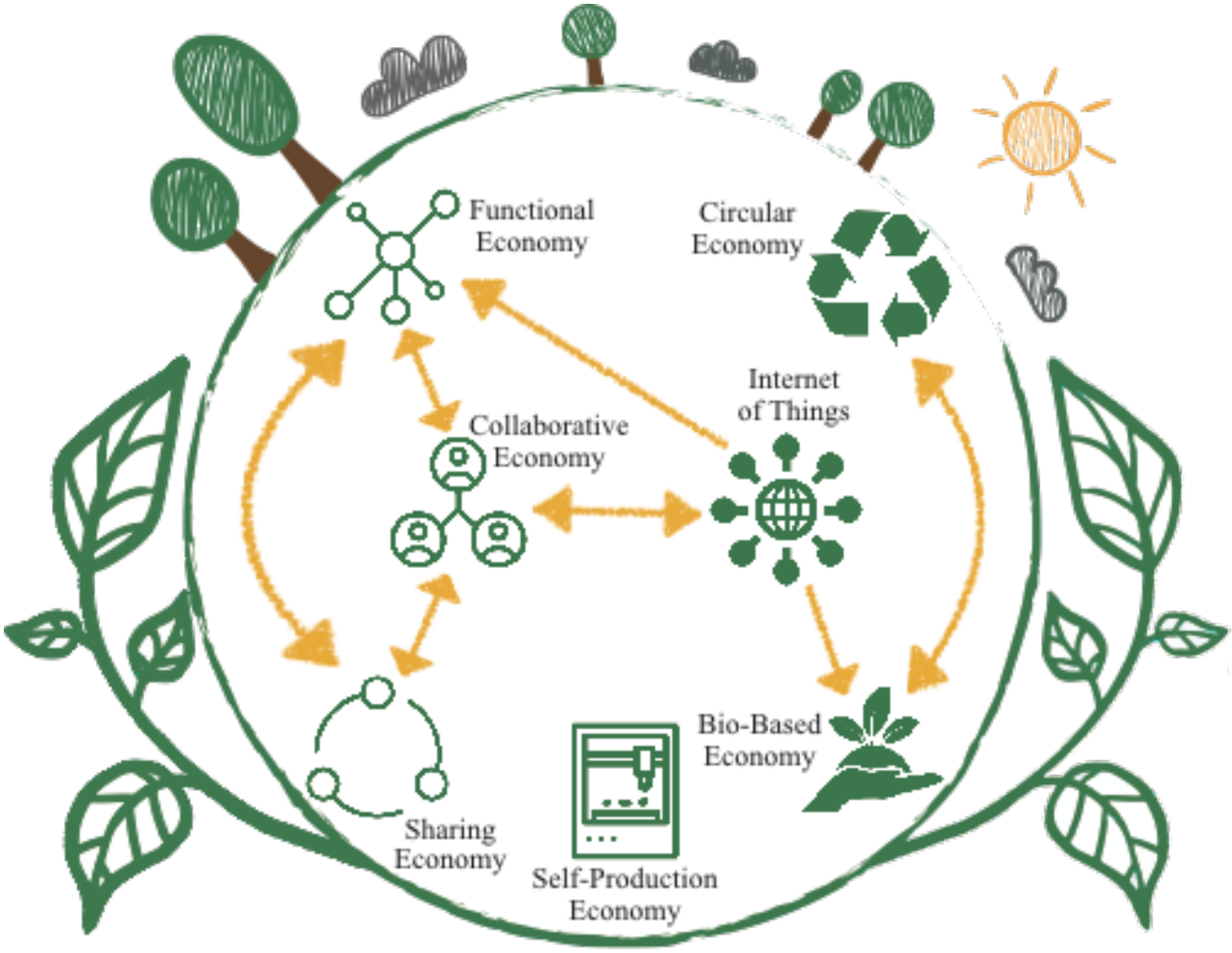
The Configuration of WEconomy trends

Exploring interrelated relations and clusters



Business Administration Master Thesis
Innovation and Entrepreneurship

Author: Nick Distelbrink
Contact: Nickdistelbrink@icloud.com
Student number: 4471202
Supervisor: Prof. Dr. J.J. Jonker
Second examiner: Dr. Ir. N. R. Faber

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I. Abstract

Recent scientific research has determined seven trends (economies) that stimulate the transition towards a more sustainable society (Jonker 2015; Wijnholds, 2015). These trends combined are called the 'WEconomy'. There are several applications of these trends within our society. It is, however, unclear how these trends contribute to and strengthen each other. The goal of this research is to gain more insight into the configuration of these WEconomy trends. This configuration consists of two parts:

- First, the relations between two trends are established.
- Second, the relations between Economy trends are used to establish clusters of multiple trends.

Since the WEconomy trends and its relations and clusters are socially constructed, two different approaches are used in order to construct a representative configuration of the trends. First, all the potential relations and clusters are defined based on a literature review. These assumptions also result in hypotheses. Second, the hypotheses are tested with quantitative research, where practitioners and experts related to at least one WEconomy trend gave their vision on existing relations and clusters. The two outcomes are compared and this resulted in a configuration of WEconomy trends, where the left side are the relations and the right side are the clusters:

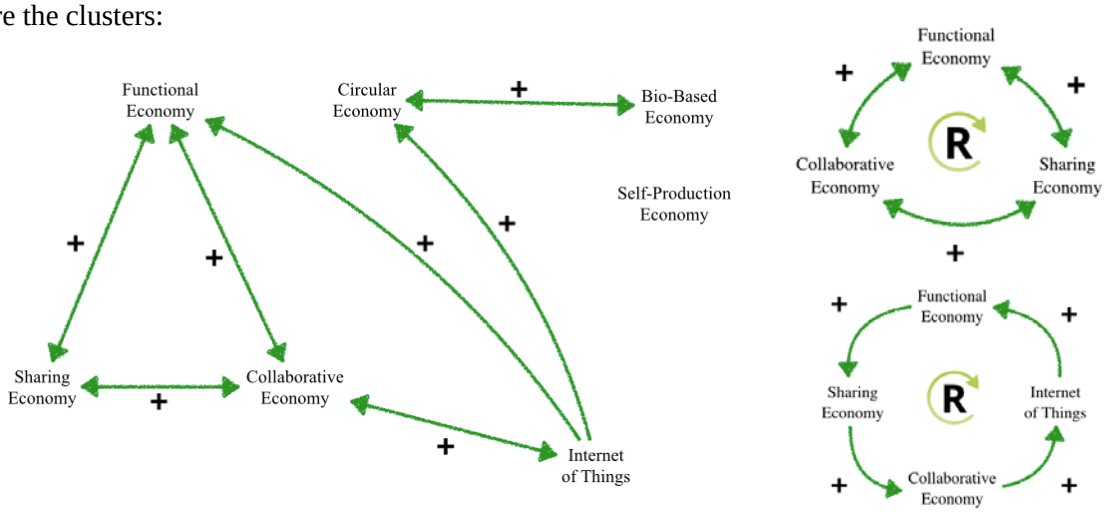


Figure I. The Configuration of the WEconomy trends

These research outcomes will need to be clarified in more detail with further research. First, it would be useful to completely define the configuration of the WEconomy. There are still undefined relations because the respondents were indecisive about these relations. Furthermore, the strengths of the relations and possible negative or balancing effects could be researched to add to the concept of the WEconomy. When the configuration of the WEconomy is further established and the concept is further expanded, it will be possible to measure the impact of the WEconomy trends, including the relations and clusters, on the business models of organizations. This approach would result in more insight in what impact the WEconomy has on the transition towards a more sustainable society.

II. Preface

Two years ago I started a pre-master in Business Administration at the Radboud University Nijmegen, after being an entrepreneur for two years. I made this choice to gain more knowledge about business-related topics to be more successful with my company or to have a greater chance of finding a fitting job in the future. Now, two years later, I can say that these years have formed me on a professional and personal level. I developed skills like critical thinking, analysing and advising further, but also developed new skills like academic writing, statistical analysing and scenario and group model building. Many of these elements are incorporated into the final assessment of the study, this Master Thesis.

The integral topic within this thesis is sustainability. While I had gathered knowledge of business models, trends and developments and innovation during my previous study and experiences as an entrepreneur, I did not know much about sustainability, and sustainable business models specifically. This research has helped me to develop my own perspective on sustainability and how particular trends can be used for creating sustainable products and services.

The goal of this research is to get more insight in the WEconomy, in this case overlapping concepts, intertwined relations and clusters. The outcome of this study is a configuration of WEconomy trends which describes how these trends interact with each other. The results of the research partially fill in the research gap that is present in the concept of the WEconomy and adds to further development of this concept. Furthermore, I think that the relations and clusters give useful insights into the possibilities for creating sustainable business models. Practitioners can use this information to create more sustainable organisations, which will eventually contribute to the transition towards a more sustainable future. This thesis offers useful insights to the practical field as well as potential societal implications for the future.

I would like to thank some people who contributed to the realisation of this Master Thesis. First, I would like to thank my supervisor Jan Jonker for his tremendous expertise on the subject(s) and his support during the project. I would also like to thank Niels Faber as an expert on the subject(s) and as the second examiner of this Master Thesis. I also owe a thank you to the 101 respondents of the survey. You offered a huge contribution to this thesis and science in general by providing your insights from the practical field. Finally, I would like to thank the lecturers of the Radboud University. You taught me the knowledge and tools necessary to be able to execute this research and write this thesis.

I sincerely hope that you, the reader, will gain more knowledge on sustainable topics, will get inspired by these topics and will use this information to become more sustainable as a person or organisation.

Nick Distelbrink, Nijmegen, 09-11-16

III. Table of content

1. Introduction

We live in an era where people, on an individual and societal level, start considering the social and ecological problems in our world as threatening. We are facing threats like resource scarcity, climate change or global warming, natural disasters, social inequality and dysfunctional economic systems. These problems are not going to solve themselves, and therefore the current generation needs to think of solutions in order to offer the next generation the same or, even better, increased quality of life.

1.1 Problem statement

Anthropocentrism is the belief that humans are the central and most significant species on the planet, while all other living things are there to sustain humanity's existence. Humans disregard animals and plants unless they provide life necessities such as nutrition, clothing, shelter and medical benefits (Nash, 1989; Kortenkamp & Moore 2001; MacKinnon 2007). The disregard of animals and plants could be measured with the ecological footprint, which measures the supply of and demand on nature (Reese, 1992). The supply side (biocapacity) represents the earth's biological productivity. The demand side (ecological footprint) represents the productive area required to provide the renewable resources humanity is using and to absorb its waste. The ecological footprint that resulted from humans' greediness has lead over the decades to massive alteration in nature's balance, as well as to many recognizable environmental crises the world is facing today (Gaston, 2005). The ecological footprint shows that anthropocentrism is often the root cause of problems in the environment. Exploitation and abuse of the natural environment to obtain resources for nutrition, clothing, shelter and medical benefits has been observed on a global scale. This exploitation and abuse results in the earlier mentioned environmental problems like resource scarcity, climate change and natural disaster (MacKinnon 2007). Socio-economic trends (like world population, energy use and real GDP) and earth system trends (like

carbon dioxide emissions, nitrous oxide emissions and deforestation) have both been growing increasingly since 1950, as visible in figure 1.

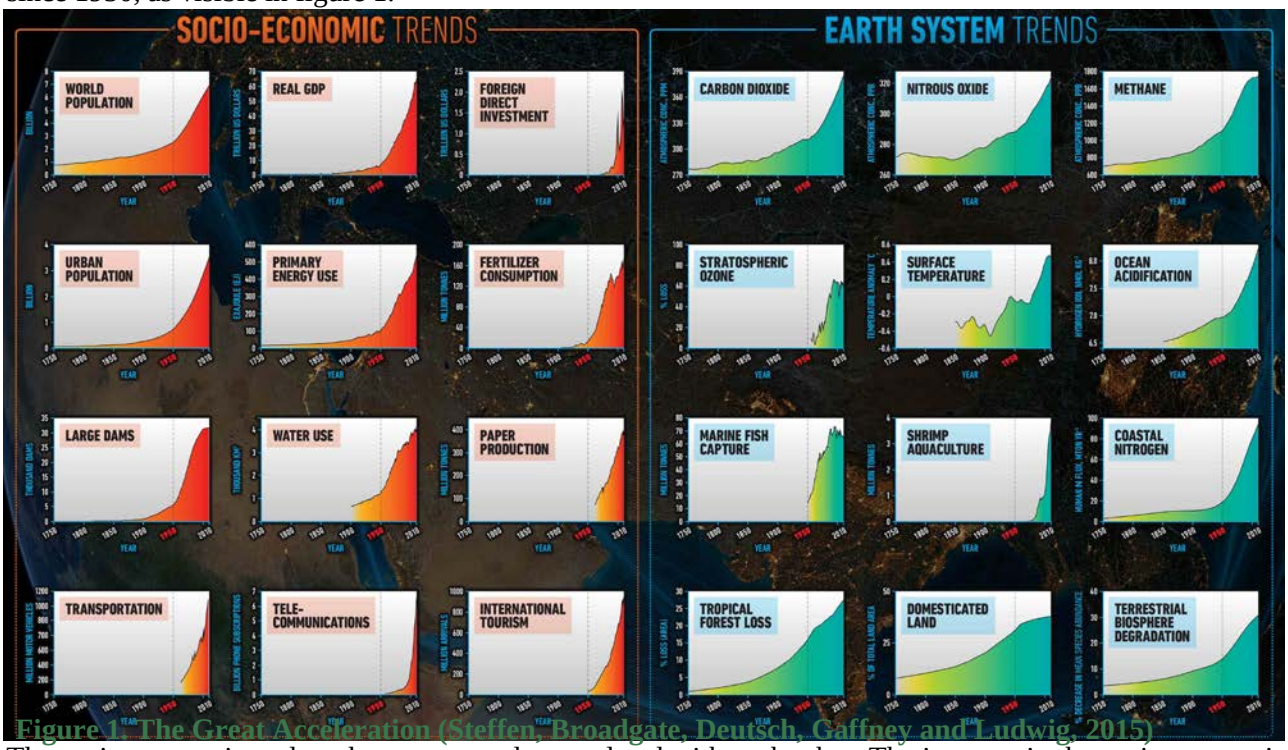


Figure 1. The Great Acceleration (Steffen, Broadgate, Deutsch, Gaffney and Ludwig, 2015)

The socio-economic and earth system trends are related with each other. The increase in the socio-economic trends caused by humans resulted in the increase of the earth system trends that have an impact on the earth. Human activity, predominantly the global economic system, is now the prime driver of change in the earth system (Steffen et al., 2004; Steffen, Broadgate, Deutsch, Gaffney and Ludwig, 2015). This phenomenon is called the Great Acceleration. The graphs showing the Great Acceleration provide strong evidence that in the last few decades key components of the earth system have changed significantly beyond the natural variability of the last 12,000 years. This period is better known as the Holocene. The Holocene started at the end of the last ice age and provided a stable ecosystem for the human species. This resulted in many developments, from basic agriculture to urbanization and industrialisation. The recent increase of the socio-economic trends has such an enormous impact on the earth system, that it is proposed that the earth has entered a new geological epoch, which is called the Anthropocene (Crutzen, 2002; Waters et al., 2016). Examples of signals of why the Anthropocene is functionally and geologically distinctive from the Holocene are:

- Carbon, nitrogen and phosphorus cycles have been substantially modified over the past century;
- Rates of sea-level rise and the extent of human disruption of the climate system exceed late Holocene changes;
- Biotic changes like species invasions worldwide and accelerating rates of extinction;
- The appearance of manufactured materials in sediments, which coincides with global spikes in fallout radionuclides and particulates from fossil fuel combustion (Waters et al., 2016).

