD) and Distributed Production (DP) (Perez, 2017).

Distributed Design is conceptualized as an open design project, in which a small-scale design unit, i.e., one person or more, connects with others through the computer. This means that several individuals, small businesses, and/or local communities, networked together, work towards the development of artifacts (Perez, 2017), including those related to fashion, such as clothing and accessories.

On the other hand, distributed production, in system format, is conceptualized as a "small-scale production unit, at the point of use or nearby, in which users are the producers – whether individuals, small businesses, and/or a local community" (LeNSin, 2016, p. 7; Perez, 2017).

This type of production signifies a significant change in traditional patterns of production and consumption, as it challenges this model, especially regarding large-scale artifact production in vast supply chains, economies of scale, and tendencies towards centralization (Perez, 2017).

Distributed production can occur in a sort of mini-factory connected to others in networks, with connections also between designers, producers, and users, in order to produce in smaller quantities using technology to meet local needs in a more sustainable manner (Perez, 2017).

It is possible to discuss digital manufacturing technologies for fashion within the context of distributed production, as they enable on-demand production, personalized products, do-it-yourself, surface design, connection with craftsmanship, and the consequent reduction of environmental impact (Santos et al, 2018). Therefore, emerging technologies will be discussed below as a way to exemplify those that can be used in the fashion sector.

2.3 DIGITAL FABRICATION AND EMERGING TECHNOLOGIES

Digital Fabrication is defined as a set of processes in which computer-monitored tools are used, meaning that these tools decode CAD (Computer-Aided Design) files for product printing. Moreover, there is the possibility for the manufacturing materials themselves to be digital, and object production can occur on demand, in the place and time it is needed (GERSHENFELD, 2012). Thus, the virtual context provides an environment that favors this new form of production, in which users/consumers have a greater role (Bastos, 2014).

In this production form, design and consumers collaborate, sharing ideas that are passed to the virtual environment, enabling interaction. Thus, co-design occurs using open design, meaning the product is realized with the aid of digital fabrication, and those who acquire them have the option to personalize them. The existence of the internet has made it easier for all interested parties in the context to access open design to produce in the quantity that suits them best (Bastos, 2014).

Regarding Fashion, some technologies for digital fabrication have already been used, often gathered in spaces called Fab labs or Fashion labs. In these places, conditions are provided for people, collaboratively and experimentally, to explore their creativity with the different available technologies, as it is a place open to

the entire community (Felippe et al., 2020).

Examples of emerging technologies that can be used in the fashion industry include Drawing and Modeling Software; Digital printing machines; Digital embroiderers; Laser cutters; Digital weaving machines; 3D printers; Vinyl cutters, and CNC milling machines.

Another type of current work that also makes use of emerging digital technologies is remote work. This work saw an acceleration with the Covid-19 pandemic, a situation that occurred even in Latin America, where this type of work increased almost tenfold compared to before the pandemic (Poder 360, 2021), due to the need to adapt labor forms to address this context.

2.4 REMOTE WORK

Remote work, or telecommuting, is defined as work that takes place outside the company's premises, and it can be carried out either at home or in another physical space connected to the company, through technological artifacts (Moço, Lopes, & Soares, 2020).

Regarding the fashion industry, with the pandemic context, stakeholders in this segment, especially those linked to garment manufacturing, needed to reinvent themselves. Fashion apparel production dropped by 90% in 2020, affecting all other links in the textile chain. This led to the production of other items, such as health items (masks and gowns), and changes in design and product commercialization methods.

Among the practices that emerged, there was an increase in remote work, with the use of platforms for digital marketing and e-commerce, including brand showrooms with virtual samples of pieces and the availability of co-creation for users of the space (customized and on-demand clothing production), such as the choice of fabric, color, and print of the pieces; avatar influencers for luxury brand promotion; online fashion shows; brand lookbooks featuring 3D clothing pieces to showcase all details virtually; WhatsApp as a sales tool; offering discounts and free shipping to boost sales; Google integration for better visibility; administrative staff working from home; and fully remote creation collectives, such as Fresco, created by fashion designer Ingrid Frederichi, composed of 5 fixed women and over 15 freelancers developing brands, products, fashion collections, prints, etc.

In the 3D context, it is worth highlighting the role of 3D software, which even before the Covid-19 pandemic was gaining prominence in garment manufacturing. With

the current health crisis, these software gained even more relevance as they could be used from home computers. The primary goal of modeling with such software is to increase efficiency and precision without the need for physical materials, as everything is digitally manipulated. This type of modeling involves product simulation and visualization to minimize losses before production. An example of such software is CLO 3D, which allows users to realistically design clothes and avatars wearing them. It enables users to create pieces and showcase them in a virtual showroom for consumers, facilitating on-demand manufacturing.

Therefore, it is evident that the fashion industry has also incorporated technology in various aspects of its operations to enable remote work and thereby prevent greater human and/or economic losses. Reflecting on the decrease in production, driven by isolation and reduced purchases, even after the most challenging period of the pandemic, there is also an observed increase in consumer preference for sustainable and durable products, which is expected to continue growing in the years to come. These factors are important drivers for making the industry more sustainable. Additionally, remote work aligns with distributed economy principles, as it involves units connected in a network where people can work from different locations but remain connected, allowing for the sharing of information, services, resources, among others (Perez, 2017).

3. RESEARCH METHOD

The study in question is divided into six phases, which will culminate in the establishment of guidelines for sustainable fashion remote work. However, this section will address what was carried out in the first, second, and third phases, as the last three phases have not yet been completed. Therefore, the details of the highlighted phases are as follows:

3.1. PHASE 1: UNDERSTANDING THE PROBLEM

In this phase, the strategies used to understand the problem and obtain data to support the development of the research protocol, to be carried out in phase 2, were described. The strategies included a theoretical review conducted systematically and unsystematically in 2021,

aimed at providing theoretical grounding on sustainable fashion, remote work, and emerging technologies, the four main points of the research.

