

CREATIVE ECONOMY AND THE QUINTUPLE HELIX INNOVATION MODEL: A CRITICAL FACTORS STUDY IN THE CONTEXT OF REGIONAL DEVELOPMENT

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Abstract. Creative economy is the area of knowledge that explores the intangible and symbolic aspects and feeds on creative talents, individually and/or collectively organized, in order to produce creative goods and services. This type of economy has its own dynamics, and it disturbs the traditional economic models. This study investigated creative economy comprehensively and aims to analyze the critical factors inherent in the dynamics of creative economy for regional development, considering the helix model of innovation (quintuple helix innovation model), aligned with entrepreneurship and innovation. To this end, the methodology used was systematized exploratory research, treated within three dimensions – the economic-financial, the socio-anthropological, and the techno-innovative. The conclusion of the study was the identification of fifteen critical factors, the direct creative economy relationship with the quintuple helix innovation model in all its helixes, as well as its “Mode 3” of the dynamics of knowledge generation, creation, and dissemination. The study also highlighted the importance of creative economy as one of the “engines” of regional development, in an economic, financial, social, technological, and sustainable way, driven by the government, its networks, and its actors.

Keywords: creative economy, entrepreneurship, helix model of innovation, innovation, quintuple helix innovation model, regional development, technologies.

Introduction

Economies of many countries are undergoing significant structural changes on account of the traditional industries are replaced by services sector and innovation. Subsequently, the knowledge economy has experienced a fast transformation, because of innovation, to a creative economy (Żelazny, 2017). In this “modern economy”, creativity is believed “not only as a key factor in the economy competitiveness of the country, but also a development vector, connected to the formation of the individual and society” (Shvydanenko et al. 2019, p. 128).

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The traditional triad (triple helix model of innovation, THMI) formed by university–industry–government, the helix model of innovation (HMI), has also undergone transformations. The HMI has been strengthening with new knowledge generation models, based on media and public culture – civil society (quadruple helix innovation model, QUAHIM) and environment (quintuple helix innovation model, QUIHIM), as important helixes in the innovation dynamics (Ap da Costa Mineiro et al., 2018).

Discussions related to creative economy, according Machado de Aragão et al. (2017) had come about in the 2000s. This creative society is an evolution of information and knowledge society. It is a progress of development founded on technology and its application to creativity and specialization (Reimeris, 2016). Nevertheless, people tend to respond to external conditions in an arbitrated way of their values, culture and even individual, subjective and objective perceptions and their intentions (Labanauskas, 2020).

The technologies role is not only a way to facilitate the ideation progress, but it also actually helps to build ideas and promote varied plausible actions (Rudnicki, 2021). These technological advances have not only transformed work, they can be considered as drivers of new forms of creativity and innovation (Jahan et al., 2015).

Creative economy has been considered a strategic pillar for the development of distinct countries and continents for the 21st century, becoming a relevant element to be problematized and understood as a result of its connection with local miscellaneous elements. Entrepreneurship, creativity and innovation go hand in hand as a pillar to the development of creative products encouraging the creation of new niches, as well as generating opportunities for local and regional development (Closs & Rocha de Oliveira, 2017; Lima Guilherme & Gondim, 2018).

However, according to Scott et al. (2018), over the last two decades, political and academic interests in the economic growth of the cultural sector have increased sharply in many countries. There have been shifts in the focus of cultural policies, prioritizing creativity explanation value more than cultural public value dimension.

Therefore, an updated approach is needed to understand better overall dynamics of the creative sector that appreciates creativity, diversity, experience, flexibility, autonomy, collaboration, communication, networking and self-motivation. Owing to this, the need to invent more appropriate tools is suggested instead of applying the same quantitative macroeconomic indicators, used in the traditional area (United Nations, 2010).

In the United Nations (UN) Educational, Scientific and Cultural Organization's and UN Development Programme's (2013) special report, it has been observed recommendations on creative economy opportunities through "ten keys to creative economy development" that is crucial to that study. A particular highlight for the "sixth key" which addresses the need to analyze critical success factors creating (new) paths for the regional creative economy development.

Being this study aim as introductory point of a scientific modeling research, the critical factors identified with the studies convergence found in the literature on creative economy together with a HMI analysis, are extremely useful and can still corroborate to understand national competitiveness oscillation, international trade, and socioeconomic development. The studies' significance on creative economy scope and thematic understanding that involve

entrepreneurship, creativity and innovation are strongly valuable for society and their public policies makers. From this perspective, this article conducts an explanatory investigation within three dimensions – economic-financial, socio-anthropological and techno-innovative, through a systematic literature review that, in fact, contributes to provide mechanisms and/or evaluation, *i.e.*, a new conception that can collaborate with actions in regional public policies.

This article was structured from this presentation and contextualization – introduction, and then showing, the theoretical exposition of literary scope – theoretical framework, where the creative economy and HMI are reported, following with research methodology, surveyed results, study conclusions and, finally, references.