These examples show that human interaction with the environment changed the world on an ecological level. The mentioned examples and signals show that anthropocentrism focuses on humanity in totality. The

behavior of the entire human species caused the change to another geological time period. There are, however, also (groups of) individuals that create problems, with humanity as a victim. Examples of these problems are social inequality and dysfunctional economic systems. From a psychological egoistic point of view, it could be stated that all actions of every individual are driven by motives of self-interest (Shaver, 2008). Hedonism is a particular version of psychological egoism, in which the self-interested motivations are only pleasure and the avoidance of pain (Bentham, 1789). The examples of social inequality and dysfunctional economic systems are a result of psychological egoism or hedonism. A specific example is the economic crisis of 2007, which began with individuals offering and buying irresponsible mortgages for years (The Economist, 2013). This egoistic or hedonistic behavior caused large financial problems for other (groups of) individuals within our society. Poverty, bad working conditions and wars are other potential consequences when (groups of) individuals are behaving egoistically or hedonistically.

Anthropocentric and egoistic or hedonistic behavior result in many problems in the world. Both, humanity in general and individuals need to change the ways they are doing things, improve current systems and change their mindsets in order to create a more sustainable world. An important aspect of creating this more sustainable world is that we take different types of sustainable development into account. There are three pillars of sustainability, which are ecological, economic and social sustainability (United Nations General Assembly, 2005);

- Ecological sustainability aims to maintain the essential functions and processes of ecosystems and retain their biodiversity in full measure over the long-term.
- Economic sustainability is the ability of economic systems to support a defined level of economic production indefinitely.
- Social sustainability is the ability of a social system, such as a country, family, or organization, to function at a defined level of social well being and harmony indefinitely.

This distinction of sustainability is in line with the Triple Bottom Line, which intention is that organisations try to achieve both social, economic and ecologic value (People, Planet, Profit) (Elkington, 1998). Unless humanity or (groups of) individuals recognise the inherent value in every human being and transform this respect towards the environment, earth will remain under threat (Wapner & Matthew, 2009). In other words, humanity should become less anthropocentric and individuals should become less egoistic or hedonistic in order to be able to stabilise the ecological and social threats the earth is facing. Humanity in general should become more ecocentric instead, so we recognise intrinsic value in all living things on earth regardless of their usefulness to humans. People should also be encouraged to respect and care for animals and plants for their own sake (Leopold, 1949; Kortenkamp & Moore 2001). Individuals should become more altruistic instead of egoistic or hedonistic. Altruism is the belief that individuals have a moral obligation to help, serve or benefit others, if necessary at the sacrifice of their self interest. More precisely, an action is morally right if the

consequences of that action are more favourable than unfavourable to everyone except the agent (Dixon, 2004).

To decrease the burden on our ecosystem and increase social welfare something has to change for humanity and (groups of) individuals. The change in mindsets and actions of humanity and individuals are central in the transition towards a more sustainable future. One part of this transition is that organisations become more sustainable than they currently are. This will be achieved by (re)creating business models. Organisations should not solely focus on economic gains anymore, but focus on ecological and social value as well. Organisations should create three different bottom lines to measure the success of their business model, based on the earlier mentioned three sustainability pillars (environment, social economic) and the Triple Bottom Line (People, Planet, Profit) (Elkington, 1998; United Nations General Assembly, 2005). Business models that are (re-)created like this and are successful on all of the three bottom lines are called New Business Models (Jonker, 2014). These New Business Models can be measured on their impact on society by the Transition Impact Framework, which consists of measurable, sustainable clusters (Geels, 2005). These sustainable clusters individually stimulate sustainability by offering possibilities for New Business Models. Together, they form a new kind of economy that takes social, ecological and economic value into account. This new kind of economy is called the WEconomy, the sustainable clusters within this kind of economy are better known as WEconomy trends (Jonker, 2015). The seven trends are:

- Circular Economy;
- Functional Economy;
- Self-production Economy;
- Sharing Economy;
- Collaborative Economy;
- Bio-based Economy;
- The Internet of Things.

The WEconomy trends could increase sustainability and contribute to the overall transition to a more sustainable world. The Transition Impact Framework is tested and validated (Wijnholds, 2015), but requires multiple moments of measurement to determine the actual impact of the WEconomy trends on the business models of organisations. In order to do this, the constructs need to be extended based on the methodological requirements. This means that these constructs should be made measurable so they could be used for longitudinal studies. At this moment the conceptualisation of the WEconomy is not optimally suitable for measuring impact because of the interaction the WEconomy trends could have with each other. When this is the case, it changes the way how the impact on the transition should be measured. At this moment, it is unknown how the trends interact with each other and what the configuration of these interactions between WEconomy trends is. Organisations could combine and adopt different WEconomy trends in their business

model. It is unknown if there are significant relations between WEconomy trends adopted by organisations, and therefore there is a research gap within the concept of the WEconomy. Establishing the configuration of the WEconomy results in more insight into the transition towards a more sustainable society. It also extents the concept of the WEconomy, which means it becomes more suitable to execute further research on the transition. The extension also offers more specific information about how humanity and individuals can become more ecocentric and altruistic. These implications are all highly relevant, for both society and science.

1.2 Research Philosophy

The research philosophy of this research is related to the problem statement. The mentioned problems regarding sustainability are extremely complex. The world is not an easily observable and measurable entity, since there are many factors that influence each other. Concepts like climate change and dysfunctional economic systems are not measurable regarding the transition to a more sustainable world. There are too many reinforcing and balancing forces present in order to come up with one reality and one ultimate solution for the problem. Possible realities or solutions regarding these topics are constructed by the interaction between people. Therefore, this research has a social constructivist approach, so it is possible to cover the grey area between the WEconomy trends and their interactions. Social constructivism is based on the following specific assumptions about reality, knowledge, and learning (Kim, 2001):

- The believe that reality is constructed through human activity, members of a society together invent the properties of the world (Kukla, 2000). In this perspective, reality cannot be discovered: it does not exist prior to its social invention.
- The assumption that knowledge is a human product, and is socially and culturally constructed (Ernest, 1999) (Gredler, 1997) (Prawat & Floden, 1994). Individuals create meaning through their interactions with each other and with the environment they live in.
- The view that learning is a social process. It does not take place only within an individual, nor is it a passive development of behaviors that are shaped by external forces (McMahon, 1997). Meaningful learning occurs when individuals are engaged in social activities.

Many problems that anthropocentric, psychological egoistic and hedonistic behaviour caused in our world are constructed through human interaction. When this is the case, the reality of these problems is often not established, but it is based on socially formed assumptions. The point of departure of this research is also socially constructed, because the WEconomy trends are socially constructed assumptions. For example, it is assumed that the Circular Economy increases sustainability overall. Many experts on different elements of the Circular Economy have constructed this reality based on assumptions, but this does not mean that there is an unanimous outcome that represents the actual reality. These experts have different perspectives about the extent the Circular Economy contributes to sustainability.

This research establishes socially constructed assumptions about the reality of WEconomy trends contributing to and strengthening each other. This approach makes it possible to establish a socially constructed configuration of the WEconomy trends, which adds more knowledge to the concept of the WEconomy and stimulates the ongoing debate about the transition towards a more sustainable world. Furthermore, it stimulates the learning process of individuals by offering additional knowledge about sustainability and the WEconomy. The benefit of this perspective could also be seen as a drawback. The social constructivist perspective offers the opportunity to establish a socially constructed configuration about the WEconomy, but it is not a clear, measurable and objective outcome. The outcome is still constructed by assumptions and therefore it is not possible to explain the configuration in the sense of causalities or correlations.

1.3 Research Design

In the previous paragraphs the problem statement and the related research philosophy are elaborated on. In this paragraph, these two sections are translated to a research objective, research questions and the steps that are taken within this research.

1.3.1 Research objective

This section describes the objective of the research. As mentioned in the problem statement, it is important to gain more insight into the WEconomy. This extension of the WEconomy would contribute to the ongoing debate about the transition towards a more sustainable world. At this moment it is unclear how WEconomy trends contribute to or strengthen each other. Therefore, the main goals should be to establish the configuration of the WEconomy by defining the relations between WEconomy trends. This results in the following research objective: **To create more insight into the ongoing debate about sustainability by extending the concept of the WEconomy with the establishment of a configuration of the seven WEconomy trends.**

1.3.2 Research questions

The main question provides an answer which completes earlier mentioned research objective. For this research, it is necessary to establish the configuration of the WEconomy to create more insight into the concept of the WEconomy and extent with the relations between the WEconomy trends. The main research question is: **What is the configuration of the seven WEconomy trends that increases sustainability?**

The social constructive perspective of the problems and WEconomy results in a design that is also in line with this philosophy. Since the reality is socially constructed, it is important to gather knowledge from multiple sources to be able to assume certain relations between WEconomy trends. To be able to do this, a literature review is executed first. Here, relations that could be possible are analysed with desk research. Scientific papers, written expert opinions or practical applications (for example start-ups that use a business model related to two WEconomy trends) provide information about the WEconomy trends that could theoretically contribute to or strengthen each other. To make better assumptions about the relations within the WEconomy,

experts and practitioners on at least one WEconomy trend are asked about their opinion on the matter as well. Hypotheses are formed based on the literature review. These hypotheses are tested with data acquired from field research. The outcome of the field research represents a shared vision of experts and practitioners in the field. After the field research, the hypotheses could be tested on whether the possible relations match the relations perceived by the experts and practitioners. The outcome provides significant assumptions for a configuration of the WEconomy. This design results in three sub-questions. The answers to these three questions altogether provide to complete answer to the main research question.

1. **Which relations and clusters between the WEconomy trends could potentially increase sustainability?**
2. **Which relations and clusters between the WEconomy trends recognised by the practical field increase sustainability?**
3. **What are the similarities and differences between the potential configuration and the perceived configuration of the WEconomy trends?**

The distinction of the main research question in these three sub-questions results in three different configurations. The three configurations are used consistently throughout this paper.

- The Potential Configuration; The configuration that is formed based on the literature review. Scientific papers, written expert opinions and practical applications, in the form of new business models, show which relations and clusters between WEconomy trends could be potentially increase sustainability. Therefore, it is called the Potential Configuration within this paper. This configuration answers the first research question.
- The Perceived Configuration; The configuration that is based on the shared vision of experts and practitioners on at least one WEconomy trend. The Perceived Configuration is established with field research. Since this configuration is a shared vision it will be called the Perceived Configuration. It is how those active in the practical field perceive the relations and clusters between WEconomy trends that increase sustainability. This configuration answers the second research question.
- The Actual Configuration; This configuration shows the relations and clusters within the WEconomy at this moment in time. The similarities between the Potential and Perceived Configuration are used to determine the Actual Configuration, the differences are analysed further. The similarities and differences answer the third research question. The actual configuration answers the main question of this research.

1.3.3 Research steps

The research questions result in research steps that have to be taken in a deductive way. This means that the literature review forms the basis for developing hypotheses. These hypotheses will be tested empirically. This way two different perspectives on the configuration of the WEconomy (potential and perceived configuration) can be compared, to be able to come up with well-supported assumptions for the actual configuration of the WEconomy trends. The research is descriptive, because the assumptions about the configuration of the

WEconomy trends are described in the form of relations and clusters. The configuration of WEconomy trends is determined in two ways. First, the relations between two trends are determined. The relations possible here are: no relation, one-sided relation or reciprocal relation. Second, clusters of trends are formed based on the way they interact with each other. A cluster is described as a group of the same or similar elements gathered or occurring closely together. These clusters are based on feedback loops that can be established based on the determined relations. The steps of this research are as following:

- **Step 1: Literature review;** Review of theories, definitions and practical applications which shows possible relations between WEconomy trends. Based on these relations, clusters can be established. The established relations and clusters will result in the potential configuration of the WEconomy.
- **Step 2: Defining hypotheses;** The hypotheses are based on the literature review. These hypotheses will be focused on testing the relations and clusters of the potential configuration.
- **Step 3: Execute empirical research;** Conduct a survey among practitioners and experts in the area of at least one WEconomy trend. The outcomes of this survey result in the Perceived Configuration..
- **Step 4: Testing the hypotheses and analysing the outcomes;** In this part, the hypotheses will be tested to determine similarities and differences between the potential and perceived configuration. Furthermore, the actual configuration of the WEconomy will be established.
- **Step 5: Discussion the results, limitations and give directions for further research;** In this part, other results of the research, in the form of discussion points, will be described. Furthermore, the limitations of this research are presented. The discussion points and constraints result in directions for further research.

1.4 Thesis outline

Chapter 2 presents the literature review. This chapter presents the definitions of the WEconomy trends and the description of how the term impact is used within this paper. Chapter 3 consists of the methodological choices that are made for this research. This chapter elaborates on the techniques, data collection, analysis and ethics of this research. The fourth chapter presents the Potential Configuration of the WEconomy trends. This chapter is followed by chapter 5, which provides the results of the quantitative research for determining the Perceived Configuration. The outcomes of the tested hypotheses in chapter 5 are used for defining the Actual Configuration of the WEconomy trends, which can be found in the first paragraph (conclusion) of the final chapter. The conclusion is followed by a discussion of the outcomes of this research, as well as directions for further research in the future. Furthermore, limitations of this research and its design are presented in chapter 6.

2. Literature Review

The first paragraph gives a brief explanation of the WEconomy trends and the elements present within these concepts. The approach for designing a configuration and the ways WEconomy trends could have an impact on each other are explained subsequently. This overview can be found in the second paragraph of this chapter.

2.1 The WEconomy

There are seven interlinked constructs established in our society, that frame an emerging sustainable economy, or in Jonker's words a WEconomy (Geels, 2005; Jonker, 2015). For this research, it is assumed that the WEconomy trends are sustainable (Jonker 2015; Wijnholds, 2015) and therefore, the focus of this research is not to discuss these individual constructs further. The focus in this research is to describe relations between these trends to create a better understanding about how these trends could increase sustainability. The seven WEconomy trends are used as the point of departure for this research.

2.1.1 Circular Economy

The transition from a linear economy – characterised by the take, make and dispose pattern – to an economy where waste becomes a resource that is recycled in the economic process (Ellen Macarthur Foundation, 2014). The Circular Economy is an industrial system that is focused on restoring or regenerating the environment. This can, for example, be achieved by extending the product life cycle of products. Specific forms of extending the life cycle are: replacement of the end-of-life concept with restoration, usage of renewable energy and elimination of the use of toxic chemicals. These solutions impair reutilisation, return sources to the biosphere and aim to eliminate waste through the design of materials, products, systems and business models. (Ellen MacArthur Foundation, 2014; Wallace & Raingold, 2012).

The ultimate goal of the Circular Economy is to create feedback loops between life-cycle stages in order to keep materials and resources in circulation, instead of wasting it. Resource-efficient industrial processes should be designed to support the creation of these feedback loops (Hobson, 2015).

2.1.2 Bio-based Economy

There are many discussions about the Bio-based Economy and what is included within this trend. From a broad economic perspective, the Bio-based Economy is the set of activities relating to the invention, development, production and use of biological products and processes (OECD, 2015). This definition is mainly focused on the activities on how to create and use bio-based products. The general idea of the Bio-based Economy is that green resources derived from raw materials such as wood, plants, grasses, crops or agricultural waste are used for different applications (for example, chemicals, materials/products, energy) (Jonker, 2015). A more specific definition comes from the European Union, which considers the Bio-based Economy as an economy that integrates the full range of natural renewable biological resources (for example: land and sea resources, biodiversity and biological materials) and the processing and consumption of these bio-materials (European Commission, 2012). In this definition, the substitution from non-renewable resources

by renewable resources is being made specific, which is an important part of the Bio-based Economy. In a Bio-based economy, particular activities and processes should be designed to be able to create renewable substitutes for the non-renewable resources. In other words, the Bio-based economy aims to create a transition by using renewable resources instead of non-renewable resources in an efficient way by using biology, innovation and technology in such a way that the environment can be spared (Wageningen UR, 2012).

2.1.3 Functional Economy

This trend defines itself by distinguishing the ownership of products and services from the usage of goods and services. The objective of the Functional Economy is to create the highest use value for the longest possible time while consuming as few material resources and energy as possible (Stahel, 1997). It transforms products into integrated service-systems, better known as Product Service Systems (PSS) (Manzini and Vezzoli, 2002). While a PSS does not necessarily lead to more sustainable applications (Kuo, 2011), there are some arguments why a PSS could increase sustainability. Product Service Systems could offer a function instead of the product itself and therefore minimalise the environmental burden in two ways. First, companies offering the service would have all the incentives to make the (product-)system efficient, as they get paid by the result. Second, consumers would be encouraged to alter their behaviour as they gain insight into all the costs involved with the use (Mont, 2002; Tukker and Tischner, 2006).