For the unsystematic review, texts (journals, conference proceedings, dissertations, etc.) were searched on Google Scholar. Physical books providing a general overview of the researched topics, as well as keywords and possible search strings, were also used. Subsequently, the systematic review was conducted according to the criteria proposed by Conforto, Amaral, and Silva (2011). This review consisted of three phases: input, processing, and output, aimed at selecting publications, archiving and cataloging them, and writing the text. Table 01 shows the respective criteria of the RBS.

Based on the coding, each case was individually

Data Collection Protocol for the State of the Art	
Question	What theory underpins sustainability in fashion? How are the themes of distributed economy, emerging technologies, and remote work related to it?
Research Objective	General: Develop the topics of fashion, sustainability, distributed economy, emerging technologies, and remote work; Specific: Identify details of the above context and, among them, define the dimensions of sustainability by bringing concepts and principles applied to fashion. Additionally, investigate the relationships between fashion, technology, distributed economy, and remote work.
Themes	Sustainable fashion, Distributed Economy, Remote Work, and Emerging Technologies.
Keywords	Fashion; Sustainability "Clothing Design"; Dimensions; SME; Textile; "Sustainable Development"; Technology; "Distributed economy".
Research Scope	Capes Journals Portal. Directs to databases containing relevant articles for the study.

Data Collection Protocol for the State of the Art	
Technical Aspects	Filter 1: Title, keywords, and abstract reading; Filter 2: Introduction and conclusion reading of the article; Filter 3: Complete article reading. Comparison with the theoretical framework of Silveira, Santos, and De Sampaio (2022).
Methodological Validity Criteria	The research is being conducted by the authors of the present study. Inclusion and exclusion criteria ensure that no relevant result is discarded. Furthermore, comparing the articles, after the filters in the technical aspects, with the theoretical framework of Silveira, Santos, and De Sampaio (2022), which addresses sustainability heuristics, will ensure a solid and coherent result.
Inclusion/ Exclusion Criteria	Inclusion criteria: Last 5 years, English language, peer-reviewed, journal articles, subject: sustainability. Exclusion criteria: Conference papers, articles on marketing, footwear.
Search Strings	Fashion AND Sustainability AND Dimensions; Fashion AND "Clothing Design" AND Sustainability; Fashion AND SME AND Sustainability; Fashion AND Textile AND "Sustainable Development"; Fashion AND technology AND Sustainability; Fashion AND Distributed economy" AND Sustainability.
Data Export	Personal hard drive of one of the authors.

Table 01: Criteria used in the initial phase of the State of the Art Review

Source: Based on Santos et al. (2018)

Only the articles that met the criteria presented were included, which were important for clarifying ideas and constructing the literature review in section 2 (General context of the future of work) of this article. Additionally, it was a preparatory stage for the field research (Santos et al., 2018).

It was also possible to observe the situation of the research problem in relation to what has been written about it.

3.2. PHASE 2: DEVELOPMENT OF THE DATA COLLECTION PROTOCOL

In this phase, the planning of the data collection protocol was described, that is, the delineation of brands to be studied, the data to be collected, and the subsequent data storage of the same.

Regarding the brand selection criteria for the case studies, the following were adopted (Table 02):

Criteria	Nature
At least one sustainable practice in at least one sphere of sustainability.	Mandatory
Digital technologies for fashion design and production, as well as facilitation of remote work	Desirable
Remote/Hybrid Work	Mandatory
Micro or small company, with no minimum time of existence	Mandatory
Location: Metropolitan Region of Curitiba	Mandatory
Distributed Economy (Work conducted in a network)	Mandatory
Apparel Industry	Mandatory

Table 02: Criteria considered for brand selection.
Source: Authors .

Data were obtained in the form of interviews, social networks and websites and images. As for their storage, an external HD and Google Docs were used.

3.2. PHASE 3: MULTIPLE CASE STUDY

The Multiple Case Study reports the collaboration that took place in Phase 2, which involved data collection, since these data are essential for the analysis of how sustainable fashion, distributed economy, remote work, and emerging technologies have been implemented with their advantages and disadvantages. Additionally,

it quantifies the maturity level of these elements in the analyzed brands, and it identifies common factors, specificities, and barriers.

3.2.1. ANALYSIS AND VALIDATION STRATEGY

To analyze the field research data, the Nvivo software was used. This software was chosen for its practicality and greater reliability in the analysis. Initially, interviews, images, and information gathered from the internet (websites and Instagram) were coded. The coding considered the four main topics of the thesis, of which this report is a part: sustainability, distributed economy, emerging technologies, and remote work. These topics were selected as attributes (attribute coding) to classify the several data formats obtained, which enhanced the analysis and interpretation of the data. Furthermore, this approach was suitable for cross-case analysis with multiple participants (Miles, Huberman, and Saldaña, 2014), as seen in this research.

In addition to codes, subcodes were established within the primary codes in order to classify the information more specifically, that is, providing further detail or enrichment to the entries. This strategy is appropriate for content analysis, studies with multiple participants and sites, and studies with a wide variety of data formats (Miles, Huberman, and Saldaña, 2014), as is the case in this research.

Therefore, the selected codes and subcodes are presented in the following table (Table 03):

Sustainability
Lifecycle, Education, Inclusion, Slow fashion, Work time, Transparency, Social and environmental responsibility and Deficiencies_S.
Distributed Economy
Co-creation, Small producer, Networking, Local valorization and Deficiencies_DE.
Emerging Technologies
Types_ET, Advantages_ET and Disadvantages_ET.
Remote Work
Forms_RW, Advantages_RW and Disadvantages_RW.