1. Theoretical framework

1.1. Creative economy

The creative economy, as term in itself, emerged in 2001 with the publication of Howkins' (2001) book *The Creative Economy: How People Make Money from Ideas* about the relationship among creativity and economy. Howkins was titled “father of creative economy”, mentioning that creativity and economy are not new things, but the nature and extent of this connection that is the novelty, which combined create extraordinary value and wealth. He also emphasized the fact that it is possible to earn some (a lot) remuneration by turning ideas into profitable business (United Nations, 2010; Machado de Aragão et al., 2017; Skavronska, 2017).

To Howkins (2012), the creative economy is linked to cognitive, knowledge capital. The UN (2010, p. 10) report presented creative economy as “an evolving concept based on creative assets that potentially generating economic growth and development” and formulated five definition points where creative economy:

1. It can foster income generation, job creation and export earnings while promoting social inclusion, cultural diversity and human development;
2. It embraces economic, cultural and social aspects interacting with technology, intellectual property and tourism objectives;
3. It is a set of knowledge-based economic activities with a development dimension and cross-cutting linkages at macro and micro levels to overall economy;
4. It is a feasible development option calling for innovative, multi-disciplinarity policy responses and interministerial action;
5. At the heart of the creative economy are the creative industries.

The creative economy is the economy of the intangible, the symbolic that feeds on creative talents, organized individual or collectively in order to produce creative goods and services that are defined by abundance rather than scarcity. It has proper dynamics and baffles traditional economy models in multiplier and dynamic effects. This economy type comprises collaborative processes among creativity, technology, and business. At this point, it reaches functional products and services, which encompass formal and informal activities, as well as (non-) industrial sectors (Ministério da Cultura, 2011; Kon, 2016; Nogueira de Paiva Britto, 2016).

For Kačerauskas (2015), in creative economy, the intersection areas of technologies, creation and economy forms a central and triple-layered zone. Such an intersection results from economic and technological development that only becomes possible because of creative outcomes on engineering or economy areas; while economy and creation use specific technologies, the creation develops on account of certain economic relations.

The pillars of creative economy, according to Kačerauskas (2012), are: creativity, business, law, media, entertainment, industrial and electronic technologies. Creative economy also approaches various social aspects, including sociology and psychology of knowledge, consumer strategies and tactics (cultural mediation), financial levers and idea-based economy, business models, intellectual property law, technology (media changes), shaping national strategies and trainings (in education systems).

Comunian and Faggian (2014) mention creative economy has two approaches. The first is based on “creative industry”, which focuses on company, where these key players in the economic growth process help and support creative class (Florida, 2002). The second approach is “creative class” which focuses on the individual. These individuals are workers in a creative occupation, who contribute to local economic growth by spreading an open and dynamic environment. However, for Schlesinger (2017), there are more concepts involved, such as: creative cities, creative innovation, creative skills, creative education, creative ecology, and digital creative economy.

The UN Conference on Trade and Development (2009) classified the creative sectors into nine areas, gathered into four categories: heritage, arts, media, and functional creations, illustrated in Figure 1, below.

The UN (2010) updated and described in their report the explicated categories in Figure 2, placing the creative industry at the center of creative economy functional relations regardless of how they are defined and classified. Siregar et al. (2017, p. 501) claimed that creative industries are located “at the heart what of can be broadly classified as a creative industry”.

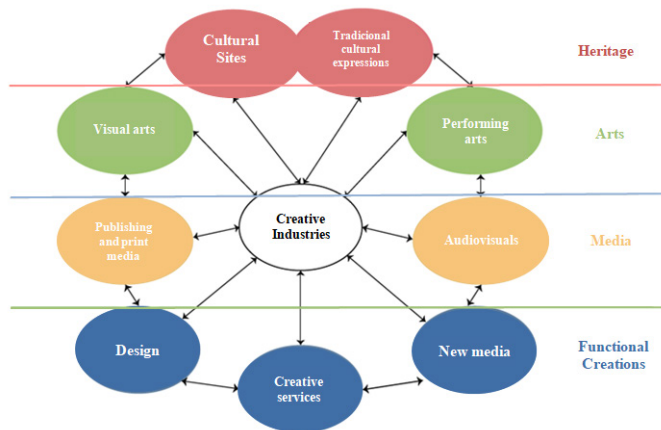


Figure 1. Classification of creative industries (source: created by authors with a base on United Nations Conference on Trade and Development, 2009)

It is observed that in the first group of Figure 2, heritage is considered as a beginning of all art forms and the soul of cultural and creative industries, bringing together cultural aspects and the historical, anthropological, ethnic, social and aesthetic elements. This first group is subdivided into two concepts: traditional cultural expressions, such as crafts, festivals and, celebrations; and cultural sites, which refers to archeological sites, libraries, museums, exhibitions, *etc.* The second group, the arts, is based on art and culture, purely as such. The artwork is inspired by heritage, symbolic meaning and identity values, its subgroups are: visual arts, such as paintings, photographs, sculptures and antiques; and performing arts, such as live music, dance, theater, puppetry, circus, opera *etc.* (United Nations, 2010).

Following this, the third group is media. This group is reasoned on creative content production aimed to establish communication with (large) audiences and is subdivided into: publishing and print media like books, press and other publications; and audiovisuals, such as television, movies, radio and other broadcasting. Finally, the last group is functional creations, consisting of service-oriented and demand-driven industries, such as products and services creation that have functional purposes, and is subdivided into three subgroups: design, such as interiors, fashion, graphics, jewelry, toys; new media like architectural, advertising, recreational, cultural, creative research and development (R&D), and other digital creative services (United Nations, 2010).