2.1.4 Collaborative Economy

This trend concerns an economic model built on distributed networks of connected individuals and communities versus centralised institutions, transforming the way we produce, consume, finance and learn (Botsman, 2013). There are three forces which drive the Collaborative Economy, namely societal, economic and technological drivers (Jonker & Faber, 2015; Weaver, 2008). The first driver is the consumers increasing desire for community and altruism and its increasing distrust in centralised institutions. This change of mindset results in individuals looking to collaborate instead of responding to offers from large institutions. Furthermore, the economic crisis resulted in a decreasing urge to own products. Individuals are starting to look for other ways to acquire the ‘function’ they need. The last driver for the Collaborative Economy is the development of technology that makes it easier for individuals to collaborate and create a network (Weaver, 2008). Social networks facilitate peer-to-peer interactions, which could lead to individuals or groups that match up supply and demand. The adoption of mobile devices enables customers and sellers to offer and locate goods at any place or time. Providing an accessible and customer-friendly platform which gives insight in the supply and demand of the individuals or groups increases the possibility to swap goods and services to bypass the need of monetary exchange or institutional dependance (Owyang, Tran, & Silva, 2013).

2.1.5 Sharing Economy

This trend is defined as an economy in which broad segments of the population can collaboratively make use of under-utilized inventory. These under-utilized assets can range from spaces to skills to material things for

both monetary or non-monetary benefits (Botsman, 2013). The emergence of the Sharing Economy has both economic and social value, as it gives an opportunity to solve problems like resource scarcity, increasing energy consumption, high unemployment and overpopulation of cities (Sikorska and Grizelj, 2015). The Sharing Economy consists of three elements, namely collaborative lifestyles, product service systems and redistribution markets (Botsman, 2013). Collaborative lifestyles can be understood as a way to share and exchange tangible and intangible assets (time, space, money, products) with other individuals that share the same interest. Product Service Systems are combinations of products and services developed in such a way that a consumer has the benefits without buying the product. The concept of PSS is already mentioned in the description of the Functional Economy. Redistribution markets are markets in which unwanted or underused assets, resources and goods are redistributed to other individuals.

2.1.6 Self-production Economy

This trend is focused on (re-)organizing the manufacturing process in which the consumer gets involved in the process of production at the beginning of the production cycle (Koff and Gustafson, 2012). The introduction of the Self-production Economy means a change in the traditional supply chain, transforming raw materials to personalized products with no storage, distribution channels and transport (Koff and Gustafson, 2012). This could increase sustainability in general because product transport, storage and distribution are not necessary anymore (Petrick & Simpson, 2013). One particular technology that increased the Self-production Economy is 3D-printing. 3D printing enables people to design, build and deliver low-volume products that allow for high degrees of complexity and customization (Berman, 2011).

2.1.7 Internet of Things

A short definition of the Internet of Things (IoT) is: RFID and sensor technology enable computers to observe, identify and understand the world, without the limitations of human-entered data (Ashton, 2009). This implies a differentiation in two possible parts; namely software and hardware. The combination of hardware and software would enable systems to act and create, gather and transform data autonomously. However, the distinction within the trend of the Internet of Things is broader. The exponential growth of IoT could be explained by the growth of mobile device and application usage and the broad availability of wireless connectivity. Other factors include the emergence of the cloud as a way to store and process large volumes of data cost-effectively, and the rapid deployment of analytics technologies (Williams, 2014). The main components for creating an IoT application that could be distinguished are: Smart Systems (sensors, smart devices), Cloud Computing (Software as a Service, Hardware as a Service and Infrastructure as a Service) and Data analytics (Software analytics) (Ashton, 2009; Cartigny, Distelbrink & Emmery, 2016; Williams, 2014). The concept of The Internet of Things is very broad and it is unclear what impact this trend has on the other six WEconomy trends, but it could be an accelerator for the other WEconomy trends (Jonker, 2015). The technology is not sustainable itself.

2.1.8 Functions of WEconomy trends

The seven WEconomy trends use different business models with different functions to increase sustainability. The trends can be categorised based on the perspective they take on markets, producers and consumers. The Functional Economy, Circular Economy and Bio-based Economy are focused on the internal, organisational and operational part of the organisation:

- The Functional Economy opts to change the business model of organisations from product-focused to service-focused.
- The Circular Economy aims to modify the value chain of an organisation.
- The Bio-based Economy focuses on a more sustainable way of producing products and materials.

These three could be considered as traditional market models because there are still producers and consumers.

The Collaborative Economy and Sharing Economy, on the contrary, are more focused on creating alternative market models with as ultimate goal to create networks of individuals that distribute products or services among each other. The Self-production Economy and the Internet of Things could be considered as trends that are a result of and stimulator for one or multiple of the other WEconomy trends. These two trends are blends of the traditional market focus and the alternative market focus:

- The Self-production Economy is still focused on products. It has, however, incorporated alternative market solutions by offering the possibility to produce these products yourself.
- The technology of the Internet of Things could still result in specific products for consumers (smart televisions, smart thermostats etcetera). The technology of Internet of Things also offers a service which these consumers use (data analytics is used for adjusting to the lifestyle of consumers).

2.2 Impact

A very broad definition of impact is: 'a powerful effect that something, especially something new, has on a situation or person' (Dictionary, n.d.). In case of this research it is the powerful effect of the WEconomy trends on each other. Impact could be divided into positive and negative impact. A WEconomy trend could have a positive impact on one trend while it has a negative impact on another trend. Therefore, a distinction could be made between positive and negative impact for this research. Since the WEconomy trends are build around sustainability, positive impact are not only economic gains (Profit), but also positive effects on the other bottom lines (People, Planet). The goal of this research is to see how the WEconomy trends contribute to and strengthen each other to increase the effects on the three bottom lines. Therefore, the focus of this research is on the positive contributions between the trends. Both, a contingency and configuration approach could be applied to gain more insight in the positive impact the WEconomy trends could have on each other. Usually, these approaches are used for designing organisations. In this research, it is possible to consider the WEconomy as an organisation to be able to look at this concept from different perspectives.

2.2.1 Contingency

The contingency theory (Lawrence and Lorsch, 1967) argues that no theory or method can be applied in all instances. There is no best way to design an organisation (Scott and Cole, 2000). Contingency employs a reductionist approach, treating an organisation as decomposable and divides it into independent elements (Sinha, Kingshuk, Van de Ven and Andrew, 2005). In the case of the WEconomy, the contingency approach divides the WEconomy into separate elements, namely the WEconomy trends and looks at the way these trends interact with their environment (in this research each other). This approach gives useful insight in how the WEconomy trends contribute to and strengthen each other.

The impact WEconomy trends could have on each other results in three possible options. The possible relations between the trends can be as following:

- No relation; There is no significant relation between the trends.
- Single-sided relation; There is a significant relation where the first trend influences the second trend, but the second trend does not influence the first one. For example a result could be that adopting a business model that is related to the Functional Economy always results in elements of the Collaborative Economy as well, but when an organisation adopts a collaborative business model it does not automatically mean that there will also be elements of the Functional Economy in the business model.
- Reciprocal relation; There is a significant two-way relation where both trends influence each other.

2.2.2 Configuration

The WEconomy is composed of many contingencies, which implies that drawing conclusions about specific contingent relations can be challenging (Sinha et al., 2005). Therefore it is also interesting to take a more holistic point of view to get more insight in the WEconomy. Rather than the pairwise relations that the contingency approach focuses on, a configuration approach establishes several elements and their relations (Drazin, Robert, Van de Ven and Andrew, 1985). Configuration is a special type of design activity, with the key feature that the entity being designed is assembled from a set of pre-defined components that can only be connected together in certain ways (Mittal and Frayman, 1989). The configuration approach argues that a holistic analysis should be applied (Miller, 1986). This approach is useful in handling the fit among multiple variables, such as the WEconomy trends.

Three aspects have to be taken into account when designing a configuration:

1. The components that can be used to design a configuration are fixed, it is not possible to design new components in the process.
2. Each component can be connected to certain other components in fixed and pre-defined ways.
3. A configuration not only specifies the actual components but also how to connect them together. In other words, it is not enough to just identify the components.

In this research, the configuration approach results in a system dynamics model that includes relations (from the contingency approach) and clusters. A cluster is described as a group of the same or similar elements gathered or occurring closely together. These clusters are formed by establishing feedback loops based on the established relations between WEconomy trends. These feedback loops create a better understanding of how particular trends contribute to and strengthen each other to potentially increase sustainability.

The three aspects of designing a configuration of the WEconomy trends are:

1. The components of this configuration are the seven WEconomy trends. No new trends are added for the configuration of this research.
2. The literature review presents pre-defined ways of how these WEconomy trends could be connected to other trends within the WEconomy. The quantitative research tests these pre-defined ways in the field.
3. The configuration presents the relations and clusters that are present within the WEconomy. It is identified how the WEconomy trends are connected to each other. So the components are not only identified but also connected to each other through the three types of relations and clusters.

To sum up, the goal of designing the configuration of the WEconomy is rearranging the different WEconomy trends into a particular arrangement so it represents the actual situation. Within this research, the configuration consists of two parts. First, the specific relations between two trends are established based on the contingency approach. Second, the configuration approach is used to determine a configuration with the use of the system dynamics technique. The relations will be transformed into a model, based on the system dynamics approach (Ford, 2010). System Dynamics is a technique to model complex and wicked problems to create a better understanding about a phenomenon. In this model, feedback loops will become visible which are used to determine clusters of WEconomy trends that strengthen each other. The model with relations between the WEconomy trends and the feedback loops of the clusters combined form the configuration of the WEconomy. This potential configuration will be the point of departure for the hypotheses and quantitative research.

3. Methodology

This chapter presents the methodological considerations and choices that are made for the desk research and quantitative research. The first paragraph provides an overview of the research techniques, data collection and analysis techniques for determining the Potential Configuration with a literature review. The second paragraph provides an overview of the research techniques, data collection, analysis techniques and research ethics for determining the Perceived Configuration with quantitative research.

3.1 Methodology for determining the Potential Configuration

The first step is to establish the Potential Configuration of the WEconomy trends. This configuration offers insight into potential relations and clusters between WEconomy trends. The outcomes of this part of the research will answer the first sub-question.

3.1.1 Research techniques

The researcher reviewed available sources related to the WEconomy trends. Sources that have been reviewed are scientific journals and written expert opinions. Furthermore, documented practical applications of WEconomy trends are reviewed. These information sources together offer a broad overview of the possibilities of how WEconomy trends could have an impact on each other.

3.1.2 Data collection

The topics that are searched for are the seven WEconomy trends and possible relations between them. The main question of the literature review is: *Could WEconomy trend A contribute to or strengthen trend B?* To be able to search in a structurised way, on top of the WEconomy trends themselves key elements of each WEconomy trend are defined and combined with the key elements of the other trends in the searching process. These key elements are based on the definitions of the WEconomy trends in paragraph 2.1. For example, key elements for the Circular Economy are recycling, reutilisation, renewability and product life-cycle, key elements for the Internet of Things are RFID and sensor technology, cloud computing, real-time data analytics and smart systems. All these key elements are combined in the searching process to find suitable sources for the literature review. When these sources are found they can be used to argument whether there is a relation

between the two trends or not. The relations are discussed based on overlapping definitions, statements from experts, practical applications or empirical research results. The potential relations are searched for in academic journals (Mendeley, Google Scholar, RUquest will be used) as well as (other) search engines, blogs and other internet sources.

3.1.3 Analysis

Morphological analysis techniques are used to review possible relations between WEconomy trends. This type of analysis is suitable because it helps exploring all the possible solutions in a non-quantified, multi-dimensional and complex problem (Zwicky, 1969). It may help discover new relations or configurations that may not be so evident. The unknown possible relations between WEconomy trends are a problem that could be solved by this technique. The steps of the morphological analysis is usually as following:

1. The problem to be solved must be very concisely formulated.
2. The sub-concepts that could be used to solve this problem must be identified.
3. A multidimensional matrix, including all the sub-concepts, is constructed. The grid is called the solution space.
4. The possible solutions are analysed and evaluated.
5. The identified solutions are applied.

In this research, the outcomes of the steps are as following:

1. The problem is that the possible relations within the concept of the WEconomy are not identified. This is a research gap, because the possible combinations of WEconomy trends are unknown. When these possible relations are identified, they offer better insight in how the WEconomy trends could increase overall sustainability.
2. The identified sub-concepts within the concept of the WEconomy are the seven WEconomy trends.
3. The matrix is constructed and consists of 7*7 options.
4. The literature review results in possible relations within the multi-dimensional matrix (see Appendix A.). The possible relations are analysed and evaluated on whether they should be included in the Potential Configuration.
5. The possible relations are established, which solves the problem mentioned in step 1. These relations are included in the Perceived Configuration.

3.2 Methodology for determining the Perceived Configuration

After the desk research, the Perceived Configuration of the WEconomy trends will be established. This part of the research answers the second research question. Practitioners and experts on at least one WEconomy trend are asked to give their perception about the relations between WEconomy trends. This way, a general vision of the practical field about these relations are established. The same question mentioned in the literature review will be asked to the practitioners and experts: *Does WEconomy trend A contribute to or strengthen*

trend B? Using the same question as in the literature review makes it possible to compare the Potential Configuration with the Perceived Configuration. Quantitative analysis techniques are used for the empirical study, in this research a closed-ended and structured questionnaire are used to gather the data necessary for this research question. Quantitative studies focus on gaining results which can be generalised to an entire population, which is necessary for defining the vision about the configuration of the WEconomy of the whole population (Babbie, 2013). In the next section the research techniques are presented. This section is followed by the description of the process on how the data is collected. The third section of this paragraph describes how this data is analysed. In the final section, the research ethics are briefly discussed.

3.2.1 Research techniques

The research technique used for this research is a closed, structured and web-based survey. The questionnaire uses closed questions to determine the relations between the WEconomy trends. The answer categories are dichotomous, which makes the data of a nominal measurement level. The nominal answer categories are used to answer the second research question. The questions lead to a definite yes or no from the respondents on the question: *"Does WEconomy trend A contribute to or strengthen trend B?"*. This way, the Perceived Configuration of the WEconomy is established. The nominal measurement level is the most suitable measurement level considering the attractiveness of the questionnaire for respondents. It is important that the survey is interesting and attractive enough to achieve that potential respondents will participate. Participation is necessary to get an acceptable amount of responses and to be able to generalise the results for the whole population.

There are two main reasons for choosing nominal answer categories instead of using other answer categories. The main reasons are the quantity and the complexity of the questions. An ordinal measurement level is not suitable because there is no rank order possible within possible relations. It is, however possible to use scale or ratio measurement levels. Using a scale or ratio measurement level would make the questionnaire long and boring for the participants if they have to fill in items for every possible relation (for example Likert items, percentages or rating from 1 -10). This choice would have resulted in 42 similar items in total, since there are 42 possible relations between two trends. The questionnaire would get even more extensive when multiple items per trend are added to measure the relations with constructs. In the current design only 7 questions will have to be asked, which will look like: *"Which of the following trends does contribute or strengthen trend A?"*. Furthermore, the questions would have become more difficult and more confusing to fill in. It is more difficult for participants to rate to what extent there is a relation instead of answering if they perceive a relation between trends. The question *"To what extent does WEconomy trend A contribute to or strengthen trend B?"* would be interesting to determine the strengths of the relations, but this question would be more convenient to answer in further research after this research has established the Actual Configuration. This would limit the amount of questions to be asked.

A web-based survey is the easiest and fastest way to gather the data necessary in the available time. There are seven questions within this survey to test all the specific relations, so the survey is not complex or lengthy. Furthermore, there is a tight deadline for this research, and a web-based survey is easy to spread quickly over a large number of respondents. To make the questionnaire more attractive, the answers to the questions are shown in pictures. Besides that, the resulting thesis with the final results will be shared among interested respondents. These choices result in a time-efficient, easy to interpret and attractive design of the survey. The design of the survey and its questions can be found in Appendix C.