Table 03: Established codes and subcodes,
Source: Author

Based on the coding, each case was individually analyzed using the Nvivo software. As a comparative parameter the content obtained in the theoretical review and tools were used to assess the level (from 1 to 5) of individual maturity (figures 01 to 03) of each one regarding sustainability, distributed economy, remote work, and emerging technologies, along with the theory obtained in the theoretical foundation. The first two tools were adapted from pre-existing ones (Paz, Frozza, and Kipper, 2015; Clear Word, 2023), and the last one, concerning emerging technologies, was created by the author of this document based on the knowledge acquired during the theoretical review conducted for the thesis. After all the previous steps, a cross-analysis was conducted among the data of each case to investigate connections, gaps, barriers and specific attributes.

Finally, a report was written, from which the results of the preliminary study were extracted, and a reflection on the study was included in the conclusions section. This report is to be presented to the brands for validation in the next phase.

Maturity Levels of Sustainability and Distributed Economy

(Adapted from Paz, Frozza e Kipper, 2015)

	Level 1 Lack of sustainability awareness	Level 2 Initial sustainability	Level 3 Intermediate sustainability	Level 4 Sustainable maturity	Level 5 Sustainable
Economic	Focus on the economic sphere (profit maximization). Economically inefficient.	Still focusing on the economic sphere, but socio-economic actions arise, and the organization begins to grow economically.	Notices obtaining advantages such as reduced costs and increased operational efficiency, but the practices have low maturity.	Good results due to the implementation of sustainable practices. Effective communication with customers who identify the company as sustainable. Enhanced brand value. Good business opportunities	Investment in innovation and the development of sustainable businesses. Registered patents and profits from sustainable innovations.
Environmental	Unaware of environmental issues in the industry. Lacks sustainable practices.	Complies with the industry's legislation and starts implementing sustainable practices, although mostly corrective.	Proactive measures are implemented, but most of them are corrective. Reduction in the use of non-renewable natural resources.	Several proactive measures. Use of renewable energy sources, attention to the product life cycle, materials, transparency, slower production.	The company is considered a reference in several sustainable practices. Only resources that do not affect its existence are used.
Social	There is virtually no interaction with society. The organization is unaware of the subject.	Little interaction between the community and the company. There is no concern for the development of the local community.	There is still limited interaction with the surrounding community. Initiation of practices for community development and improvement of workers' quality of life.	Developed relationship with the local community. Partnerships with NGOs and associations for community development. Co-creation. Local empowerment. Sustainable policies motivating employees/partners.	Well-developed relationships with all stakeholders, including Research Centers, Universities, and Regulatory Organizations.

Figure 01: Assessment Tools for Sustainability and Distributed Economy Maturity Levels .

Source: Adapted from Paz, Frozza, and Kipper (2015).

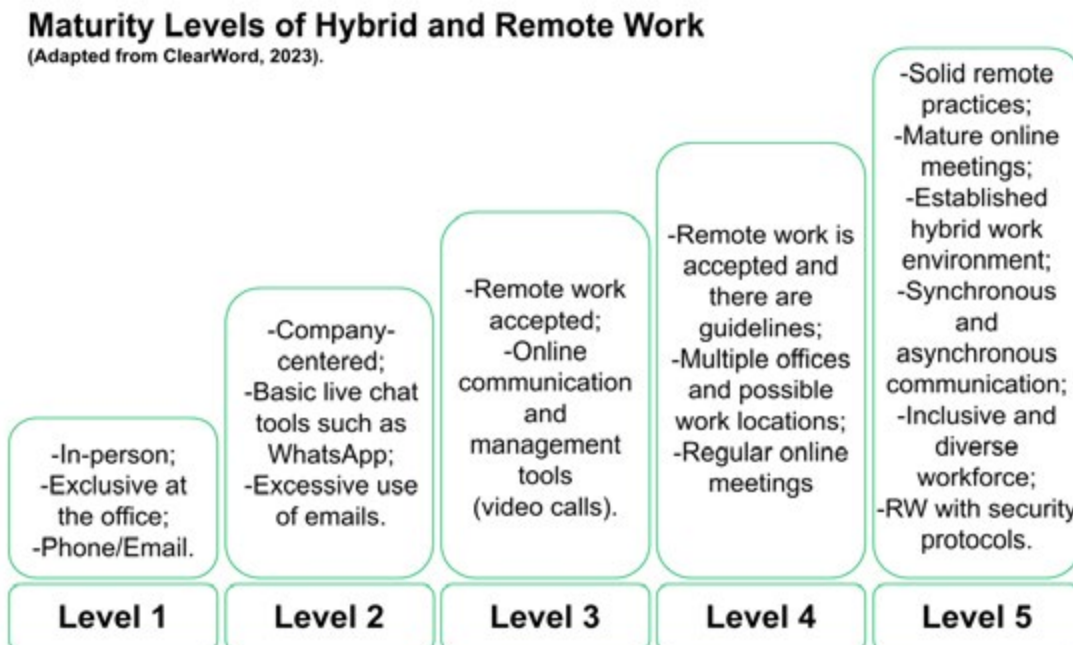


Figure 02: Assessment Tools for Maturity Levels of Hybrid and Remote Work.

Source: Adapted from Clear Word, (2023).

Maturity Levels of Emerging Technologies (Author, 2023).