Skavronska (2017) mentioned that a comfortable environment that enables the combined involvement of a natural environment, artificial background, and exciting and energetic atmosphere encourage creative industry growth, offering people from diverse cultural and social groups the possibility of communicate themselves, connecting and collaborating with each other. According to de Figueiredo and Santos Vieira de Jesus (2020), the multiple creative skills are not only useful for cultural activities; on the opposite, creative economy professionals have huge potential to work in various sectors of economic activity, strengthening innovation capacity.

From the perspective of sustainable, creative economy in its character and cultural relevance, has an important role as a development mechanism in the global development agenda, to sustainable development goals. This happens in relation to cultural and creative industries, which besides playing a crucial role in the production of new ideas and technologies, also contribute socially in a non-monetized way (Olmedo Barchello, 2017). Thus, it becomes an alternative for developing countries to produce goods and services with high added value. In other words, without harming the environment and still bringing benefits to local cultures, such as lifestyle, folklore and arts, imaginary and, what is more, knowledge (Closs & Rocha de Oliveira, 2017; Quadrado Closs & Rocha de Oliveira, 2018).

1.2. Helix model of innovation

The HMI was initially built to conceptualize innovation system. Its first model is the double helix model of innovation that shows interaction among academic institutions and industries. From this construction, it was observed the possibility of generating alternative strategies for economic growth and social transformation considering different and potential ways of relations between varied spheres (Etzkowitz & Leydesdorff, 2000; Carayannis et al., 2020).

The THMI, proposed in 1995 by Etzkowitz and Leydesdorff, explains the technological innovation dynamic from the interaction between three main actors: university, industry, and government. The different institutional arrangements of existing relationships are reflections of innovation systems evolution and this three-way interaction (Etzkowitz & Leydesdorff, 2000; Ap da Costa Mineiro et al., 2018).

A first model within THMI is the THMI-1 where the nation–state encompasses university and industry, guiding the interaction each other. Whereas, THMI-2 consists of separate spheres, with huge boundaries and dividing circumscribed between them; and THMI-3 is a knowledge infrastructure in terms of overlapping spheres, each taking the role of other with emerging hybrid organizations at the interfaces (Etzkowitz & Leydesdorff, 2000). These three models are illustrated in Figure 2, below.

Many countries and localities trying to achieve the THMI-3, aimed to perceive university innovative environment, trilateral initiatives for knowledge-based economic development besides strategic alliances among large and small firms, from different areas, varied technology stages, academic research groups and government laboratories (Etzkowitz & Leydesdorff, 2000).

The THMI focuses on production and knowledge use within the context of government–university–industry relations. Nevertheless, such model highlights intention to contribute to the patterns of social structures, with emphasis on the relevance of other helices. However, the dynamic of helices interaction, in relation to generation, creation, and diffusion of knowledge is approached in three distinct forms. The THMI is connected to “Mode 1” ideas and knowledge production of “Mode 2” (Etzkowitz & Leydesdorff, 2000; Carayannis & Campbell, 2009, 2010; Ap da Costa Mineiro et al., 2018). Chart 1 in Table 1 demonstrates these action modes.

The QUAHIM extends the THMI by adding on government, university and industry a fourth helix based on media and public culture, which also include values and their different systems. Therefore, it helps to build a knowledge democracy replete with political citizens,

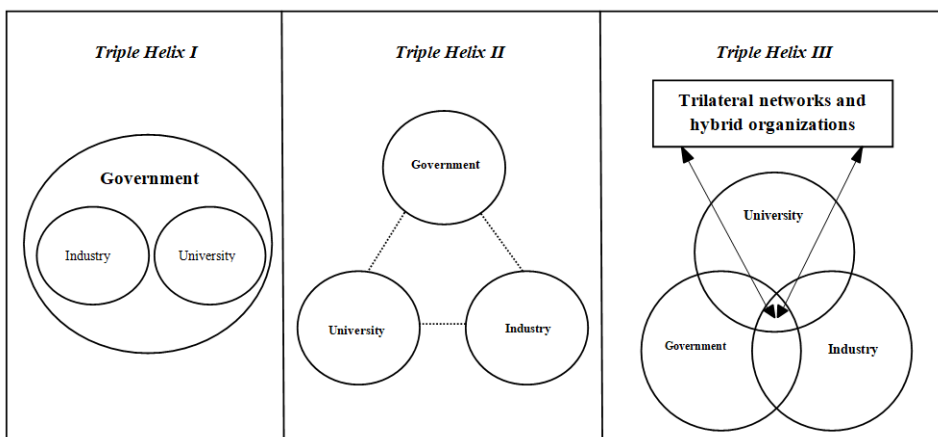


Figure 2. Models of triple helix model of innovation: triple helix model of innovation 1, triple helix model of innovation 2 and triple helix model of innovation 3 (source: created by authors with a base on Etzkowitz & Leydesdorff, 2000, p. 111)

Table 1. Chart 1: dynamic of helix interaction (source: created by authors with a base on Etzkowitz & Leydesdorff (2000), Carayannis & Campbell (2009, 2010), Carayannis et al. (2018))