3.2.2 Data collection

The web-based survey is spread among LinkedIn groups related to the WEconomy, which results in a large amount of potential respondents that are reached. The LinkedIn groups are selected by the researcher and have to be related to the WEconomy and sustainability. It is assumed that the members of these groups can be considered as experts or practitioners on the matter. There is, however, a possibility that random people respond to this survey since it is shared on a social medium. Normally, this could have implications for the validity of the research. For this research, it will not have huge consequences for the outcome if there are some unrelated respondents. The result of this quantitative part of the research is a shared vision about the relations of WEconomy trends from the practical field, and this vision is still a shared vision if unrelated respondents participate. Besides that, it is highly unlikely that members of these LinkedIn groups do not know anything about one of these trends. If this would be the case, they probably would have quit at the first page of the survey because they would have experienced difficulties understanding the content of the questionnaire. The invitation and introduction of the survey also both elaborate that the participants should be an expert or practitioner related to sustainability. Finally, it is possible to analyse if the results that deviate are significant or not. This means that the reliability of the results stays high, even with the chance of unrelated respondents. The sampling technique used for this research is purposive sampling. With purposive sampling, participants are grouped based on preselected criteria. The preselected criterium of this research is that the participants have knowledge of at least one of the WEconomy trends. Furthermore, snowballing is used within purposive sampling to use the networks of respondents to contact other experts on the subjects.

3.2.3 Analysis

The data of the survey is of a nominal measurement level. In practice, this means that there are limitations for the statistical analyses that can be executed. For this empirical research, it is important to eliminate data that is indecisive. Indecisiveness means that the larger amount of the sample does not agree on whether there is a relation or not. There is a possibility that the group of respondents is indecisive whether one trend contributes to another trend. To test if the answers significantly vary from each other, chi-square tests are executed on each individual possible relation. The chi-square tests to what extent there are equal values, in other words, equal amount of responses for one question. The output of this test are decisive and indecisive responses of the sample. The decisive results are used for determining whether the relation should be in the Perceived

Configuration or not. The indecisive results are not used in the Perceived Configuration and will be saved for further discussion.
The decisive results are tested on whether there is a relation between the two trends or not. This test is executed by analysing the descriptives and determining whether the larger amount of the sample ascertains a relation between the trends. This way the relations can be established for the Perceived Configuration. A visual model with the perceived relations of the WEconomy trends is developed to be able to determine clusters within this configuration.

The feedback loops within the visual model of the perceived relations is tested on the coherence between the relations. This means that it is tested whether the respondents consider all the relations within the cluster. This way, the clusters are tested on a statistical basis since a significant amount of the respondents sees the coherence between the relations within the cluster. The coherence is tested by generating cross-tabulations and executing a chi-square test between two variables. With this test the coherence between the answers to the two questions can be tested. If this coherence (chi-square) is significant, the answers of the first and second question are generally responded to the same by the sample. In the case of the clusters, the answers of the respondents are generally that in both cases there are relations between the trends present. This way, a significant feedback loop can be established. These tests also generate the Cramer's V. The Cramer's V results in an indication of how strong the coherence of the variables/given answers is.
The Potential Configuration is compared with the Perceived Configuration to find similarities and differences between the two configurations. First, the relations of the WEconomy trends within the configurations are compared. For this comparison, there are four outcomes possible.

1. The relation is present in the potential configuration, and the relation is significant in the perceived configuration. In this case, the relation is included in the Actual Configuration of the WEconomy trends.
2. There is no relation present in the Potential Configuration, and the relation is not significant in the Perceived Configuration. In this case, the relation will be excluded from the Actual Configuration of the WEconomy trends.
3. The relation is present in the Potential Configuration, but the relation is not significant in the Perceived Configuration. This outcome means that there is a scientific basis for assuming that there could be a relation between the two trends, but it is not acknowledged in practice. The difference between the two trends will be discussed further and are possibly interesting for further research.
4. There is no relation present in the Potential Configuration, but the relation is significant in the Perceived Configuration. This outcome means that the practitioners and/or experts perceive a relation between two WEconomy trends that is not backed up by the literature review. The differences between the configurations will be discussed further and are possibly interesting for further research.

After comparing the relations between WEconomy trends, the clusters of the configurations are compared. In practice, this means that the feedback loops of the Perceived Configuration are compared with the feedback

loops of the Potential Configuration. If both configurations have the same feedback loops, they are included in the actual configuration. If feedback loops are missing in one of the other configurations, they will be discussed further.

3.2.4 Research Ethics

A scientific researcher has obligations regarding conducting the research in an ethical manner. To have an ethical research design a few considerations are made. First, potential respondents are found on the open social media platform LinkedIn. This means their professional information is public knowledge. Second, to make sure the process of gathering the data is done in an ethical way, the decision to participate lies with the respondents. The potential respondents are asked if they are willing to contribute their knowledge, but they are not forced into doing anything. Third, the participants are offered full anonymity in the questionnaire. With this research design, it is guaranteed that the interaction with (potential) participants of this research is ethical and the decision to participate is theirs to make. Fourth, the participants have the option to receive the research paper when it is finished. This way, they will be able to see the research and results they contributed their knowledge to. Finally, the respondents are asked if they are willing to participate in possible future researches about the WEconomy. This consideration will further ensure ethical interaction with the participants in the future, since it will be clear which participants like to participate and which participants do not like to participate in this area of research.

4. The Potential Configuration of WEconomy trends

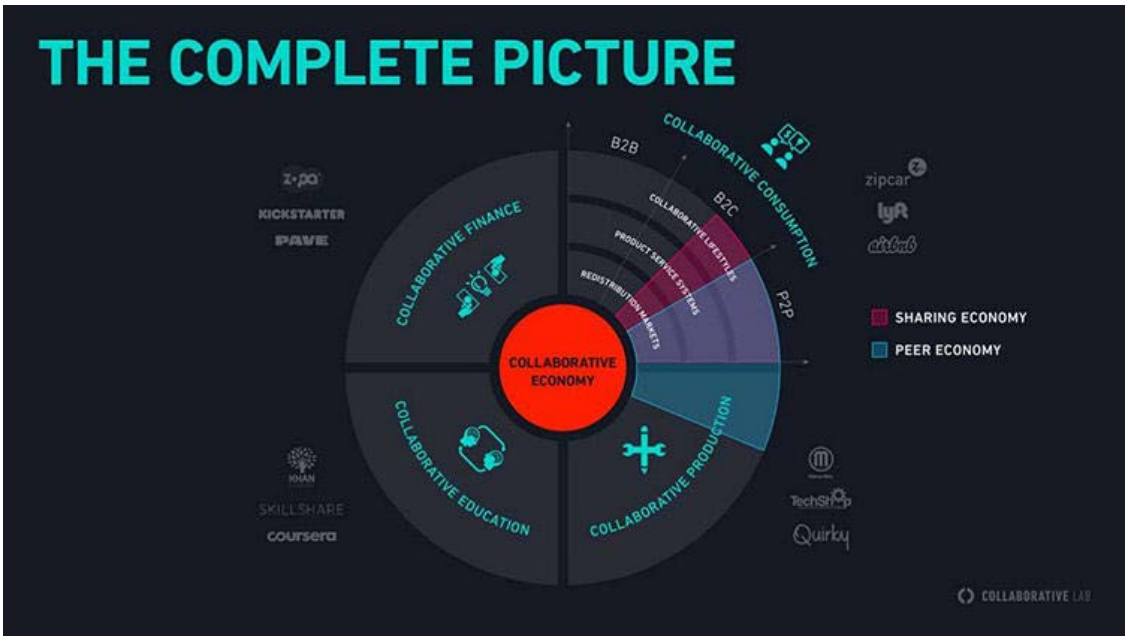
The social constructive philosophy results in assumptions for a socially constructed configuration of the WEconomy trends. The first step for constructing these assumptions is to review literature about the relations between the seven WEconomy trends. This chapter presents the potential relations and clusters that could be present between the WEconomy trends. The potential relations can be found in paragraph 4.1. The potential clusters and conclusion of the chapter can be found in paragraph 4.2.

4.1 Potential relations between WEconomy trends

In this paragraph, the potential relations between the WEconomy trends are reviewed based on theories, concepts, written expert opinions and practical applications. The potential relations are established with morphological analysis. The morphological grid with the outcomes of the literature review can be found in appendix B.

4.1.1 Sharing Economy and Collaborative Economy

A first potential relation is found in the definition of the Sharing Economy. The Sharing Economy definition of Botsman (2.1.5) states that collaboration is necessary to make use of assets and therefore suggests a relation between the concepts. This theoretical relation could be reciprocal and also work the other way around. Sharing could be a plausible concept within the producing, consuming, financing and learning in networks of individuals and communities. Somewhere between the Sharing and Collaborative Economy, there is the concept of Collaborative Consumption. Collaborative Consumption could be described as people coordinating



the acquisition and distribution of a resource for a fee or other compensation (Belk, 2014).

Figure 2. The Collaborative Economy (Botsman, 2015).

Collaborative Consumption is often seen as a synonym for sharing (Hamari & Ukkonen, 2013; Matzler, Veider, & Kathan, 2015; McLean, 2015). Belk, however, states that with Collaborative Consumption a compensation is involved, while people do not get incentives when they are sharing (Belk, 2014). Botsman divided the collaborative economy in four clusters; Collaborative Finance, Collaborative Education, Collaborative Production and Collaborative Consumption. As visible in the image below, Collaborative Consumption consists partially of the Sharing Economy, which contradicts the statement of Belk (Botsman, 2013). Within this perspective, the Sharing Economy contributes to the Collaborative Economy. The earlier mentioned definition of Belk could be seen as the peer economy definition of Botsman because it involves people sharing without compensation. In the definition of Botsman, the Sharing Economy takes place in the business-to-consumer segment. The difference in definitions is confusing, but this does not matter for defining a possible relation between the economies. The collaborative Economy might also contribute to the Sharing Economy because in the peer economy (Sharing Economy definition of Belk) there has to be collaboration to share within the network of people/peers. This contribution also returns in the necessary underlying values defined for creating a Collaborative Economy (Belk, 2014; Botsman, 2013).

4.1.2 Functional Economy and Circular Economy

A second potential relation might be found in the conceptualisation of the Circular Economy. The Circular Economy could be conceptualised in the following constructs (Green Alliance & WRAP, 2015):

- Repair and remanufacturing;
- Reuse;
- Bio-refining;
- Closed loop recycling;
- Open loop recycling;
- Servitisation.

In this conceptualisation, it is particularly interesting to look at the construct Servitisation. Servitisation is defined as: *"any system which increases the effective use of assets. It can include leasing and moving from providing products to services instead, thereby deferring consumption of new assets"* (Green Alliance & WRAP, 2015). Servitisation could be seen as a synonym for Product Service Systems, a concept that has been mentioned in section 2.1.3 and describes the intention of the Functional Economy. Both concepts transform products to services that offer functions instead. This means that servitisation and the Functional Economy are both focused on new systems or ways to effectively use assets. With this argumentation, servitisation is the overlapping part between the Functional and Circular Economy.

Therefore, it is assumed that the Circular Economy could have a relation with the Functional Economy. The argument for this statement is that, based on this conceptualisation, an organisation that is focusing on a circular business model could also use parts of the Functional Economy, like switching to services that offer particular functions of a product instead of providing these products. When these services successfully offer the functions the products used to provide, it could contribute to the transition from a product focused economy towards a service focused economy, something which is the main objective of the Functional Economy (Baines, Lightfoot, Benedettini, & Kay, 2009; Boucher & Peillon, 2015). This might increase sustainability since the products used within these services can be used more effectively. The average usage of these products could get higher and the product life cycle might increase. This could be seen as important objectives of the Circular Economy. At the end, this could mean that a functional business model (using PSS or Servitisation) might contribute to the Circular Economy. This conclusion suggests that there could be a one-sided relation in which the Functional Economy contributes to a more Circular Economy. This relation does not work the other way around, since adopting a circular business model does not necessarily mean that a PSS will be introduced. The Circular Economy is much broader than only servitisation. Therefore, it is not expected that the Circular Economy contributes much to the Functional Economy.

4.1.3 Functional Economy and Sharing Economy

The Functional and Sharing Economy could also have a relation. The Functional Economy definition of Stahel (2.1.3) suggests other ways of acquiring the goods and services, like leasing, lending but also sharing. It is about creating the highest use value for the longest possible time while consuming as few material resources and energy as possible. Creating the highest use value could also be accomplished by sharing these products or services among a large amount of users. Sharing could be one of the possible solutions to create a service economy instead of a manufacturing economy (Mont, 2002). Creating a Functional Economy seems like the ultimate societal goal here and sharing goods could be one solution to achieve this. In the theory of Botsman about the Collaborative Economy, the Sharing Economy is a small part of the concept. Within this small part, Botsman defined three clusters, namely Collaborative Lifestyles, Redistribution Markets and Product Service Systems. The concept Product Service Systems means pay to access the benefit or function of a product versus needing to own it outright (Botsman, 2013). This means that within the concept of the Collaborative Consumption (see the image of section 4.4.1), both the Sharing Economy and PSS's plays a role. According to Botsman, the Sharing Economy consists of Collaborative Lifestyles, Redistribution Markets and Product Service Systems. Products Service Systems is a broader concepts, since it could also be introduced in the Business-to-Business markets. The Sharing Economy could be focused on Business-to-Consumer and mostly Peer-to-Peer practices.

Since the concept of product service systems is largely overlapping or even a synonym for the Functional Economy, it could be assumed that the Functional Economy is partially overlapping the Sharing Economy. In practice this would mean that sharing could be considered as a service that could offer functions instead of products. It also suggests that changing from a product-oriented to a service-oriented business model could increase the sharing of functions.

The Functional Economy could be considered as a part of the Sharing Economy, but the Sharing Economy could also contribute to the creation of more service-oriented businesses that offer functions instead of products. Therefore a reciprocal relation between the concepts might be present.

4.1.4 Bio-based Economy and Circular Economy

The Sustainable Biomaterials Collaborative (SBC) came up with four criteria for something to be a bio-material or bio-based product (Sustainable Biomaterials Collaborative, 2016). Sustainable bio-materials are those that are:

- manufactured without hazardous inputs and impacts;
- sourced from sustainably grown and harvested cropland or forests;
- healthy and safe for the environment during use;
- designed to be reutilised at the end of their intended purpose such as recycling or composting.

Especially the fourth criterium is interesting since the reutilisation, recycling and decomposing of products is exactly what is the intention of the Circular Economy within the concept of the WEconomy. Reutilisation and (open- and closed-loop) recycling are both mentioned as a construct within the concept of Circular Economy

(Green Alliance & WRAP, 2015). Based on this conceptualisation, a relation between the Bio-Based and Circular Economy could be present. Materials should have a reutilisation function to be considered a bio-based material, according to this conceptualisation. This means that a bio-based material should automatically have a circular function, in the form of reutilisation, recycling or decomposing.
The Bio-Based economy relies on sustainable, plant-derived resources for fuels, chemicals, materials, food and feed rather than on the evanescent usage of fossil resources (Vanholme et al., 2013). The concept of Cradle-to-Cradle supports this statement, which is shown by the five Cradle-to-Cradle principles (McDonough & Braungart, 2002):

- Material Health: Value materials as nutrients for safe, continuous cycling;
- Material Reutilisation: Maintain continuous flows of biological and technical nutrients;
- Renewable Energy: Power all operations with 100% renewable energy;
- Water Stewardship: Regard water as a precious resource;
- Social Fairness: Celebrate all people and natural systems.

While it might be difficult to achieve these principles it does show that, from the Cradle-to-Cradle perspective, the Bio-Based Economy and Circular Economy could be related. This is shown by the first and second principle, because they seem to be hybrids of circular (continuous cycling, continuous flows) and bio-based (biological and technical nutrients) functions.