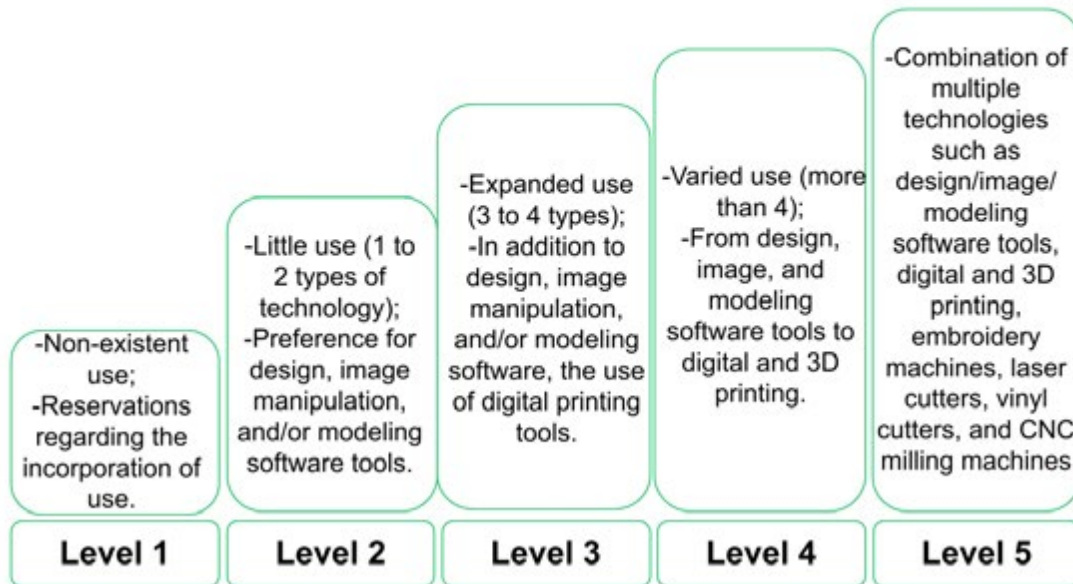


Figure 03: Assessment Tools for Maturity Levels of Emerging Technologies.
 Source: Authors.

4. RESULTS

4.1. Phase 1 Results

In order to understand the research problem and identify authors, content, and knowledge, as well as to provide a basis for the theoretical review in item 2, an unsystematic review was conducted in conjunction with the systematic review.

Regarding the Systematic Review, Table 04 was created to show the results obtained with the search strings and, after their use, with the filters. Although several articles were found, only 17 were used in writing the thesis because the central theme of the current document is still underexplored. Additionally, articles focusing on remote work, after attempts to search using various strings such as Fashion AND Sustainability and Remote Work, Fashion AND Sustain* AND Remote Work, and Fashion AND Sustain* AND Hybrid Work, did not yield any results. This can be considered a gap but also an opportunity to explore the subject in this thesis through unsystematic review.

Search Strings	Results	Filter 1	Filter 2	Filter 3
Fashion AND Sustainability AND Dimensions	3	2	1	1
Fashion AND Clothing Design AND Sustainability	64	30	11	4
Fashion AND SME AND Sustainability	340	70	14	3
Fashion AND Textile AND Sustainable Development	50	20	13	3
Fashion AND Technology AND Sustainability	157	60	20	3
Fashion AND Distributed Economy AND Sustainability	600	150	40	3
Total	1214	332	99	17

Table 04: Results of the Systematic Literature Review
 Source: Authors (2023).

Regarding the quantity of publications (Figure 04), after applying filter 2, an evolution of the publications over the last 5 years was observed. There was growth in 2018, fluctuation in 2019, and a significant increase in 2020, with 29 publications.

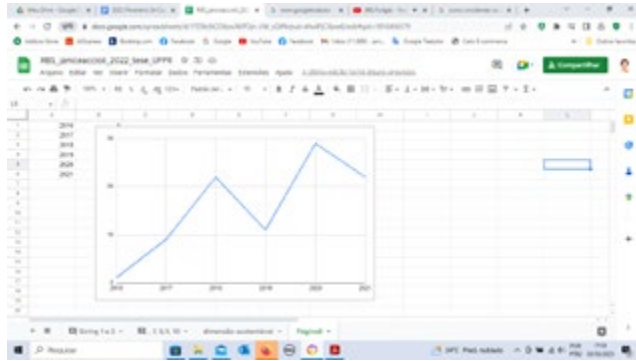


Figure 04: Timeline of Publications from the Systematic Review
Source: Authors (2023).

Despite the reasonable number of publications, the final result after filter 3 showed an insufficient amount of work to support the present research. Therefore, the importance of also conducting the unsystematic review is highlighted, as it provided theoretical support for this document through books, articles, theses, and dissertations.

4.2. Phase 2 Results

The data collection protocol began with the choice of six local brands, from the city of Curitiba, Paraná, which took into consideration the criteria outlined in section 3.1. These brands were initially selected through internet search, a SEBRAE Sustainable Fashion event attended by one of the research authors and also through the recommendation of experts. In order to maintain the confidentiality of the brand names, at this early stage of the research, they were referred to as Brand 1, Brand 2, Brand 3, Brand 4, Brand 5 and Brand 6. Their detailed profiles are described below:

a) Type 1 Cases: Remote Work with Distributed Economy and Emerging Digital Technologies (Brand 2 and Brand 3). Common characteristics include Sustainability (only in Brand 3), Digital Technologies, Remote/Hybrid Work, Micro/Small Business, Local, Distributed Economy, and Apparel;

b) Type 2 Cases: Remote Work with Sustainability and Emerging Digital Technologies (Brand 5 and Brand 6). Common characteristics include Sustainability, Digital Technologies, Remote/Hybrid Work, Micro/Small Business, Local, Distributed Economy, and Apparel;

c) Type 3 Cases: Remote Work and Sustainability (Brand 1 and Brand 4). Common characteristics include Sustainability, Remote/Hybrid Work, Micro/Small Business, Local, Distributed Economy, and Apparel.