Dynamic of generation, creation and diffusion of knowledge on helix model of innovation (the helix interactions modes)	
MODE 1	<ul style="list-style-type: none"> – A knowledge production model at universities. – Compatible with linear innovation model, where: <ol style="list-style-type: none"> 1. There is basic research at university; 2. Convert fundamental investigation on applied research of intermediary organizations (institutions related from university); 3. Firms take and transform applied investigation on experimental development, so it is introduced as commercial market applications. – Applied in triple helix model of innovation.
MODE 2	<ul style="list-style-type: none"> – It is a model focuses on knowledge application and conflict resolutions, based on knowledge. – It is involved four principles: <ol style="list-style-type: none"> 1. Transdisciplinarity; 2. Heterogeneity and organizational diversity; 3. Social responsibility and reflexivity; 4. Quality control. – Compatible with non-linear innovation model: knowledge production systems. – Triple helix model of innovation referred to “Mode 1” ideas and knowledge production of “Mode 2”.
MODE 3	<ul style="list-style-type: none"> – It is a model that consists on network of clusters knowledge and innovation to knowledge creation, diffusion and utilization, extending the “Mode 1” and “Mode 2” concepts. – Non-linear innovation models in the multiple stages context of innovation systems. – Incorporate fourth actor: civil society. – It allows and emphasizes the coexistence and coevolution of distinct knowledge and innovation paradigms. – Expand the “Mode 1” to “Mode 2”, in a conceptualized, dynamic and complex helical way. – Applied to quadruple helix innovation model and quintuple helix innovation model of helix model of innovation.

holder of knowledge. Soon, this fourth helix adds media and culture perspectives in addition to civil society (Carayannis & Campbell, 2009, 2010; Ap da Costa Mineiro et al., 2018).

In the following Figure 3, it is seen this QUAHIM concept and description of respective helix namely: first helix – academia/universities; second helix – industry/business; third helix – state/government; fourth helix – civil society, based on media and public culture, communication means, creative industries, culture, principles and lifestyle.

As it is a THMI extension, according Carayannis and Campbell (2010), the QUAHIM can be used to research questions out of focus, *i.e.*, government–university–industry. Knowledge, innovation strategies and politics are now supported by communication strategies through communication means (media), influenced by culture and values. Art transcends to foster

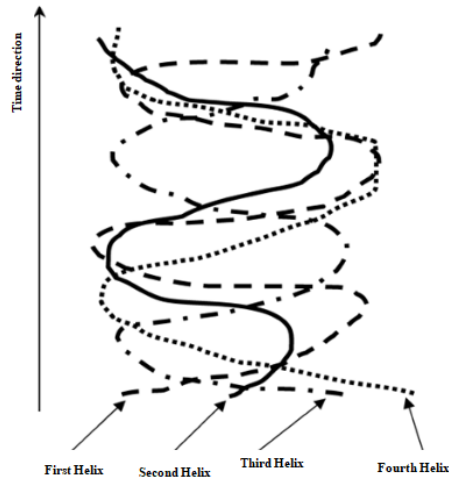


Figure 3. The quadruple helix innovation model (source: created by authors with a base on Etzkowitz & Leydesdorff (2000), Carayannis & Campbell (2009))

creativity, which results in new forms of knowledge and innovation, supporting and pointing out opportunities of coevolutionary learning and recognizes society role as ways to achieve goals and objectives (Ap da Costa Mineiro et al., 2018).

QUAHIM interacts with “Mode 3” (Table 1). The production system knowledge, consisting of innovation networks and clusters knowledge for knowledge creation, diffusion and utilization, is a multilayered, multimodal and multilateral system that mutually encompasses, complements and reinforces these innovation networks and clusters; consisting of human and intellectual capital to social capital form and supported by financial capital. Thus, this interaction emphasizes an innovation ecosystem that encourages the coevolution of distinct knowledge and innovation modes (Carayannis & Campbell, 2009; Carayannis et al., 2018).

Afterwards, this fourth helix – civil society – is perceived as innovation user. These users are in the model center and stimulate innovation processes. Definitely, it connects and trains innovation co-creators as inventors, entrepreneurs, artists and other value generators that reinforces ecosystem (Carayannis & Campbell, 2009, 2010; Ap da Costa Mineiro et al., 2018).

The QUIHIM is a fifth helix model that incorporates QUAHIM by adding environment helix. Therefore, knowledge and innovation are connected with the environment (natural ambience), including social ecology resources, which refers to the sustainable development scope and social ecology (Carayannis & Campbell, 2010; Harwiki & Malet, 2020).

The following Figure 4 illustrates the QUIHIM concept, where the natural environment and society’s natural environment compose the fifth part of this system. It encompasses government, university, firms, civil society (media/culture), and natural environment (natural resources) (Carayannis & Campbell, 2010).