Based on these theories, it can be concluded that one particular function of a bio-based material is that it is renewable. Renewability (energy, materials, resources etcetera) implies that the resource could be recycled in some way, which could be achieved by activities taken from the Circular Economy. This shows us that the Bio-based Economy could be a sustainable solution within the Circular Economy, since the creation of bio-materials could increase activities like recycling or bio-refining at the end of the product life cycle (Green Alliance & WRAP, 2015). The Bio-Based Economy could contribute to the Circular Economy this way. Furthermore, bio-materials should have a reutilising function (Sustainable Biomaterials Collaborative, 2016). This means that the Circular Economy contributes to the Bio-Based Economy with recycling and reutilisation at the end of the product life cycle. There could be a reciprocal relation between the two trends, based on these argumentations.

4.1.5 Sharing Economy and Self-production Economy

Within the Sharing Economy, people collaborate to share products or services to create the highest value possible during the product life cycle. The Sharing Economy could stimulate the Self-Production Economy. When looking at 3D-printing, it could be stated that there is lots of sharing going on which has an increasing effect on the growth of the Self-production Economy. 3D Hubs, for example, is an online 3D printing service platform. It operates a network of 3D printers with almost 30.000 locations in over 150 countries, providing over 1 billion people access to a 3D printer within 10 miles of their home (3D Hubs, 2016). People share these

3D printers by making use of this service, instead of buying a 3D printer themselves. Besides sharing the printers for manufacturing the products, the design of these products could also be shared. Services like Thingiverse and Autodesk 123D, among others, offer designers the possibility to share their 3D designs (Thingiverse, 2016; Autodesk 123D, 2016). Sharing the designs with other people creates more value for this particular design, since the design will be used more often.

Based on these services it could be stated that there might be a relation between the two economies. It seems like that the Sharing Economy has a more significant impact on the Self-Production Economy than the other way around. This statement is assumed because the Sharing Economy is much larger than only Sharing 3D print services. These services are however a huge part of the total market of the Self-production Economy. Therefore, a one-sided relation seems more likely than a reciprocal relation.

4.1.6 Sharing Economy and the Internet of Things

The Sharing Economy and the Internet of Things could have a reciprocal relation. Combining the two trends resulted in a new concept named: The Internet of Sharing Things (Trendwatching, 2015). The Internet of Shared Things (IoST) could be defined as the following; *"As more objects become connected, new ways of deriving value from them will become possible for consumers, shared access being one"* (Trendwatching, 2015). At this moment Internet of Things applications are largely in an exploring phase, but it is likely that the number of applications will increase in the future. Gartner forecasts that 6.4 billion connected 'things' will be in use in 2016, a growth of 30% from 2015, and IoT service spending will increase 22% from 2015 (van der Meulen, 2015). There are, however, already some interesting applications of IoST available. There is Audi Unite, which allows a group of people to share an Audi (Audi unite, 2016). Umbrella Here is another example that allows users to share their umbrella with individuals locally when it rains, based on Internet of Things technology (Umbrella Here, 2016). Breather allows people to find unused urban spaces to rent for as little as 30 minutes, to recharge or work in. After booking, users are granted temporary access to unlock the property via the NFC keyless entry system (Breather, 2016). These and other examples show that the Internet of Sharing Things could be a legitimate sub-trend between the Sharing Economy and the Internet of Things. The Internet of Things increases the possibilities of sharing underutilised products, in the case of the examples the car, umbrella and property. New technologies enable us to unlock the idling capacity of resources, which is untapped social, economic, and environmental value of underutilised assets. Social, mobile and location-based technologies enable people to efficiently and safely connect with other individuals who have this idling capacity (goods, services or skills) with those who want it (Botsman, 2013). The Internet of Things would be a new technology which involves social, local and mobile services to increase sharing (Botsman, 2013) or collaborative consumption (John, 2013). The Sharing Economy unlocks alternative applications for the Internet of Things and IoT could be used to let individuals share more efficiently. There might be a reciprocal relation between the two trends, since the trends could contribute to each other by offering additional possibilities within each economy.

4.1.7 Collaborative Economy and Functional Economy

Mont's definition of the Functional Economy (2.1.3) implies that the Functional Economy's goal is to create a change in mindset within society towards a service economy. In the theory of Botsman about the Collaborative Economy, the Sharing Economy is a small part of the concept. Within this small part, Botsman defined three clusters, namely Collaborative Lifestyles, Redistribution Markets and Product Service Systems. Product service systems means pay to access the benefit of a product versus needing to own it outright (Botsman, 2013). This categorisation suggests that the Functional Economy is a part of collaborative consumption, which is a part of the Collaborative Economy. There is also the concept 'collaborative services', which situates itself on the overlap between the two economies. "*Collaborative Services offer a solution to communities by providing a platform for sharing and exchange of resources through innovation and participation. Collaborative Services are designed and utilised on a local scale, to meet specific community needs and have been found to provide Social, Natural, Human, Political, Cultural, Built and Financial Community Capital returns on investment"* (Daniel, Horwitz, & Prato, 2010). This definition of collaborative services shows that collaboration and servitisation could be connected to each other and that these collaborative services could contribute to the creation of a Functional Economy, in the form of sharing and exchanging resources to create different kinds of value within communities.

Collaborating by sharing, swapping, trading or renting to get access to a product or service could be one solution of how the service economy could be created. In other words, this solution would be offering functions on a local scale by individuals collaborating (Daniel, Horwitz, & Prato, 2010). A service economy on the other hand, could create more collaborative initiatives on a local scale as well. Based on this argumentation, it could be stated that collaborating could result in a Functional Economy and that the change from product to service focus could create more collaborative options for individuals or organisations. Therefore, it could be assumed that there might be a reciprocal relation between the Collaborative Economy and the Functional Economy.

4.1.8 Collaborative Economy and Internet of Things

In the first section of this paragraph, it is stated that the Collaborative Economy and Sharing Economy could have a reciprocal relation. The two concepts seem te be heavily related since the Sharing Economy is part of Collaborative Consumption, which is one of the four elements of the Collaborative Economy (Botsman, 2015). This observation has implications for the possible relation between the Collaborative Economy and the Internet of Things. In part 6 of this paragraph three examples of the Internet of Sharing Things are mentioned, namely: sharing a car with a group (Audi unite, 2016), sharing an umbrella (Umbrella Here, 2016) and sharing unused urban space (Breather, 2016). These examples allow individuals to create a network of collaborating individuals to be able to share, swap, trade or rent their car, umbrella or urban space. The goals of the Internet of Sharing Things is to create a platform or service so individuals can share access to these products or services (Trendwatching, 2015). Sharing access is only possible if these people collaborate as a network within IoST platforms by sharing, swapping, trading or renting these products or services. The Internet of Things would

be a new technology which involves social, local and mobile services to increase Collaborative Consumption, which would eventually stimulate the Collaborative Economy (John, 2013). These findings are once more a sign that the Collaborative Economy seems to have a reciprocal relation with the Sharing Economy. It also shows us that collaboration between individuals in a network is necessary to create the possibilities of the Internet of Sharing Things (Atzori, Iera, Morabito & Nitti, 2012). The Internet of Things could contribute to the Collaborative Economy by creating (IoST) platforms that allows users to collaborate more efficiently. The Collaborative Economy could stimulate the usage of the (IoST) platforms when individuals start to collaborate within these platforms. The possible increase of Internet of Sharing Things applications would, in this case, contribute to the overall increase of Internet of Things Applications. Furthermore, the IoST applications could create more and more efficient collaboration in general. Therefore, it is stated that there might be a reciprocal relation between the Collaborative Economy and the Internet of Things.

4.1.9 Functional Economy and Internet of Things

The Internet of Things consists of three components, namely: Smart Systems (sensors, smart devices), Cloud Computing (Software as a Service, Hardware as a Service and Infrastructure as a Service) and Data analytics (Software for analytics) (Ashton, 2009; Cartigny, Distelbrink & Emmery, 2016; Williams, 2014). This distinction already suggests that the network, storage and platform is offered as a service. Furthermore, the concept the Internet of Things as a Service (TaaS) is introduced. The Internet of Things will cooperate with the Internet of Services to provide users with services that are aware of their environment. The three earlier mentioned components abstract the functionalities of Things as a Service as well as provide interoperability and flexibility (Georgantas, Hachem & Teixeira, 2011). Besides to the platform features of Internet of Things, the application of Internet of Things could also be offered as a service. It is possible to provide the three earlier mentioned components together as a service. The Canadian company Rogers is one example of a company that offers packages and services for applying Internet of Things technology (Rogers, 2016).

Besides these business-to-business examples, the earlier examples of customer-oriented services serve (sharing a car, an umbrella or unused space) as an example that the Internet of Things could accelerate the transition towards a Functional Economy. Therefore, there might be a potential relation between the two trends, where the Internet of Things increases the application of functional business models (Atzori, Iera, Morabito & Nitti, 2012). Furthermore, Internet of Things applications could be partially (network, storage, platform) or entirely (complete package of the three elements) offered as a service. This relation would be one-sided since the Internet of Things would contribute to the Functional Economy by offering more possibilities to change the focus from a product-oriented to a service-oriented business model. The use of a functional business model would not necessarily increase the amount of Internet of Things applications since this is just one possible application for the technology. Furthermore, the Functional Economy is very broad, so changing IoT products to services would be a very limited part of this change.

4.1.10 Bio-based Economy and Self-production Economy

Scientific research shows that it could already be possible to use bio-materials in combination with 3D printing. The combination of the two trends leads to biomedical and healthcare opportunities in particular (Chia & Wu, 2015; Emerald Group Publishing Limited, 2015; van Wijk & van Wijk, 2015). One example of biomedical solutions is that it is possible to print human tissue. The material used is bio-based ink and is accepted by the human body (Lee et al., 2014). Another interesting possibility is that 3D-printing a house, by using bio-based plastics from sugar beet, reduces the carbon footprint by at least 60% (van Wijk & van Wijk, 2015). There are still some complications with producing like this (Concrete is, for example, still needed), the 3D-printing technology is still evolving and the possibilities and implications of producing bio-materials is still unclear, but it does show that the combination of the bio-based materials and 3D printing could create possibilities that might be more sustainable than the current ways of producing.

These examples show possibilities regarding the 3D-printing of bio-materials. 3D printing could reduce material and energy waste because the products can be produced on location and just-in-time. Printing bio-materials closes the circular course (see part 11. for more information) (van Wijk & van Wijk, 2015).

While there is still some unclarity about the possibilities and implications about the combination of these two trends, applications of these two trends altogether might result in a sustainable solution. The Self-production Economy, in the form of 3D printing, could contribute to the Bio-based Economy and the other way around. 3D-printing bio-based material might be an efficient and effective manner to apply the bio-based material on location, just-in-time and more sustainably. The Bio-based Economy offers alternative opportunities for the 3D-printer, as in the context it will be used for. Based on these examples, there might be a possible reciprocal relation because both economies are contributing to each other. Bio-based material could be used increasingly for 3D printing, and the 3D printer could be increasingly used to be able to produce bio-based material in a cost-effective manner.

4.1.11 Self-production Economy and Circular Economy

Besides 3D printing with bio-based material, it is also possible to use a 3D printer to print recyclable plastics. In this case, recycled filaments (for example ABS from car dashboards and PET bottles) are utilised for the 3D printer, which prints a product that is also suitable for recycling (Brewster, 2013) (Refil, 2016). There are still some complications with the settings of 3D printing recycled filaments, the costs and the quality of the end-product, but it still proves that it might be possible and that it might be optimised in the future. Besides printing recyclable plastics, it is also possible to print with degradable biomaterials (see part 10.). Both solutions result in a contribution to the Circular Economy by closing the circular loop (van Wijk & van Wijk, 2015). In this case, there could be a possible reciprocal relation. First, the Circular Economy contributes to the Self-production Economy because the 3D-printing of recyclable plastics and degradable biomaterials could increase the number of products that can be recycled and closes the circular loop this way. Second, the recyclable plastics could be used to create filaments for 3D printing again, which creates an open recycling loop (Green Alliance & WRAP, 2015). Creating such a loop could increase the use of a 3D-printer as a sustainable manufacturing solution. It is, for instance, already possible to purchase a print shredder which

allows the user to crush their 3D prints and this shredder could be used to create recycled filaments on their own (Molitch-Hou, 2015). These examples and solutions show that there might be a reciprocal relation between the two trends.

4.1.12 Circular Economy and Internet of Things

Combining Circular Economy principles with Internet of Things applications could dramatically boost resource efficiency and lead to 'broad social benefits' (MacArthur & Waughray, 2016). Pairing IoT applications (in the report they are named intelligent assets) with the Circular Economy could result in possibilities like:

- Smart maintenance; devices can transmit performance data to the manufacturer enabling predictive maintenance and software upgrades. Engineering firm Arup installed, for example, 1,000 sensors on a bridge over the Firth of Forth in Scotland, enabling predictive maintenance which will extend the bridge's use cycle (Arup, 2016).
- Increased farming yields; Australian cotton grower Auscott employs sophisticated IoT-based irrigation and cotton bale tracking systems to assist them in achieving world-class yields (Auscott, 2016).
- Optimised waste collection; The IoT has enabled the creation of intelligent waste containers which measure data such as temperature, humidity, weight and volume on demand. This information facilitates the optimisation of the waste collection system and enables waste management to operate on a more granular level, leading to more sophisticated sorting and recycling processes (Enevo, 2016).
- Connected offices; ICT firm Cisco has developed office optimisation software that allows employees to reserve and use office space and desks. The system can create a 50% reduction in workspace facilities cost per employee, and also allows optimisation of heating, cooling and lighting creating further savings.

While it is debatable whether all examples are part of the Circular Economy, it shows us that IoT could be used to increase resource utilisation or to reduce waste. The third example, optimised waste collection, could be a significant trend that connects the Circular Economy and the Internet of Things perfectly.

There are other examples to be found that connect IoT with the Circular Economy. Case studies in the cities of Wuhan and Shanghai (China) show that it is feasible to use the Internet of Things for municipal solid waste (MSW) management. In this system, Radio Frequency Identification (RFID) technology is applied to the collection, transportation, and disposal of MSW. Meanwhile, source separation is also combined as a best practice for management of trash and recyclable materials. These solutions will help the government getting better and real-time information about every stage of MSW management, and finally, achieve the goal of creating an intelligent cycle (An, Li, Wu, He, & Shi, 2014; Tao & Xiang, 2010).

In these examples, the technology of the Internet of Things allows companies and governments to improve their circular activities with reutilization and waste management. There could be a one-sided relation where

the Internet of Things contributes to the Circular Economy. The Circular Economy could increase IoT applications but, since the Internet of Things is a very broad concept with lots of different applications, it is not expected that the impact is significant at this moment in time.

4.2 Conclusion - The Potential Configuration

In the first part of this paragraph the system dynamics model with the potential relations between WEconomy trends is presented. Furthermore, the hypotheses based on testing the potential relations are designed. The second part of this paragraph is focused on determining the clusters that are present in the system dynamics model. Based on these clusters, four additional hypotheses are designed. The potential relations and clusters together form the Potential Configuration and are the concluding part of the literature review.

4.2.1 Potential relations

Based on the literature review, it can be concluded that there might be several one-sided and reciprocal relations between the different WEconomy trends. The different potential relations from the literature review are visualised in a conceptual model to clarify and summarise these relations. The system dynamics approach that is used to visualise the WEconomy configurations allows for analysing particular relations and feedback loops. In this image the one-sided arrows are the one-sided relations and the two-sided arrows are reciprocal relations.