Interviews were performed with the appropriate completion of Informed Consent and Clarification forms. The semi-structured format of these interviews allowed participants to express different perspectives, in addition to the questions that were asked. All interviews were recorded in audio format using a mobile phone and stored on an external hard drive owned by one of the authors. They were then transcribed using NVivo transcription software.

Data collection from the internet (information and images) including websites and social media platforms such as Instagram, aimed to facilitate data triangulation, which is a requirement in the case study method. This provided an overall overview of the brands in terms of sustainable fashion, actions taken in this regard, the use of emerging technologies, sustainable messaging to consumers, type of marketed apparel products, and the respective raw materials. The most relevant information was gathered and stored in a Google Docs spreadsheet.

Photographed images included clothing items, fabric samples, and packaging. Collected artifacts consisted of finished brand products or samples of raw materials used in products. This approach was taken to examine the artifacts produced by the brands in terms of raw materials, printing details, multifunctionality, timelessness, agenderness, artifacts produced from production waste, and upcycling. Each image was cataloged as a card in a Google Docs document, along with all possible details, and they were stored on an external hard drive owned by one of the authors.

Upon this scenario it was possible to set the foundation for the next phase, involving Multiple Case Study and the consequent data analysis.

4.3. Phase 3 Results

This analysis process began with the coding of interviews using NVivo software, as well as images (records from one of the research authors and social media) and information collected from the internet (websites and Instagram), totaling 166 files coded, and 1,116 coded references. The four main topics of the thesis, of which this report is a part of, were chosen as codes: sustainability (775), distributed economy (195), emerging technologies (83), and remote work (63).

The performed analysis was provided by the static grouping mechanism, present in NVivo Software, which allows the aggregation of elements for the research purposes (SOFTWARE SHOP, 2023). In virtue of this grouping of data, triangulation is enabled, where the three types of data sources corresponding to each case were consolidated into separate folders. Triangulation consists in confirming information from different sources related to the research topic and highlights inconsistencies, errors, and conflicts, enabling the researcher to discover and explain properly why these discrepancies exist, which enhances the reliability of the analysis (Miles, Huberman, and Saldaña, 2014).

From the data grouping, the software analyzed the data and provided results regarding the presence of each code and subcode in the data..

Subsequently, the analysis involved examining individual cases to evaluate the four main aspects underpinning the research and conducting cross-case analysis using information from all interviewed brands. The results of both analyses will be presented in the following items.

4.3.1. Individual Analysis

4.3.1.1. Sustainability

Regarding sustainability, brand 1 is at **level 2**, indicating **initiation of sustainability** when comparing the data obtained with the maturity tool, in the highlighted aspect. This is because sustainability is already seen in the brand, but there are still deficiencies, such as the use of materials with two fibers and materials from more distant locations, lack of repair availability, among others, which would be important for facilitating the extension of the lifecycle of garments/materials (Vezzoli et al., 2022) and for reducing carbon emissions by preferring local resources (Gwilt, 2014). Some notable actions include the use of recycled materials, multifunctional pieces (Vezzoli et al., 2022), communication for consumer education (Santos et al., 2019), and the inclusion of diverse female body types (Gwilt, 2014), however, the brand needs to further enhance its sustainable character, particularly regarding the inclusion of marginalized groups (Santos et al., 2019). Additionally, the Social and Environmental Responsibility subcode was not identified in the analyzed sources due to this lack of action by the brand.

As for brand 2, it is at **level 1**, meaning **lack of sustainable awareness** when comparing the data obtained with the maturity tool regarding the highlighted aspect. This means that although the brand already has some sustainable practices, such as using local and biodegradable raw materials (Gwilt, 2014); producing in small quantities on-demand (Perez and Santos, 2018); and offering high-quality products (Nunes et al., 2019), so that they last longer; there is little awareness on the subject and many deficiencies. The latter include not using organic cotton, using materials with two fibers, no use of recycling in any way (Vezzoli et al, 2022), nor is there the inclusion of marginalized people (Santos et al., 2019). Besides, several subcodes related to sustainability were not found in the analyzed materials, which could be relevant for the brand's sustainable practices such as education for sustainability, social and environmental responsibility, and sustainability in work hours

Brand 3 is at **level 4**, that is, **sustainable maturity** when comparing the data obtained with the maturity tool for the highlighted aspect. Which means, despite a few deficiencies, such as the use of materials with two fiber types (Vezzoli et al, 2022) and PET itself (Redação Future Print, 2021) due to its maturity in other areas, it is well developed in terms of sustainability. The other aspects are the use of organic, recyclable, and recycled materials, zero waste practices, multifunctional items (Vezzoli et al, 2022), waste integration into production (Nunes et al, 2019), inclusion of marginalized groups and consumers (Santos et al., 2019), in the strong social and environmental responsibility that is actually present, covering all positive subcodes.

Brand 4 is at **level 3**, indicating **moderate sustainability** when comparing the data obtained with the maturity tool for the highlighted aspect. Besides some reservations, such as using raw materials that, despite being recycled, contain more than one fiber type in the composition (Vezzoli et al, 2022), waste is not reintroduced in the production (Nunes et al, 2019), there is a lack of initiatives in the area of social and environmental responsibility, which could engage continuous community involvement, and providing greater transparency on the website, specifically regarding partners responsible for clothing production (Bhamra et al, 2011).

Brand 5 is at **level 4**, which represents **sustainable maturity** when comparing the data obtained with the maturity tool for the highlighted aspect. Although it still has some deficiencies, including not accepting returns of items for raw materials lifecycle extension,

waste management, and the use of recycled materials or modular/multifunctional pieces, some issues are being addressed, such as transitioning from paper to QR codes for minimizing material use (Vezzoli et al., 2022). Also, it is a brand that has been growing and improving in social and environmental efforts, and it complies with all positive subcodes.