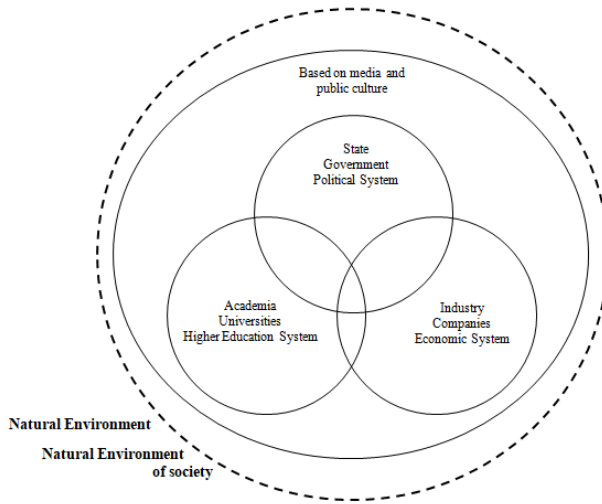


Figure 4. Quintuple helix innovation model (source: created by authors with a base on Etzkowitz & Leydesdorff (2000), Carayannis & Campbell (2009))

The description of role or assignment of each helix is briefly presented in Table 2, below.

Table 2. Chart 2: quintuple helix innovation model (source: created by authors with a base on Etzkowitz & Leydesdorff (2000), Carayannis & Campbell (2010), Harwiki & Malet (2020))

Helix	Synthetizing the aspects of the quintuple helix innovation model
Government	Performs an (important) role on knowledge transfer and assistance to improve creative industries.
Universities	Technology transfer centers as well as provision of human resources and knowledge.
Industry	Promote business incubators and commercialization of knowledge, supporting companies to reach their goals.
Civil society	Contribute formally to management participation and organization of environment and processes, based on culture and communication means.
Natural environment	Provide people with natural capital (or human), resources, plants, animals for the sustainable development.

This QUIHIM model has an interdisciplinary and transdisciplinary structure, according Carayannis and Campbell (2010), who also affirm the complexity of this structure provoke necessity of a/an (full) analytical comprehension of all helices and ongoing disciplinary involvement from natural sciences to social and human sciences. The transdisciplinarity can be used as a reference overview for decision making in relation to knowledge, innovation and environment (natural). Thus, the add of this fifth helix provides creation of (constant) knowledge, production, application, diffusion and utilization as well as innovation that are booster aspects of sustainable development, promoting eco-innovation and eco-entrepreneurship on current and future sphere (Carayannis & Campbell, 2010; Harwiki & Malet, 2020).

In the QUIHIM, its interaction model (Table 2) is a “Mode 3” which accentuates hybrid combinations and possibilities of “Mode 1” (basic research) and “Mode 2” (applied and trial research). Therefore, the cross-learning among modes in “Mode 3” smooths the edges, seen at Schumpeter (2017) studies about “creative destruction” in the economic-technological sphere, providing non-linear systems in benefit of creative-learning and creative-coevolution (Carayannis & Campbell, 2009, 2010).

Carayannis et al. (2020) mention innovation and entrepreneurial actions generate diversity and productivity among companies resulting on the reorganization of their actions, due to competitive pressures. Indeed, a significant component of environment to expand innovation is the relation between politic institutions, corporative, and academic institutions.

Because of it, HMI becomes useful to understand national competitiveness oscillations, international trade, and economic development; as well as QUIHIM, which in its dynamics and relationship comprehension, can provide innovation and socioeconomic development.

2. Methodology

According to Constant Vergara (2016), there are many taxonomies research types that seek within scientific investigation to rank research type, its concepts and justifications. As a result of it, the current study conducts an exploratory investigation with qualitative approach through a systematic literature review based on Freire Galvão et al. (2015) and Moreira Rodrigues et al. (2019) studies. Then, this data survey enhanced the identification of convergences in the literature on creative economy in relation to regional development, aligned by entrepreneurship and innovation. The sample consists of scientific publications on creative economy from 2010 to 2020 period, based on published materials in scientific publications (sources and journals).

The research was performed in five steps. At the first, a guiding question was elaborated for using on search field of scientific productions data bases. Secondly, inclusion and exclusion criteria were applied as well as eligibility verification. Thirdly, studies included were analyzed aimed to substantiate the identification of research constructs. At the fourth step, creative economy criticality factors were recognized in relation to regional development. Finally, the last phase was an explanative table elaboration with this critic points and authors identification.

For such methodology, the criticality factors recognized were classified on three dimensions:

1. Economic-financial dimension is treated as the union of the economic and financial dimensions, comprising public policies. The economic dimension approaches of the concern “with development of an economy that has purpose to generate better quality of life for people with lowest possible environmental standards”, according to Schmitt Siqueira Garcia (2016, p. 151); and economy activity, to Ricardo Correa (2015, p. 79) explains about “set of activities developed by humans in favor of production, distribution, and goods and services consumption necessary for survival and quality of life”. As for the financial approach, according to Gomes dos Reis et al. (2014), it refers to revenues and expenses, how they are structured and, the commitment with main

parties involved in expenses and obligations. In this sense, this dimension also deals with the involvement of money (financial contribution) in business;

2. Socio-anthropological is the union of the social and anthropological dimensions. Human capital, according to some authors (Beni et al., 2012) is considered as the social dimension and, so, the social aspect related to human qualities, such as: skills, experiences, and dedication. It might be internally to organizations and externally linked to community and human rights. As for the anthropological aspect, from the perspective of Botelho (2001), it establishes that social interaction is produced by culture, its elaborate way of feeling and thinking. In addition, it forms values, managing identity and diversity and, also establishing routines. Thus, the anthropological aspect is interpreted as small worlds built by individuals, who can assure them, in social coexistence, stability and balance (Fernandes, 2007);
3. Techno-innovative dimension seeks to determinate some convergence among technology and innovation. Teixeira da Silva (2003) approaches technology in a product development aspect as well as idea transformation process, technologies and market data into new knowledge for the generation of products and services and, what is more, new or already known technologies. Therefore, this “novelty” implies the innovation part, here namely as innovative. Marcovitch (1999) mentions in his study especially this accentuation of innovation linked to technological aspect, considered as a multiplying tool and, yet one of the best alternatives for business expansions.