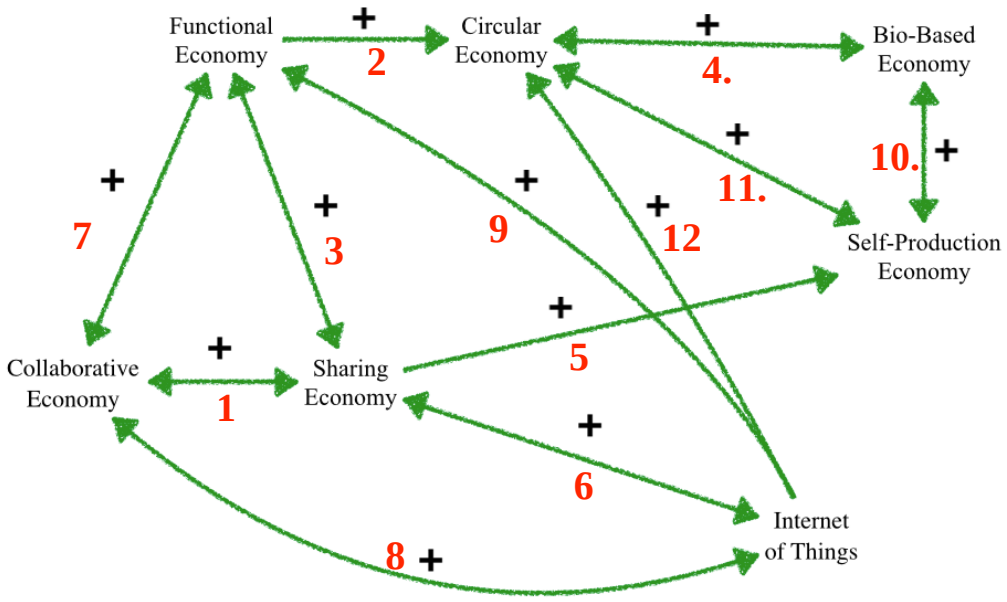


Figure 3. The potential relations between the WEconomy trends

The potential relations of figure 3. are the basis for the hypotheses that are tested with quantitative research. The general hypotheses for determining the relations between WEconomy trends is:

H_0: WEconomy trend A does not contribute to the WEconomy trend B.

H_A: WEconomy trend A contributes to WEconomy trend B.

The list of actual hypotheses can be found in appendix B. The red numbers in figure 3. correspond with the numbers of the hypotheses in this appendix.

4.2.2 Potential clusters

Potential clusters are formed based on the potential relations of figure 3. These potential clusters are established by feedback loops in this model. Feedback loops became visible when at least three WEconomy trends are connected to each other. The feedback loops are reinforcing since only the positive effects of the trends on each other are analysed in this research. The potential clusters can also be tested with quantitative research, and therefore hypotheses are based on the feedback loops that are established. For each cluster, the general hypothesis will be as following:

H_0: Cluster X is present in the perceived configuration

H_A: Cluster X is not present in the perceived configuration

The actual hypotheses can be found in appendix B.

Cluster A.

The first potential cluster consists of a reciprocal feedback loop between the Sharing Economy, the Collaborative Economy and the Functional Economy. Based on the literature review, the Sharing Economy could strengthen the Functional Economy, which could reinforce the Collaborative Economy, which eventually could strengthen the Sharing Economy and vice versa.

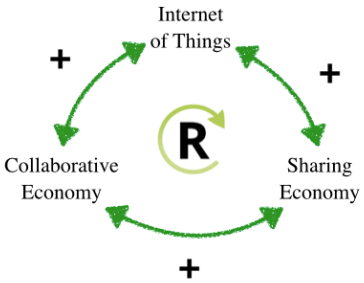


Figure 4. Cluster A.

Cluster B

The next potential feedback loop is interesting since this one-sided feedback loop also exists within Cluster A, but now with the addition of the Internet of Things. This feedback loop could also have a different order in which the Functional Economy contributes to the Sharing Economy which, contributes to the Collaborative Economy.

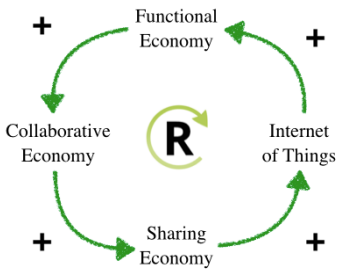


Figure 5. Cluster B.

Cluster C

Cluster C consists of a reciprocal feedback loop. This time, the Internet of Things could strengthen the Collaborative Economy, which could reinforce the Sharing Economy. The Sharing Economy could increase the use of Internet of Things applications. This potential feedback loop also works the other way around.

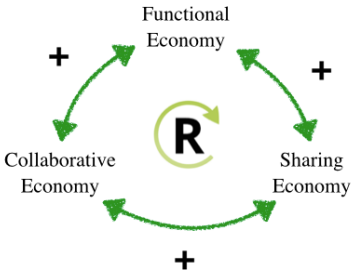


Figure 6. Cluster C.

Cluster D

The last potential cluster involves three different trends as are involved in the previous three clusters. In this cluster, there is a reciprocal feedback loop in which the Circular Economy could contribute to the Bio-Based Economy, which could contribute to the Self-Production Economy. The Self-Production Economy could finally reinforce the Circular Economy.

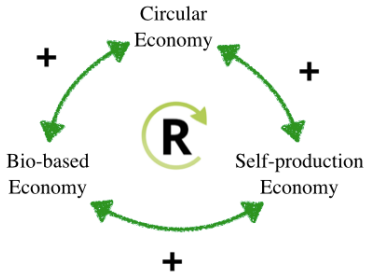


Figure 7. Cluster D.

5. The Perceived Configuration of WEconomy trends

In this chapter, the results of the quantitative research will be presented and analysed. In the first paragraph, the perceived relations between the WEconomy trends are analysed. The tested and established perceived relations result in a visual model. In the second paragraph, the clusters are determined based on the visual model and tested if they are coherent.

5.1 Perceived relations between WEconomy trends

101 respondents participated in this research. To find relations between WEconomy trends, it is important to eliminate data that could be inflicted by chance or randomness. Therefore, a chi-square test is executed to test determine equal values in the data. The statistical term equal values means that the frequency of the answers by the 101 respondents are 50/50. The chi-square tests whether the actual values significantly vary from the expected values of 50. If there is no significant difference between the actual and expected values, the frequencies of the two answer categories are too similar. A similarity between two answer categories means that the group of respondents are too indecisive about the possible relation between the two trends. In practice, this means that the sample does not significantly agree whether they perceive a particular relation between two trends. Indecisive results will not be included in the perceived configuration, because of the indecisiveness of the sample. The indecisive outcomes are discussed further in chapter 6. The variables that significantly differ from the expected values are considered as valid since there is not a possibility of chance or randomness involved. In practice, this means that the sample answered one category significantly more than the other category. Since the answer categories are dichotomous, it is clear that the sample generally agrees about

whether they perceive or do not perceive a particular relation between trends. The decisive outcomes are used for the perceived configuration.

5.1.1 Trends contributing to the Sharing Economy

Test Statistics

	Collab_Share	SelfP_Share	IoT_Share	BioB_Share	Circ_Share	Funct_Share
Chi-Square	39,297[a]	21,871[a]	3,574[a]	21,871[a]	4,366[a]	27,812[a]
df	1	1	1	1	1	1
Asymp. Sig.	,000	,000	,059	,000	,037	,000

a. 0 cells (0,0%) have expected frequencies less than 5. The minimum expected cell frequency is 50,5.

Figure 8. Test Statistics Sharing Economy

The hypotheses for this statistical test are:

H_0: The values do not differ from the expected values of 50/50.

H_A: The values do differ from the expected values of 50/50.

Collab_Share: The critical value χ^2: 39,297 ; $p < .001$; 1 df

SelfP_Share: The critical value χ^2: 21,871 ; $p < .001$; 1 df

IoT_Share: The critical value χ^2: 3,574 ; $p = .059$; 1 df

BioB_Share: The critical value χ^2: 21,871 ; $p < .001$; 1 df

Circ_Share: The critical value χ^2: 4,366 ; $p = .037$; 1 df

Funct_Share: The critical value χ^2: 4,366 ; $p < .001$; 1 df

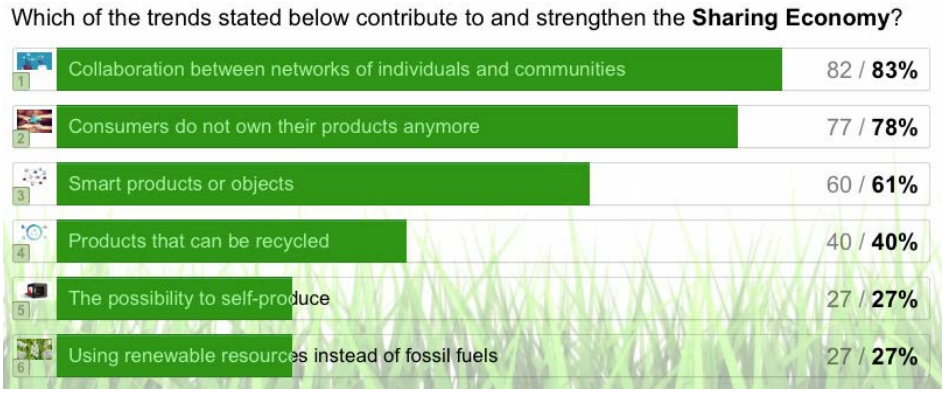
H_0 is rejected when when the observed p-value is larger than the critical p-value.

$\alpha = .05$ and the critical value: $p < .05$.

Based on these data, the H0 hypotheses of Collab_Share, SelfP_Share, BioB_Share, Circ_Share and Funct_Share are rejected, since the p-value of these variables is lower than the critical p-value.

The H0 hypothesis of IoT_Share is accepted because .059 is higher than $\alpha = .05$.

These results mean that respondents are indecisive if the Internet of Things contributes to the Sharing Economy. The answers of the other variables vary enough to be used for the perceived configuration. To see



if the trends contribute or not, the frequencies can be used.

Figure 9. Frequency table Sharing Economy

Based on this frequency table it can be concluded that the Collaborative Economy (83% positive) and the Functional Economy (78% positive) contribute to the Sharing Economy. The Circular Economy (60% negative), the Self-Production Economy (63% negative) and the Bio-Based Economy (63% negative) do not contribute to the Sharing Economy according to the sample. The contribution of the Functional Economy and Collaborative Economy to the Sharing Economy are included in the perceived configuration. The outcomes for the perceived configuration are summarised in the table below.

Included	Indecisive	Excluded
Functional Economy	Internet of Things	Self-Production Economy
Collaborative Economy		Bio-Based Economy
		Circular Economy

Now that these results are established from the quantitative research, hypotheses that are focused on the contribution to the Sharing Economy can be tested. This way, it can be decided if the relations should be included in the actual configuration. The hypotheses that test the contribution of WEconomy trends to the Sharing Economy are:

- Hypothesis 2: The Collaborative Economy contributes to the Sharing Economy
- Hypothesis 4: The Functional Economy contributes to the Sharing Economy
- Hypothesis 10: The Internet of Things contributes to the Sharing Economy

For hypothesis 2 and 4, H_0 is rejected and H_A is accepted. The Functional and Collaborative Economy contribute to the Sharing Economy. These relations are included in the actual configuration. For hypothesis 10, H_0 is accepted and H_A is rejected. The Internet of Things does not contribute to the Sharing Economy in the perceived configuration. This relation is excluded in the actual configuration.

5.1.2 Trends contributing to the Self-Production Economy

Test Statistics

	Collab_SelfP	Share_SelfP	IoT_SelfP	BioB_SelfP	Circ_SelfP	Funct_SelfP
Chi-Square	23,772[a]	7,218[a]	,010[a]	9,515[a]	2,228[a]	29,950[a]
df	1	1	1	1	1	1
Asymp. Sig.	,000	,007	,921	,002	,136	,000

a. 0 cells (0,0%) have expected frequencies less than 5. The minimum expected cell frequency is 50,5.

Figure 10. Test Statistics

Self-Production Economy

The hypotheses for this statistical test are:

H_0: The values do not differ from the expected values of 50/50.

H_A: The values do differ from the expected values of 50/50.

Collab_SelfP: The critical value χ^2: 23,772 ; $p < .001$; 1 df

Share_SelfP: The critical value χ^2: 7,218 ; $p < .01$; 1 df

IoT_SelfP: The critical value χ^2: 0,010 ; $p = .921$; 1 df

BioB_SelfP: The critical value χ^2: 9,515 ; $p < .01$; 1 df

Circ_SelfP: The critical value χ^2: 2,228 ; $p = .136$; 1 df

Funct_SelfP: The critical value χ^2: 29,950 ; $p < .001$; 1 df

H_0 is rejected when when the observed p-value is larger than the critical p-value.

$\alpha = .05$ and the critical value: $p < .05$.

Based on these data, the H0 hypotheses of Collab_SelfP, Share_SelfP, BioB_SelfP and Funct_Share are rejected, since the p-value of these variables is lower than the critical p-value.

The H0 hypotheses of IoT_SelfP and Circ_SelfP is accepted because .921 and .136 are higher than $\alpha = .05$.

These results mean that respondents are indecisive if the Internet of Things and Circular Economy contribute to the Self-Production Economy. The answers of the other variables vary enough to be used for the perceived configuration. To see if they contribute or not, the frequencies can be used.

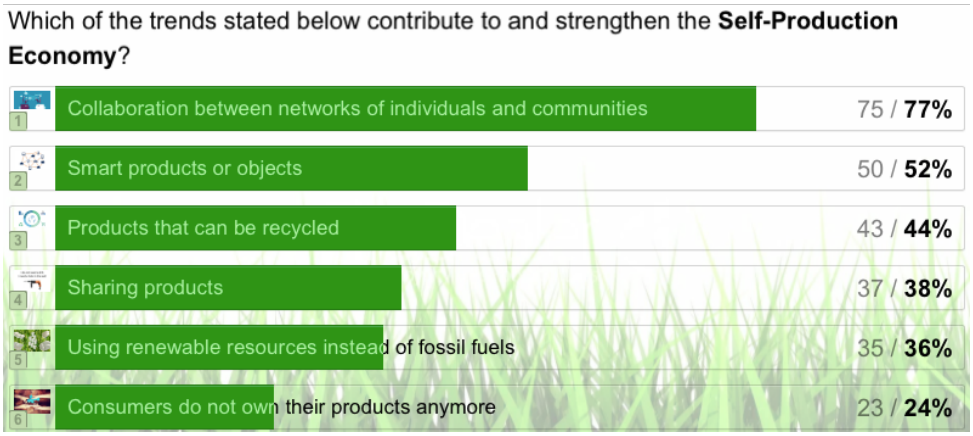


Figure 10. Frequency table Self-production Economy

Based on this table it can be concluded that the Collaborative Economy (77% positive) contributes to the Self-Production Economy. The Circular Economy (56% negative), the Sharing Economy (62% negative), the Bio-Based Economy (64% negative) and the Functional Economy (76% negative) do not contribute to the Self-Production Economy according to the sample. The contribution of the Collaborative Economy to the Self-Production Economy is included in the perceived configuration. The outcomes for the perceived configuration are summarised in the table below.

Included	Indecisive	Excluded
Collaborative Economy	Internet of Things	Self-Production Economy
	Circular Economy	Bio-Based Economy
		Sharing Economy

Now that these results are established from the empirical research, hypotheses that are focused on the contribution to the Self-production Economy can be tested. This way, it can be decided if the relations should be included in the actual configuration. The hypotheses that test the contribution of WEconomy trends to the Self-production Economy are:

- Hypothesis 8: The Sharing Economy contributes to the Self-production Economy
- Hypothesis 16: The Bio-based Economy contributes to the Self-production Economy
- Hypothesis 19: The Circular Economy contributes to the Self-production Economy

For hypothesis 8, 16 and 19, H_0 is accepted and H_A is rejected. The Sharing Economy, Bio-based Economy and Circular Economy do not contribute to the Self-production Economy in the perceived configuration. These relations are excluded in the actual configuration. Furthermore, the Contribution of the Collaborative Economy to the Self-production Economy is included in the perceived configuration, but not in the actual configuration. The respondents perceive that the Collaborative Economy contributes to the Self-production Economy, while there is no theoretical background for this relation.

5.1.3 Trends contributing to the Collaborative Economy

Test Statistics

	Share_Collab	SelfP_Collab	IoT_Collab	BioB_Collab	Circ_Collab	Funct_Collab
Chi-Square	18,307[a]	2,861[a]	12,129[a]	23,772[a]	13,554[a]	21,871[a]
df	1	1	1	1	1	1
Asymp. Sig.	,000	,091	,000	,000	,000	,000

a. 0 cells (0,0%) have expected frequencies less than 5. The minimum expected cell frequency is 50,5.