Brand 6 is at **level 3**, meaning **moderate sustainability** when comparing the data obtained with the maturity tool for the highlighted aspect. The company already has more sustainable practices, such as considering the design of clothing, not just the material, a point that it is very conscious of, being strongly selective about its materials (Vezzoli et al., 2022). However, points such as a lack of involvement in the development of the local community (Santos et al., 2019), to the point that social and environmental responsibility was an unmarked topic; more engagement with research organizations, as they are interested in new materials; the issue of waste management (Vezzoli et al., 2022), transparency (Bhamra, Lilley and Tang, 2011) are areas that need improvement to achieve a higher level of sustainability maturity.

4.3.1.2. Distributed Economy

Brand 1 is at **level 2**, indicating **limited interaction between the company and the community**, when comparing the data obtained using the maturity tool for the highlighted aspect. This is primarily due to the nearly non-existent engagement between the company and the community, which should be intensified (Santos et al., 2019), limited co-creation aspects for their products, and the absence of customized garments, which should be broader to enhance product personalization (Duarte and Santos, 2019).

Brand 2 is at **level 2**, denoting **limited interaction between the company and the community**, when comparing the data obtained using the maturity tool for the highlighted aspect. It is evident that the company's focus is more on economic aspects rather than on community development, which would be an essential aspect (Santos et al., 2019). This is supported by the total absence of the subcode "local valorization", which is crucial for establishing a deeper connection with the community and valuing local materials, knowledge, etc.

Brand 3 is at **level 4**, that is, a **well-developed relationship with the surrounding community**, among other factors, when comparing the data obtained using

the maturity tool for the highlighted aspect. Besides the absence of deficiencies in the data, there is a considerable level of engagement with the community, aimed at its development and appreciation (Santos et al., 2019). What would make it truly sustainable and distributed is forming partnerships with universities and regulatory organizations.

Brand 4 is at **level 3**, implying a **somewhat limited relationship with the surrounding community**, when comparing the data obtained using the maturity tool for the highlighted aspect. While co-creation is one of the brand's strengths (Duarte and Santos, 2019), with numerous partnerships (Nunes et al., 2019), and deficiencies not being mentioned, it lacks involvement in projects aimed at community improvement (Santos et al., 2019), rather than just benefiting the brand.

Brand 5 is at **level 4**, meaning **partnerships with NGOs and associations for community development**, when comparing the data obtained using the maturity tool for the highlighted aspect. Despite having some deficiencies, particularly the absence of co-creation in pattern-making for all order quantities (Duarte and Santos, 2019) and not being able to confirm the existence of bonuses/incentives for individuals producing the garments to enhance working conditions in the fashion industry (Vezzoli 2007; 2010), the brand, overall, is progressing toward establishing itself as a sustainable business, featuring numerous positive aspects and is already recognized for it.

Brand 6 is at **level 3**, suggesting a **somewhat limited relationship with the surrounding community** when comparing the data obtained using the maturity tool for the highlighted aspect. Despite concerns about remuneration (Vezzoli 2007; 2010) and the valorization of local resources (people and raw materials) (Nunes et al., 2019), there is still insufficient community involvement, even as a means to have a more substantial social and environmental responsibility. Moreover, there is a lack of significant customer engagement in co-creating for the brand (Duarte and Santos, 2019), which would help create stronger emotional connections with people (Lilley, 2009; Santos et al., 2019).

4.3.1.3. Emerging Technologies

Brand 1 is at **level 1**, meaning there is **no use of emerging technologies** when comparing the data obtained with the maturity tool regarding the highlighted aspect.

The use of technology would improve the clothing design (software) and on-demand production, product personalization, and the integration of craftsmanship with technology (Perez and Santos, 2018).

Brand 2 is at **level 4**, indicating the **use of more than four types of integrated emerging technologies** when comparing the data obtained with the maturity tool regarding the highlighted aspect. These technologies include design software tools (Corel Draw and Adobe Illustrator), image manipulation software (Adobe Photoshop), and digital printing technologies (DTF and Sublimation). The use of these technologies offers several advantages such as on-demand production in small quantities (Troncoso and Rustchiling, 2014), customization according to customer preferences (Perez and Santos, 2018), and efficiency, especially with DTF for printing labels and patterns, saving time and resources (Sanches et al., 2021).

Brand 3 is at **level 2**, meaning there is **limited use of technologies**, comparing the data obtained with the maturity tool regarding the highlighted aspect. The brand uses two software tools for pattern modeling, which minimize waste generation (Lulitex, 2022; Molde me, 2022). To optimize the production process even further, the incorporation of other software tools that cover the entire production process, such as Audaces and Lectra, would be more efficient (Lectra, 2022; Audaces, 2022). The limited use of more technologies is due to the unavailability of inks made from more sustainable materials for digital printing, such as materials made from reclaimed resources, which would contribute to sustainability by using biodegradable and reused materials from other production processes (Vezzoli et al., 2022).

Brand 4 is at **level 2**, indicating **limited use of technologies** when comparing the data obtained with the maturity tool regarding the highlighted aspect. Despite some forays into the 3D realm, the brand's use of technology is limited to two software tools for graphic design purposes, like brochures. Even with the strong artisanal appeal of the brand, greater utilization of 3D printing for buttons and other accessories, the design of unique pieces similar to handcrafted products (Gonçalves, Teofilo, and Campos, 2017) with zero waste (Pasricha and Greeninger, 2018) and other software tools covering the entire production process, such as Audaces and Lectra (Lectra, 2022; Audaces, 2022), would enhance the overall efficiency.