3. Results

To identify criticality factors, convergences had been verified in scientific studies published in database on creative economy theme within regional development, aligned to entrepreneurship and innovation. Hence, this systematic literature review resulted in five steps:

- a) Guiding question: it sought through a question to recognize possible keywords for the search at database. The structured question in this study was: “What is the relationship between creative economy and entrepreneurship, regional/local development and innovation?”;
- b) Keywords identified (identification): they were “creative economy”, “entrepreneurship”, “regional/local development”, and “innovation”, which resulted in the expression: “creative economy and entrepreneurship and development and innovation”, used in search fields at the *Scopus (Elsevier)* and *Web of Science (WoS, Core Collection)*, but only the expression “creative economy” at the *Scientific Electronic Library Online (SciELO)* base since the full expression did not allow for a significant collection in as much the quantity of scientific productions was concerned. Although, it is essential to highlight that lack of “OR” in this expression had been embraced in a strategic manner, aimed to secure specific productions on this study theme. Access to these databases had been provide through Federated Academic Community on the Journal Portal of the Coordination for Improvement of Higher Educational Personnel/Ministry of Education (Brazil) in June, 2020;

- c) Inclusion and exclusion criteria (selection): Every publication from 2010 to 2020 originally published in English, Spanish and Portuguese were included. After that, every non-scientific article publications were excluded given that they did not undergo a strict peer-review process. Moreover, all those that were not open access, *i.e.*, free access to the content, were also excluded. Above all, during exclusion process, the crossing between databases was performed to identify productions in duplicity;
- d) Eligible productions quality (eligibility): the eligible scientific productions were screened and verified by reading and analyzing titles, abstracts, and keywords analysis; and some of them were excluded as a result do not attend the study purpose;
- e) Analysis of included studies (inclusion): As a consequence of systematized review, these studies were read integrally in order to identify convergences in the literature and thus collect research constructs addressed namely criticality factors inherent to the creative economy and its dynamics in regional development.

Thus, 218 scientific productions were identified at the three databases used in systematized exploratory research, as shown in Table 3. However, only 30 scientific articles were included in these study analyses, *i.e.*, selected articles fully read. The data spreadsheet was created in *Microsoft Excel* program to summarize main information in order to identify the critic factors.

Table 3. Systematic literature review (source: created by authors)

Identification	Total founded in the bases		Scopus	WoS*	SciELO**	Total
			94	83	41	218
Selection	Inclusion criteria	Publication year: from 2010 to 2020	75	77	39	191
		Languages: Portuguese, English and Spanish	72	74	38	184
	Exclusion criteria	Type: every non-scientific article	36	35	36	107
		Access: every that were not open/free	15	10	20	39
Eligibility	Analysis of title and abstract, and the crossing among bases to remove duplicated studies		15	4	20	39
Inclusion	Total included		9	2	19	30

Note*: WoS – Web of Science.

Note**: SciELO – Scientific Electronic Library Online.

Undoubtedly, the scientific articles from the total result of included studies emphasized that creative economy theme is at an international scope due to their publications in distinct countries. These articles were originally published in English (42%), Portuguese (39%), and Spanish (19%) as a result of systematized research in following databases: *Scielo* (60%), *Scopus* (30%), and *WoS* (10%). Such articles presented the largest proportion in years below: 2017 (32%), 2016 (22%), 2018 (16%), 2019 (11%), 2015 (7%) and 2010, 2013 and 2020, each with 4%.

These included articles presented, in relation to research methodology, 83% qualitative method and 17% qualitative-quantitative method. The research approaches were: field or case studies (and multiple); exploratory, descriptive, observational, field, bibliographic and documental research; and, bibliographic, documentary and/or literature reviews. The tools used were: bibliographic, documental and statistics analysis (also descriptive with mapping, SWOT (strengths, weaknesses, opportunities, threats) analysis, discriminator and SPSS); and in-depth interviews – individual, semi-structure with questionnaire, content analysis, second source, applied statistics, fuzzy cluster and observations.

Indeed, these studies analysis provide Chart 3 in Table 4 elaborations – proposal of this study – with critic factors connected to these identified convergences in the literature, presented in three dimensions that approach this study scope: economic-financial dimension, socio-anthropological dimension, and techno-innovative dimension.