Figure 11. Test Statistics Collaborative Economy

The hypotheses for this statistical test are:

H_0: The values do not differ from the expected values of 50/50.

H_A: The values do differ from the expected values of 50/50.

Share_Collab: The critical value χ^2: 18,307 ; $p < .001$; 1 df

SelfP_Collab: The critical value χ^2: 2,861 ; $p = .091$; 1 df

IoT_Collab: The critical value χ^2: 12,129 ; p < .001 ; 1 df

BioB_Collab: The critical value χ^2: 23,772 ; p < .001 ; 1 df

Circ_Collab: The critical value χ^2: 13,554 ; p < .001 ; 1 df

Funct_Collab: The critical value χ^2: 21,871 ; p < .001 ; 1 df

H_0 is rejected when when the observed p-value is larger than the critical p-value.

α = .05 and the critical value: p < .05.

Based on these data, the H0 hypotheses of Share_Collab, Iot_Collab, BioB_Collab, Circ_Collab and Funct_Collab are rejected, since the p-value of these variables is lower than the critical p-value.

The H0 hypothesis of SelfP_Collab is accepted because .091 is higher than α = .05.

These results mean that respondents are indecisive if the Self-Production Economy contributes to the Collaborative Economy. The answers of the other variables vary enough to be used for the perceived configuration. To see if they contribute or not, the frequencies can be used.

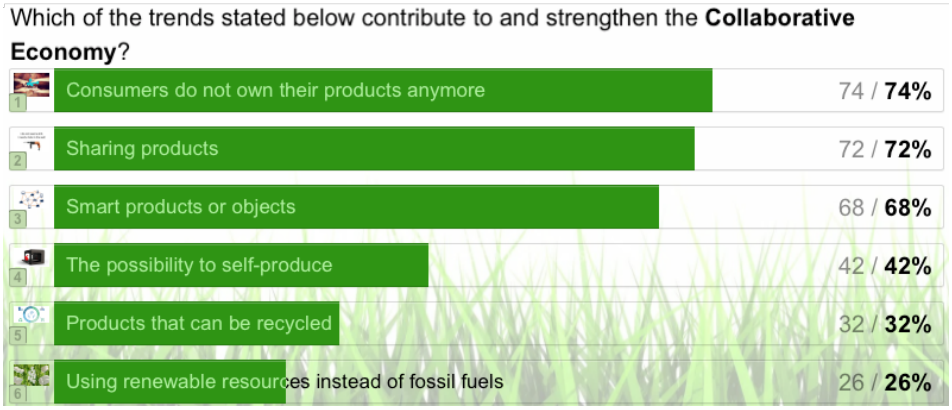


Figure 12. Frequency table Collaborative Economy

Based on this table it can be concluded that the Functional Economy (74% positive), the Sharing Economy (72% positive) and the Internet of Things (68% positive) contribute to the Collaborative Economy. The Circular Economy (68% negative) and the Bio-Based Economy (74% negative) do not contribute to the Collaborative Economy according to the sample. The contribution of the Functional Economy, the Sharing Economy and the Internet of Things to the Collaborative Economy are included in the perceived configuration. The outcomes for the perceived configuration are summarised in the table below.

Included	Indecisive	Excluded
Functional Economy	Self-Production Economy	Bio-Based Economy
Sharing Economy		Circular Economy
Internet of Things		

Now that these results are established from the empirical research, hypotheses that are focused on the contribution to the Collaborative Economy can be tested. This way, it can be decided if the relations should be included in the actual configuration. The hypotheses that test the contribution of WEconomy trends to the Collaborative Economy are:

- Hypothesis 1: The Sharing Economy contributes to the Collaborative Economy
- Hypothesis 12: The Functional Economy contributes to the Collaborative Economy
- Hypothesis 14: The Internet of Things contributes to the Collaborative Economy

For hypothesis 1, 12 and 14, H_0 is rejected and H_A is accepted. The Sharing Economy, Functional Economy and the Internet of Things contribute to the Collaborative Economy. These relations are also included in the actual configuration.

5.1.4 Trends contributing to the Circular Economy

Test Statistics

	Collab_Circ	SelfP_Circ	IoT_Circ	BioB_Circ	Share_Circ	Funct_Circ
Chi-Square	25,752[a]	8,327[a]	9,515[a]	36,842[a]	,248[a]	,485[a]
df	1	1	1	1	1	1
Asymp. Sig.	,000	,004	,002	,000	,619	,486

a. 0 cells (0,0%) have expected frequencies less than 5. The minimum expected cell frequency is 50,5.

Figure 13. Test Statistics Circular Economy

The hypotheses for this statistical test are:

H_0: The values do not differ from the expected values of 50/50.

H_A: The values do differ from the expected values of 50/50.

Collab_Circ: The critical value χ^2: 25,752 ; $p < .001$; 1 df

SelfP_Circ: The critical value χ^2: 8,327 ; $p < .01$; 1 df

IoT_Circ: The critical value χ^2: 9,515 ; $p < .01$; 1 df

BioB_Circ: The critical value χ^2: 36,842 ; $p < .001$; 1 df

Share_Circ: The critical value χ^2: ,248 ; $p = .619$; 1 df

Funct_Circ: The critical value χ^2: ,486 ; $p = .486$; 1 df

H_0 is rejected when when the observed p-value is larger than the critical p-value.

$\alpha = .05$ and the critical value: $p < .05$.

Based on these data, the H0 hypotheses of Collab_Circ, SelfP_Circ, IoT_Circ and BioB_Circ, are rejected, since the p-value of these variables is lower than the critical p-value.

The H0 hypotheses of Share_Circ and Funct_Circ is accepted because .619 and .486 are higher than $\alpha = .05$.

These results mean that respondents are indecisive if the Sharing Economy and Functional Economy contribute to the Circular Economy. The answers of the other variables vary enough to be used for the perceived configuration. To see if they contribute or not, the frequencies can be used.

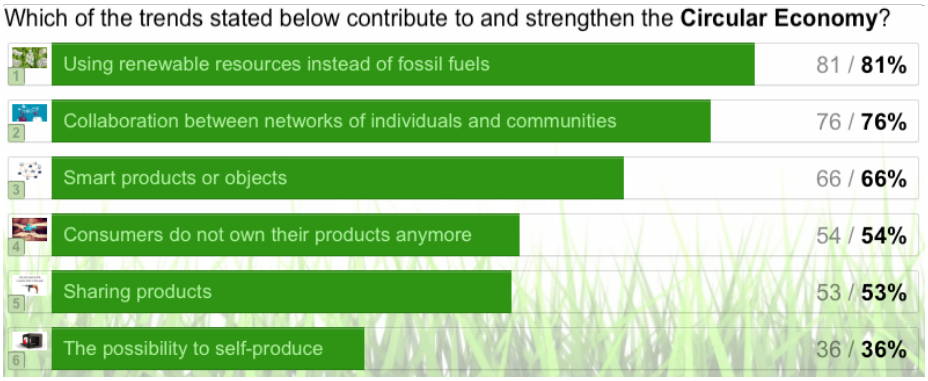


Figure 14. Frequency table Circular Economy

Based on this table it can be concluded that the Bio-based Economy (81% positive), the Collaborative Economy (76% positive) and the Internet of Things (66% positive) contribute to the Circular Economy. The Self-Production Economy (64% negative) does not contribute to the Collaborative Economy according to the sample. The contribution of the Bio-based Economy, the Collaborative Economy and the Internet of Things to the Circular Economy are included in the perceived configuration. The outcomes for the perceived configuration are summarised in the table below.

Included	Indecisive	Excluded
Bio-Based Economy	Functional Economy	Self-Production Economy
Collaborative Economy	Sharing Economy	
Internet of Things		

Now that these results are established from the empirical research, hypotheses that are focused on the contribution to the Circular Economy can be tested. This way, it can be decided if the relations should be included in the actual configuration. The hypotheses that test the contribution of WEconomy trends to the Circular Economy are:

- Hypothesis 3: The Functional Economy contributes to the Circular Economy
- Hypothesis 6: The Bio-based Economy contributes to the Circular Economy
- Hypothesis 18: The Self-production Economy contributes to the Circular Economy
- Hypothesis 20: The Internet of Things contributes to the Circular Economy

For hypothesis 6 and 20, H_0 is rejected and H_A is accepted. The Bio-based Economy and the Internet of Things contribute to the Circular Economy. These relations are also included in the actual configuration. For hypothesis 3 and 18, H_0 is accepted and H_A is rejected. The Functional Economy and Self-production Economy do not contribute to the Circular Economy in the perceived configuration. These relations are excluded in the actual configuration. Furthermore, the Contribution of the Collaborative Economy to the Circular Economy

is included in the perceived configuration, but not in the actual configuration. The respondents perceive that the Collaborative Economy contributes to the Circular Economy, while there is no theoretical background for this relation. This outcome is further discussed in chapter 6.

5.1.5 Chi-square test trends contributing to the Functional Economy

Test Statistics

	Collab_Funct	SelfP_Funct	IoT_Funct	BioB_Funct	Circ_Funct	Share_Funct
Chi-Square	15,059[a]	23,772[a]	8,327[a]	23,772[a]	6,188[a]	41,832[a]
df	1	1	1	1	1	1
Asymp. Sig.	,000	,000	,004	,000	,013	,000

a. 0 cells (0,0%) have expected frequencies less than 5. The minimum expected cell frequency is 50,5.

Figure 15. Test Statistics Functional Economy

The hypotheses for this statistical test are:

H_0: The values do not differ from the expected values of 50/50.

H_A: The values do differ from the expected values of 50/50.

Collab_Funct The critical value χ^2: 15,059 ; $p < .001$; 1 df

SelfP_Funct: The critical value χ^2: 23,772 ; $p < .001$; 1 df

IoT_Funct: The critical value χ^2: 8,327 ; $p < .01$; 1 df

BioB_Funct: The critical value χ^2: 23,772 ; $p < .001$; 1 df

Circ_Funct: The critical value χ^2: 6,188 ; $p < .05$; 1 df

Share_Funct: The critical value χ^2: 41,832 ; $p < .001$; 1 df

H_0 is rejected when when the observed p-value is larger than the critical p-value.

$\alpha = .05$ and the critical value: $p < .05$.

Based on these data, the H0 hypotheses of all the variables are rejected, since the p-value of these variables is lower than the critical p-value. These results mean that respondents are not indecisive about the contribution

of these trends to the Circular Economy. The answers of the variables vary enough to be used for the perceived configuration. To see if they contribute or not, the frequencies can be used.

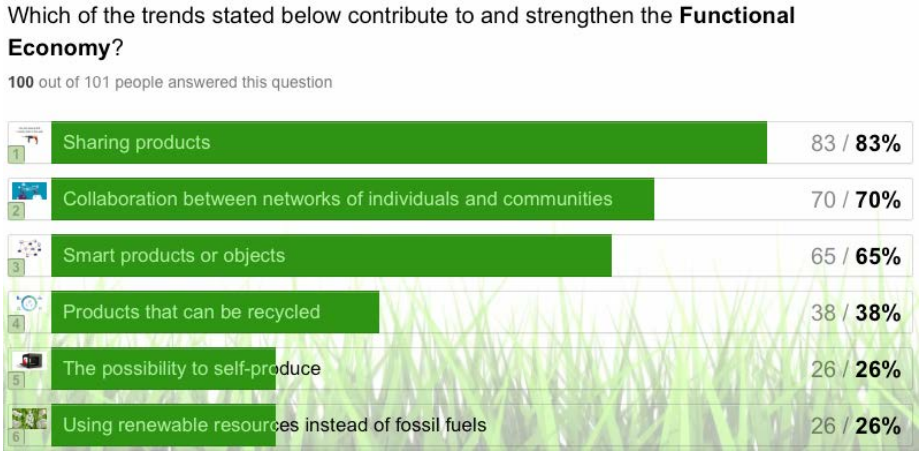


Figure 16. Frequency table Functional Economy

Based on this table it can be concluded that the Sharing Economy (83% positive), the Collaborative Economy (70% positive) and the Internet of Things (65% positive) contribute to the Functional Economy. The Circular Economy (62% negative), Self-Production Economy (74% negative) and the Bio-based Economy (74% negative) do not contribute to the Functional Economy according to the sample. The contribution of the Sharing Economy, the Collaborative Economy and the Internet of Things to the Functional Economy are included in the perceived configuration. The outcomes for the perceived configuration are summarised in the table below.

Included	Indecisive	Excluded
Sharing Economy		Circular Economy
Collaborative Economy		Self-Production Economy
Internet of Things		Bio-Based Economy

Now that these results are established from the empirical research, hypotheses that are focused on the contribution to the Functional Economy can be tested. This way, it can be decided if the relations should be included in the actual configuration. The hypotheses that test the contribution of WEconomy trends to the Functional Economy are:

- Hypothesis 5: The Sharing Economy contributes to the Functional Economy
- Hypothesis 11: The Collaborative Economy contributes to the Functional Economy
- Hypothesis 15: The Internet of Things contributes to the Functional Economy

For hypothesis 5, 11 and 15, H_0 is rejected and H_A is accepted. The Sharing Economy, the Collaborative Economy and the Internet of Things contribute to the Functional Economy. These relations are also included in the actual configuration.

5.1.6 Chi-square test trends contributing to the Bio-Based Economy

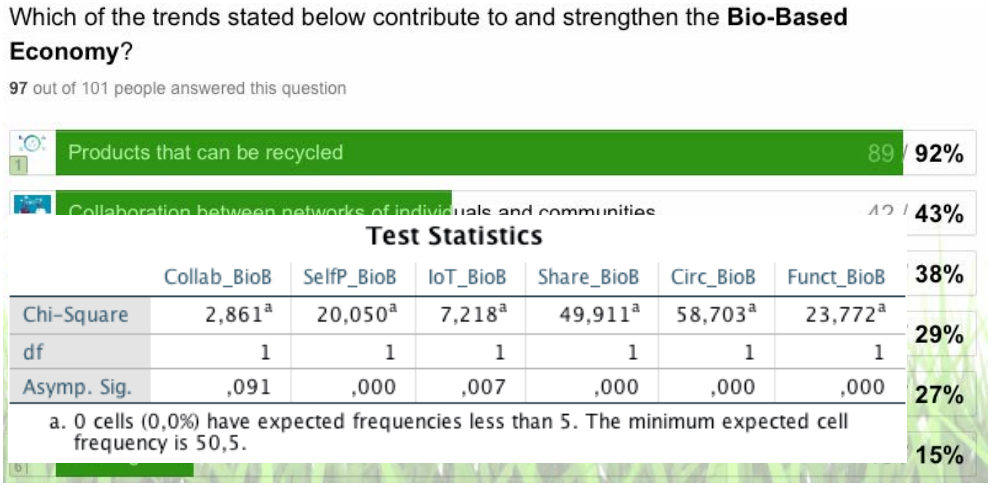


Figure 17. Test Statistics Bio-Based Economy

The hypotheses for this statistical test are:

H_0: The values do not differ from the expected values of 50/50.

H_A: The values do differ from the expected values of 50/50.

Collab_BioB The critical value χ^2: 2,861 ; p = .091 ; 1 df

SelfP_BioB: The critical value χ^2: 20,050 ; p < .001 ; 1 df

IoT_BioB: The critical value χ^2: 7,218 ; p < .01 ; 1 df

Share_BioB: The critical value χ^2: 49,911 ; p < .001 ; 1 df

Circ_BioB: The critical value χ^2: 58,703 ; p < .001 ; 1 df

Funct_BioB: The critical value χ^2: 23,772 ; p < .001 ; 1 df

H_0 is rejected when when the observed p-value is larger than the critical p-value.

α = .05 and the critical value: p < .05.

Based on these data, the H0 hypotheses of SelfP_BioB, IoT_BioB, Share_BioB, Circ_BioB and Funct_BioB are rejected, since the p-value of these variables is lower than the critical p-value.