Brand 5 is at **level 3**, meaning **use of three types of technologies** when comparing the data obtained with the maturity tool regarding the highlighted aspect. These

technologies include DTF, DTG, and Adobe Illustrator. Notably, DTF allows for the printing of smaller quantities, or on-demand production (Troncoso and Rustchiling, 2014), and does not use water in the printing process, conserving resources, and DTG has a less toxic composition, reducing health hazards (Vezzoli et al., 2022).

Brand 6 is at **level 5**, with the **use of several technologies and software tools** when comparing the data obtained with the maturity tool regarding the highlighted aspect. The brand employs two types of digital printing, laser cutting, and three software tools for design and image manipulation. Although, the incorporation of a comprehensive software tool like Audaces 360 (Audaces, 2020), which covers the entire process of creating pieces, would certainly further enhance waste reduction, time and energy savings (Vezzoli et al., 2022).

4.3.1.4. Remote Work

Brand 1 is at **level 3**, meaning **remote work is accepted** when comparing the data obtained with the maturity tool regarding the highlighted aspect. The brand's designer and owner creates and produces clothes at home, sells them, and meets with clients at Casa 102, in addition to online sales (a hybrid approach) (NYC, 2022), and there is also a person who works with her remotely (home office) (SOBRATT, 2020).

Brand 2 is at **level 3**, meaning **remote work is accepted** when comparing the data obtained with the maturity tool regarding the highlighted aspect. The company owner works from home or in a co-working space and sells online (a hybrid approach) (NYU, 2022), their partners work from their respective locations, and communication is mainly conducted via technologies, especially through WhatsApp. They are not always physically present, but the work processes proceed as usual.

Brand 3 is at **level 5**, indicating **solid remote work practices** when comparing the data obtained with the maturity tool regarding the highlighted aspect. The brand predominantly follows a hybrid work model (NYU, 2022), with people working remotely in collaboration with the brand, using technology for communication. No deficiencies were detected in the data, and remote work functions exceptionally well in the company, as demonstrated by the high-quality production that benefits all involved, without the need to be physically present together.

Brand 4 is at **level 4**, meaning **several acceptable work locations** when comparing the data obtained with the maturity tool regarding the highlighted aspect. The brand's designer and owner works in a hybrid manner (NYU, 2022), creating pieces at home while their production occurs in the brand's own studio. Additionally, there is a network of partners who work from different locations, including their homes and locations outside the state. Communication is facilitated through internet-connected technology, primarily WhatsApp.

Brand 5 is at **level 4**, indicating **several acceptable work locations** when comparing the data obtained with the maturity tool regarding the highlighted aspect. Part of the work is done from the brand owner's residence (for creation and marketing), sales are conducted at the Acampar store and online (a hybrid approach) (NYU, 2022). Production takes place in other locations, across four partner hubs, and there are partners for prints design who reside outside of Brazil.

Brand 6 is at **level 3**, meaning **remote work is accepted** when comparing the data obtained with the maturity tool regarding the highlighted aspect. The brand's designers and owners often work from home (for design and managing social media) and interact with clients at the studio (a hybrid approach) (NYU, 2022). Communication is facilitated through internet-connected technology, primarily WhatsApp. The work also involves collaboration with other professionals (production and print design).

4.3.2. Cross Analysis

With the purpose of comparing the results of the brands, it was necessary to cross-reference them, starting with the maturity levels concerning the four main aspects that underpin the research.

The graphs (Figures 05 and 06) verify that two companies (brands 3 and 5) have a level 4 of sustainable maturity and the distributed economy maturity level, being followed by brands 4 and 6 (3), brand 1 (2), and brand 2, with no points concerning sustainability and 2 concerning the distributed economy.

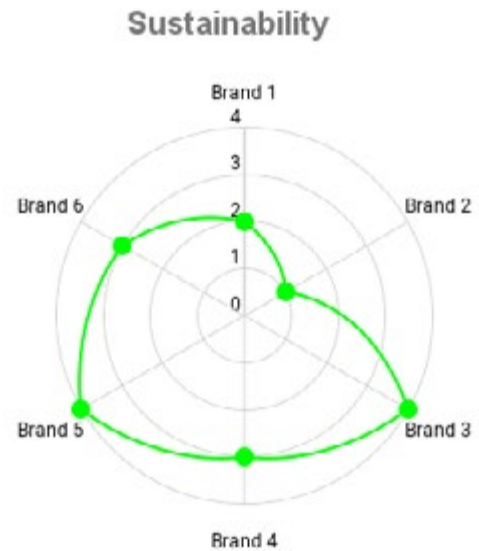


Figure 05: Graph showing brand maturity in terms of sustainability.
Source: Authors.

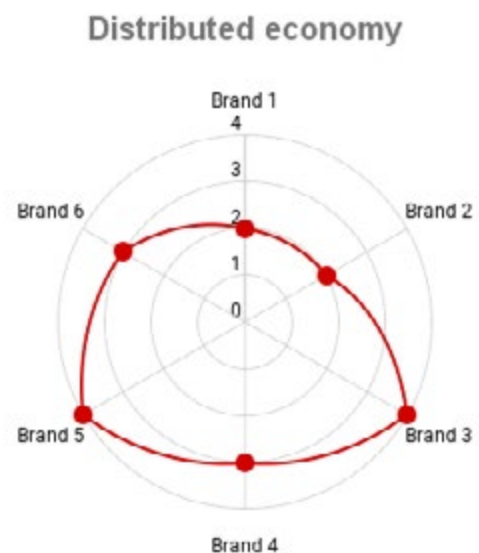


Figure 06: Graph showing brand maturity in terms of the distributed economy.
Source: Authors.