Table 4. Chart 3: dimensions and criticality factors of creative economy (source: created by authors)

Economic-financial dimension
<p>Economic transformation: Creative economy as an “engine” part of transformation, contribution, and economic growth (also cultural and sustainable) of a locality, region and/or nation (Yúdice, 2019; Pancheri Teixeira et al., 2019; Pereira de Castro Pacheco & Benini, 2018; Adebola Abisuga Oyekunle & Sirayi, 2018; Quadrado Closs & Rocha de Oliveira, 2018; Lima Guilherme & Gondim, 2018; Maimon Schiray et al., 2017; Pereira de Castro Pacheco et al., 2017; Adebola Oyekunle, 2017; Closs & Rocha de Oliveira, 2017; Santos Vieira de Jesus, 2017; Meyer et al., 2016; Kon, 2016; Héraud, 2021; Sampaio Rodrigues Grazinoli Garrido & Vasconcellos Amaral, 2016; de Amorim Barbosa & Salett Tauk Santos, 2015; Bostaph, 2013; Foster, 2010).</p>
<p>Partnership: The involvement of (national or international) agents and institutions as stimulators and generators of transformation through networks, partnership, infrastructure, formal support with (public or private) corporations; promoting the creative economy development in a region, locality and/or nation (Sleuwaegen & Ramboer, 2020; Pancheri Teixeira et al., 2019; Santos Vieira de Jesus, 2017).</p>
<p>Income generation: The creative economy potential in the growth and development of income generation in a region, locality or even specific individuals (Valdivia López & Rodríguez Luna, 2019; Maimon Schiray et al., 2017; Pereira de Castro Pacheco et al., 2017; Kon, 2016).</p>
<p>Employability: The possibility, potential, and evolution in the creative economy empregability in varied territorial stages, providing increased employment and remuneration; resulting on economic growth to a region/locality or even a nation (Valdivia López & Rodríguez Luna, 2019; Maimon Schiray et al., 2017; Pereira de Castro Pacheco et al., 2017; Adebola Oyekunle, 2017; Kon, 2016; Nogueira de Paiva Britto, 2016; Sampaio Rodrigues Grazinoli Garrido & Vasconcellos Amaral, 2016; Quadrado Closs & Rocha de Oliveira, 2018).</p>
<p>Public power: Actions and importance of public authorities in the creative sectors, territories, and cities; proposing, promoting and implementing public policies that an impact on economic development at regional and local levels (Sleuwaegen & Ramboer, 2020; Yúdice, 2019; Pancheri Teixeira et al., 2019; Pereira de Castro Pacheco & Benini, 2018; Adebola Abisuga Oyekunle & Sirayi, 2018; Quadrado Closs & Rocha de Oliveira, 2018; Lima Guilherme & Gondim, 2018; Maimon Schiray et al., 2017; Pereira de Castro Pacheco et al., 2017; Adebola Oyekunle, 2017; Closs & Rocha de Oliveira, 2017; Santos Vieira de Jesus, 2017; Meyer et al., 2016; Vaz de Melo & Leite Paiva, 2016; Kon, 2016; Héraud, 2021; Nogueira de Paiva Britto, 2016; Foster, 2010).</p>

End of Table 4

Socio-anthropological dimension
<p>Contact networks: The connections and associations among people, public or private institutions that enable to develop and extends business and creative activities (Sleuwaegen & Ramboer, 2020; Maimon Schiray et al., 2017; Machado Cabral Melo, 2017; Olmedo Barchello, 2017; Bianchini Galuk et al., 2016).</p>
<p>Creative intelligence: Agents-individuals with the ability to understanding (specific) knowledge, taking part of a distributed intelligence architecture and acting as a catalytic interface between other actors of innovation system in the creative economy (Sleuwaegen & Ramboer, 2020; Wen, 2017; Muzzio, 2017; Héraud, 2021).</p>
<p>Diversity: The shared knowledge, skills, tradition, costums, and cultural values (cultural/creative diversity) enable and develop creative economy competitiveness; reducing costs, leading to better livelihood, and income generation opportunities (Sleuwaegen & Ramboer, 2020; Adebola Oyekunle, 2017; Olmedo Barchello, 2017).</p>
<p>Inequality: Creative economy, in specific contexts, contributes to the reduction of social discrepancies or emphasizes them (de Amorim Barbosa & Salett Tauk Santos, 2015; Nogueira de Paiva Britto, 2016).</p>
<p>Entrepreneur: The entrepreneur image (human capital) playing an important (or central) role in the creative economy (Oliva Abarca, 2018; Park, 2017; Machado Cabral Melo, 2017; Héraud, 2021; Ruiduit Garcia, 2015; Foster, 2010).</p>
Techno-innovative dimension
<p>Diffusion: The dissemination of innovations, including organizational innovations; promoting new technologies and also new skills (Sleuwaegen & Ramboer, 2020; Muzzio, 2017; Foster, 2010).</p>
<p>Knowledge: The importance of knowledge, especially in its management, to a creative economy development, diffusion and growth (Muzzio, 2017; Héraud, 2021; Foster, 2010).</p>
<p>Information: The relevance of the flow of CE ideas, information and data (Muzzio, 2017; Héraud, 2021).</p>
<p>Co-participation: In creative economy, customers, consumers or participants (social actors/human capital), in some situations or cases, can take part to the production or service creation; thus, contributing to the generation of new products, creative concepts and, even communitarian legacy (Sleuwaegen & Ramboer, 2020; Wen, 2017; Maimon Schiray et al., 2017; Bianchini Galuk et al., 2016).</p>
<p>Research and development: The relevance of research and development of products and services in the creative-technological-innovation area and, also the involvement of agents-individuals and institutions (Kon, 2016; Héraud, 2021; Sampaio Rodrigues Grazinoli Garrido & Vasconcellos Amaral, 2016; Foster, 2010).</p>

Hence, the chart 3 presents 15 critic factors identified in relation to creative economy in regional development sphere, which are: economic transformation, partnership, income generation, employability, public power, contact network, creative intelligence, diversity, inequality, entrepreneur, dissemination, knowledge, information, co-participation, and R&D.