This is due to the fact that the brands have nearly the same level of development between these two items, meaning there is a greater balance.

Regarding emerging technologies (Figure 07), two brands stand out (brand 6 and brand 2) with 5 and 4 points, respectively, as they make more extensive use of these technologies. Brand 5 comes next (3), then brand 4 (2), and only one (brand 1) still does not use any technology.

Connections	Gaps
<ul style="list-style-type: none"> - Slow Fashion - Biodegradable materials - Does not use PET fabrics - Sustainable education - Inclusion (consumer) - Garment lifespan extension (maintenance care) <ul style="list-style-type: none"> - Multifunctionality - Certified materials - Production on demand - Recycled and recyclable packaging <ul style="list-style-type: none"> - Networking - Local valorization (materials and partnerships) - Local valorization (ancestral knowledge) - Co-creation (partners) - Co-creation (consumer) - Small-scale producer - The business is the sole source of income - Emerging technologies <ul style="list-style-type: none"> - Remote work - Partners working from home - WhatsApp is the primary means of communication 	<ul style="list-style-type: none"> - Biodegradable and organic materials - Concern for post-disposal - Use of recycled/upcycled materials <ul style="list-style-type: none"> - Garment lifespan extension (repair) - They communicate to the consumer, in some way, the meaning of symbols for garment care <ul style="list-style-type: none"> - Transparency - Inclusion (LGBTQIAP+ individuals, black individuals) as models or in the production chain <ul style="list-style-type: none"> - Inclusion (production chain, models, or social causes) of Persons with Disabilities (PCDs) - Use of fabrics with more than one fiber <ul style="list-style-type: none"> - Suppliers and materials from longer distances - Custom-made garments - Social and environmental responsibility <ul style="list-style-type: none"> - Incentives for employees <ul style="list-style-type: none"> - Garment lifespan extension (rental) <ul style="list-style-type: none"> - Modularity - Certified brands and/or labels attesting to sustainability - Use of inks based on waste reuse

Table 05: Results related to connections and gaps
Source: Authors.

Barriers	Specific Attributes
<ul style="list-style-type: none"> - Higher price compared to a conventional product - They do not use or would like to use more sustainable practices, but do not do it due to the high cost, uncertainty about the positive aspects of sustainability, or not knowing how to use them <ul style="list-style-type: none"> - Receives clients in a shared location because they lack the infrastructure at home 	<ul style="list-style-type: none"> - T-shirts are the primary product in their production <ul style="list-style-type: none"> - They use natural dyes - The designer's main workplace is their home - Use of emerging technologies (up to 3) - Use of emerging technologies (4 or more)

Table 06: Results related to barriers and specific attributes
Source: Authors.

After all the procedures were completed, it was observed that the number of gaps and connections, in terms of numbers, are almost equal, with few barriers and some peculiarities. In terms of connections, the standout feature is that most brands are Slow Fashion, which already contributes to the existence of several other common characteristics such as the use of biodegradable and quality materials, garment life extension, concern about the product life cycle, etc. As for the gaps, it is notable that not all brands use organic biodegradable materials, partly due to issues related to traditional cotton culture and the use of upcycled materials. The latter would be more sustainable as it involves using existing materials and not extracting more resources from nature to create new clothing items.

Financial incentives for partners/employees are not a common characteristic for all brands, and the concept of clothing rental as a form of extending the life of garments is present in only one brand. Regarding barriers, the cost of more sustainable materials and technological processes is a significant obstacle, reported by almost all brands, as well as the lack of infrastructure for receiving customers at home. As for particularities, working from home is the main workspace for the brands, and the use of technologies is specific to each brand since, despite the commonality of remote work and technology use, each brand uses these tools in a way that best suits its work.

Therefore, it was possible to obtain a general and concrete understanding of the situation of fashion brands, their relationships with sustainability, remote work, new technologies, and areas where they can improve and innovate (barriers and gaps).

5. CONCLUSION

After conducting Multiple Case Study, some reflections were carried out regarding the planning and execution of the latter, the consistency of the results, and whether, in their current state, these results could be validated by the companies to proceed to the next steps required by the present research.

Regarding the planning and the process, both the software used (NVivo) and the chosen data for analysis were crucial for a more accurate study of the current context.

This is stated because a purely manual analysis was not used; instead, a tool traditionally employed in various fields for qualitative research brought more reliability to the diverse data collected. This data included the experiences and opinions of the brands, details of the work they perform, their communication with consumers, supported initiatives, and samples of products and raw materials, all of which were recorded by the authors of this research.

Regarding the results, it was noticed that the analyzed brands, even those with limited knowledge of sustainability, such as Brand 1, and the need for improvement in almost all of them, particularly in waste management, have initiatives related to this theme. In some brands, this is more evident, such as Brand 3 and Brand 5, but it is clear that, at the local level, efforts to have sustainable standards encompassing at least a substantial portion of the life cycle of a garment are already a concrete reality in most cases. As for other aspects, there is also a need for improvement, especially in terms of greater involvement with the local community for development, collaboration with organizations like universities to apply research results in the fashion market, and granting consumers greater freedom for co-creation to establish a real bond with clothing items. Additionally, it is necessary to further utilize and lower the costs of emerging technologies to make them more accessible. There is also room for more partners to work from home to establish it as an achievable working environment.

However, when analyzing the questions and responses, even though they were more comprehensive and robust than expected, as they provided details that were not directly asked for, it is clear that a new round of questioning is necessary. This will be conducted to address the research question fully, that is, to understand aspects related to: the integration of local culture into the project and manufacturing, the ergonomics of working from home, sharing resources/machinery with other local producers, future plans, and other relevant factors.

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