Subsequently, these criticality factors have a dynamic relationship with QUIHIM (Chart 2 in Table 2) and “Mode 3” (Chart 1 in Table 1), as treated in theoretical framework of this study. The Figure 5, below clarifies this creative economy interaction with the five helixes of the QUIHIM/HMI and their respective critical factors.

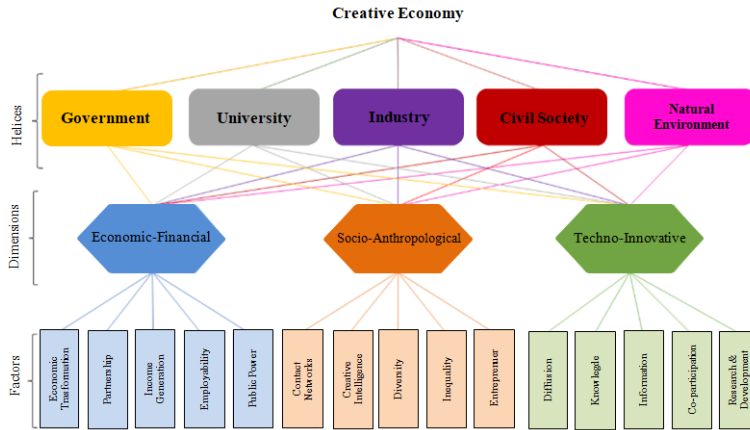


Figure 5. Creative economy graphic representation in relation to quintuple helix innovation model/helix model of innovation, their dimensions and criticality factors (source: created by authors)

The QUIHIM and creative economy interaction (Figure 5) promote an interdisciplinary and transdisciplinary structure, supported by Carayannis and Campbell (2010) and Harwiki and Malet (2020) studies. This QUIHIM provides opportunities to the (constant) creation, application, diffusion, and utilization of knowledge besides innovation as stimulated aspects to (sustainable) development.

This study corroborates with other, for an example, Kačerauskas (2012, 2015) who presents as creative economy pillars: creativity, business, law, media, entertainment, industrial, electronic technologies and other aspects, and also the positioning of creative economy within technology, creation and economy area, whose intersection forms a central and triple layer zone. Just as Closs and Rocha de Oliveira (2017) and Guilherme and Gondim (2018) studies treat creative economy as strategic pillar for economic development and entrepreneurship, creativity and innovation are also considered as pillars to creative products development with potential to provide opportunities for local and regional development.

Conclusions

This study investigated the creative economy in a comprehensive way and aimed at analyzing the criticality factors inherent to its dynamic for regional development, considering QUIHIM of HMI, aligned to entrepreneurship and innovation.

According to theoretical framework of this study, it was possible to identify that distinct studies have already indicated to creative economy importance as one of the “engines” of regional development, in an economic, financial, social, technological, and sustainable way.

All of fifteen factors collected on study demonstrated relevance and relationship within creative economy, such as: economic transformation, partnership, income generation, employability, public power, contact network, creative intelligence, diversity, inequality, entrepreneur, diffusion, knowledge, information, co-participation, and R&D. These highlighted

criticality factors were approached within three important dimensions – economic-financial dimension, socio-anthropological dimension, and techno-innovative dimension.

Furthermore, this study also found a direct relation with the QUIHIM helixes (government, university, industry, civil society, and natural environment) and with “Mode 3” of generation, creation and diffusion knowledge dynamic in HMI, broadening “Mode 1” and “Mode 2” in a conceptualized, dynamic and complex helical way. This interaction promotes an interdisciplinarity and transdisciplinarity structure, providing opportunities for the constant creation, application, diffusion, and utilization of knowledge, stimulated aspects for social, economic, and sustainable development.

Given these findings and the relationship with the QUIHIM, this study concludes that government, universities, industries, civil society, and natural environment, together with criticality factors, need to be interconnected articulating support and stimulation measures of creative economy to contribute to socioeconomic and sustainable development. Driven by the government, its networks and its actors, technological innovation is the lever of a system whose “engine” has social, cultural, and anthropological aspects.

This study brings originality to science, corroborate with other studies and/or authors, and also contribute to provide mechanisms and/or creative economy systematic analysis to the regional development scope; thereby, it generates a new concept that can encourage with actions in regional public policies.

Considering the study limitation in relation to its qualitative analysis only, an applied investigation with scientific modeling tools is suggested, for instance fuzzy analytic hierarchy process and other non-parametric methods, which tend to an investigation close to reality. This study has not depleted the theme and it might be answered or adapted itself in different spheres and even specific sector within creative economy itself.

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