The H0 hypotheses of Collab_BioB is accepted because .091 is higher than α = .05.

These results mean that respondents are indecisive if the Collaborative Economy contributes to the Bio-based Economy. The answers of the other variables vary enough to be used for the perceived configuration. To see if they contribute or not, the frequencies can be used.

Figure 18. Frequency table Bio-Based Economy

Based on this table it can be concluded that the Circular Economy (92% positive) contributes to the Bio-based Economy. The Internet of Things (62% negative), the Self-production Economy (71% negative), Functional Economy (63% negative) and the Sharing Economy (85% negative) do not contribute to the Bio-based Economy according to the sample. The contribution of the Circular Economy to the Bio-based Economy is included in the perceived configuration. The outcomes for the perceived configuration are summarised in the table below.

Included	Indecisive	Excluded
Circular Economy	Collaborative Economy	Internet of Things
		Self-Production Economy
		Functional Economy
		Sharing Economy

Now that these results are established from the empirical research, hypotheses that are focused on the contribution to the Bio-Based Economy can be tested. This way, it can be decided if the relations should be included in the actual configuration. The hypotheses that test the contribution of WEconomy trends to the Bio-based Economy are:

- Hypothesis 7: The Circular Economy contributes to the Bio-based Economy
- Hypothesis 17: The Self-production Economy contributes to the Bio-based Economy

For hypothesis 7, H_0 is rejected and H_A is accepted. The Circular Economy contributes to the Bio-based Economy. This relation is included in the actual configuration. For hypothesis 17, H_0 is accepted and H_A is rejected. The Self-production Economy does not contribute to the Bio-based Economy in the perceived configuration. This relation is excluded in the actual configuration.

5.1.7 Trends contributing to the Internet of Things

Test Statistics

	Collab_IoT	SelfP_IoT	Share_IoT	BioB_IoT	Circ_IoT	Funct_IoT
Chi-Square	44,446[a]	1,673[a]	3,574[a]	49,911[a]	32,168[a]	1,673[a]
df	1	1	1	1	1	1
Asymp. Sig.	,000	,196	,059	,000	,000	,196

a. 0 cells (0,0%) have expected frequencies less than 5. The minimum expected cell frequency is 50,5.

Figure 19. Test Statistics Internet of Things

The hypotheses for this statistical test are:

H_0: The values do not differ from the expected values of 50/50.

H_A: The values do differ from the expected values of 50/50.

Collab_IoT: The critical value χ^2: 44,446 ; $p < .001$; 1 df

SelfP_IoT: The critical value χ^2: 1,673 ; $p = .196$; 1 df

Share_IoT: The critical value χ^2: 3,574 ; $p = .059$; 1 df

BioB_IoT: The critical value χ^2: 49,911 ; $p < .001$; 1 df

Circ_IoT: The critical value χ^2: 32,168 ; $p < .001$; 1 df

Funct_IoT: The critical value χ^2: 1,673 ; $p = .196$; 1 df

H_0 is rejected when when the observed p-value is larger than the critical p-value.

$\alpha = .05$ and the critical value: $p < .05$.

Based on these data, the H0 hypotheses of Collab_IoT, BioB_IoT and Circ_IoT are rejected, since the p-value of these variables is lower than the critical p-value.

The H0 hypotheses of SelfP_BIoT, Share_IoT and Funct_IoT are accepted because .196, .059 and .196 are higher than $\alpha = .05$.

These results mean that respondents are indecisive if the Self-production Economy, Sharing Economy and Functional Economy contribute to the Internet of Things. The answers of the other variables vary enough to be used for the perceived configuration. To see if they contribute or not, the frequencies can be used.

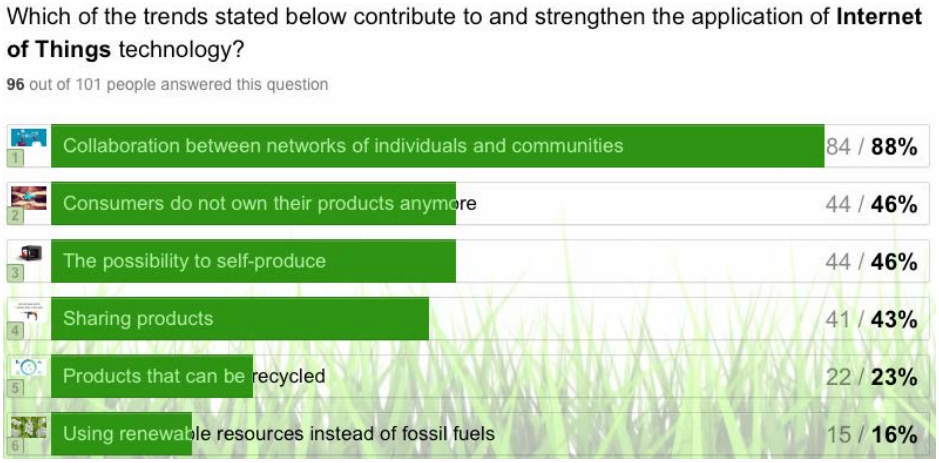


Figure 20. Frequency table Internet of Things

Based on this table it can be concluded that the Collaborative Economy (88% positive) contributes to the Internet of Things. The Circular Economy (77% negative) and the Bio-based Economy (84% negative) do not

Included	Indecisive	Excluded
Collaborative Economy	Functional Economy	Circular Economy
	Self-Production Economy	Bio-based Economy
	Sharing Economy	

contribute to the Internet of Things according to the sample. The contribution of the Collaborative Economy to the Internet of Things is included in the perceived configuration. The outcomes for the perceived configuration are summarised in the table below.

Now that these results are established from the empirical research, hypotheses that are focused on the contribution to the Internet of Things can be tested. This way, it can be decided if the relations should be included in the actual configuration. The hypotheses that test the contribution of WEconomy trends to the Internet of Things are:

- Hypothesis 9: The Sharing Economy contributes to the Internet of Things
- Hypothesis 13: The Collaborative Economy contributes to the Internet of Things

For hypothesis 13, H_0 is rejected and H_A is accepted. The Collaborative Economy contributes to the Internet of Things. This relation is included in the actual configuration. For hypothesis 9, H_0 is accepted and H_A is rejected. The Sharing Economy does not contribute to the Internet of Things in the perceived configuration.

5.2 Conclusion perceived relations

To test the hypotheses regarding the feedback loops, a system dynamics model is created for the Perceived Configuration. This model is used to determine the feedback loops of the Perceived Configuration. This way, the clusters of the Perceived Configuration can be compared with the Potential Configuration by testing the

hypotheses. Based on the outcomes of the chi-square tests, relations are included or excluded for the Perceived Configuration. The included relations are visualised in the following model.

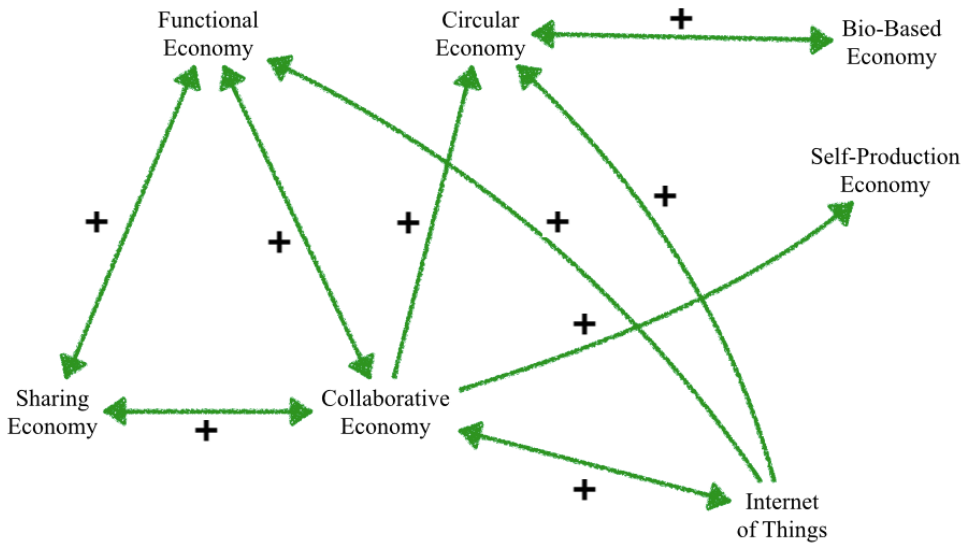


Figure 21. The perceived relations between WEconomy trends

The following reciprocal relations have been established in the perceived configuration:

- Functional Economy and Sharing Economy;
- Functional Economy and Collaborative Economy;
- Collaborative Economy and the Internet of Things;
- Circular Economy and Bio-Based Economy.

Furthermore, a few one-sided relations are determined:

- Collaborative Economy contributes to the Circular Economy.
- Collaborative Economy contributes to the Self-Production Economy.
- The Internet of Things contributes to the Functional Economy.
- The Internet of things contributes to the Circular Economy.

5.3 Perceived clusters of WEconomy trends

Based on the visual model in figure 15, the following clusters can be established:

- The reciprocal feedback loop: Collaborative Economy - Functional Economy - Sharing Economy - Collaborative Economy.

- Based on the outcomes of the survey, the Internet of Things could contribute to this cluster in two ways.
  - There is the one-sided feedback loop: Internet of Things - Functional Economy - Sharing Economy - Collaborative Economy - Internet of Things.
  - There is the one-sided feedback loop: Internet of Things - Functional Economy - Collaborative Economy - Internet of Things.

This has implications for two hypotheses. Cluster C and D are not present in the perceived configuration.

- For hypothesis 23 (cluster C), H_0 is rejected and H_A is accepted. There is no reciprocal relation between the Internet of Things and the Sharing Economy in the perceived configuration.
- For hypothesis 24 (cluster D), H_0 is rejected and H_A is accepted. The Self-Production Economy has no relations with the Circular Economy or the Bio-Based Economy.

For the feedback loops that are present in the perceived configuration, it is interesting to see if the respondents are decisive about these feedback loops. Decisiveness means that the respondents see all the particular relations within a cluster. These clusters could be tested by using the chi-square in cross-tabs. The chi-square in cross-tabs is suitable since it measures the coherence of two nominal variables. When there is a significant coherence between two trends, the answers the sample has given on both questions is coherent. In practice this means that it the amount of respondents that has answered both questions the same way is significant. When the coherence is significant and the respondents perceived both variables as a contribution, it is included in the feedback loops of the Perceived Configuration. The outcomes of the chi-square in the cross-tabs can be found in appendix E.

5.3.1 Reciprocal feedback loop

The reciprocal cluster will be divided in two one-sided feedback loops to see if both directions have a significant coherence. The first direction is: Collaborative Economy - Functional Economy - Sharing Economy - Collaborative Economy.

H_0: There is no significant coherence between the answers of Collab_Funct and Funct_Share.

H_A: There is a significant coherence between the answers of Collab_Funct and Funct_Share.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5,516[a]	1	,019		
Continuity Correction[b]	4,390	1	,036		
Likelihood Ratio	5,241	1	,022		
Fisher's Exact Test				,024	,020
Linear-by-Linear Association	5,462	1	,019		
N of Valid Cases	101				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 7,37.

b. Computed only for a 2x2 table

Collab_Funct * Funct_Share Crosstabulation

Count

		Funct_Share		
		No Contribution	Contribution	Total
Collab_Funct	No Contribution	12	19	31
	Contribution	12	58	70
Total		24	77	101

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	,234	,019
	Cramer's V	,234	,019
N of Valid Cases		101	

Figure 22. Test Statistics Collab_Funct*Funct_Share

Collab_Funct*Funct_Share: The critical value χ^2: 5,516 ; $p < .05$; 1 df

H_0 is rejected when when the observed p-value is larger than the critical p-value.

$\alpha = .05$ and the critical value: $p < .05$.

Based on these data, the H0 hypotheses is rejected, since the p-value of this variable (.019) is lower than the critical p-value (<.05). Therefore, it can be concluded that there is a significant coherence between the answers of the two variables. In the frequency table, it is visible that many respondents see both a relation between the Functional and Sharing Economy and between the Collaborative and Functional Economy. The strength of the coherence could be indicated as slightly weak since the Cramer's V is .234.

H_0: There is no significant coherence between the answers of Funct_Share and Share_Collab.

H_A: There is a significant coherence between the answers of Funct_Share and Share_Collab.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4,508[a]	1	,034		
Continuity Correction[b]	3,478	1	,062		
Likelihood Ratio	4,264	1	,039		
Fisher's Exact Test				,042	,033
Linear-by-Linear Association	4,463	1	,035		
N of Valid Cases	101				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 6,89.

b. Computed only for a 2x2 table

Funct_Share * Share_Collab Crosstabulation

Count

		Share_Collab		
		No Contribution	Contribution	Total
Funct_Share	No Contribution	11	13	24
	Contribution	18	59	77
Total		29	72	101

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	,211	,034
	Cramer's V	,211	,034
N of Valid Cases		101	

Figure 23. Test Statistics Funct_Share*Share_Collab

Funct_Share*Share_Collab: The critical value χ^2: 4,508 ; $p < .05$; 1 df

H_0 is rejected when when the observed p-value is larger than the critical p-value.

$\alpha = .05$ and the critical value: $p < .05$.

Based on these data, the H0 hypotheses is rejected, since the p-value of this variable (.034) is lower than the critical p-value (<.05). Therefore, it can be concluded that there is a significant coherence between the answers of the two variables. In the frequency table, it is visible that many respondents see both a relation between the Sharing and Collaborative Economy and between the Functional and Sharing Economy. The strength of the coherence could be indicated as slightly weak since the Cramer's V is .211.

H_0: There is no significant coherence between the answers of Share_Collab and Collab_Funct.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	11,460[a]	1	,001		
Continuity Correction[b]	9,902	1	,002		
Likelihood Ratio	10,976	1	,001		
Fisher's Exact Test				,002	,001
Linear-by-Linear Association	11,346	1	,001		
N of Valid Cases	101				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 8,90.

b. Computed only for a 2x2 table

Share_Collab * Collab_Funct Crosstabulation

Count

		Collab_Funct		
		No Contribution	Contribution	Total
Share_Collab	No Contribution	16	13	29
	Contribution	15	57	72
Total		31	70	101

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	,337	,001
	Cramer's V	,337	,001
N of Valid Cases		101	

H_A: There is a significant coherence between the answers of Share_Collab and Collab_Funct.

Figure 24. Test Statistics Share_Collab*Collab_Funct

Share_Collab*Collab_Funct: The critical value χ^2: 11,460 ; $p < .001$; 1 df

H_0 is rejected when when the observed p-value is larger than the critical p-value.

$\alpha = .05$ and the critical value: $p < .05$.

Based on these data, the H0 hypotheses is rejected, since the p-value of this variable (.001) is lower than the critical p-value (<.05). Therefore, it can be concluded that there is a significant coherence between the answers of the two variables. In the frequency table, it is visible that many respondents see both a relation between the Collaborative and Functional Economy and between the Sharing and Collaborative Economy. The strength of the coherence could be indicated as medium since the Cramer's V is .337.

H_0: There is no significant coherence between the answers of Collab_Share and Share_Funct.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5,781[a]	1	,016		
Continuity Correction[b]	4,292	1	,038		
Likelihood Ratio	5,018	1	,025		
Fisher's Exact Test				,040	,024
Linear-by-Linear Association	5,724	1	,017		
N of Valid Cases	101				

a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 3,39.

b. Computed only for a 2x2 table

Collab_Share * Share_Funct Crosstabulation

Count

		Share_Funct		
		No Contribution	Contribution	Total
Collab_Share	No Contribution	7	12	19
	Contribution	11	71	82
Total		18	83	101

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	,239	,016
	Cramer's V	,239	,016
N of Valid Cases		101	

H_A: There is a significant coherence between the answers of Collab_Share and Share_Funct.

Figure 25. Test Statistics Collab_Share*Share_Funct

Collab_Share*Share_Funct: The critical value Fisher's exact test (expected count in one cell is less than 5): $p < .05$

H_0 is rejected when when the observed p-value is larger than the critical p-value.

$\alpha = .05$ and the critical value: $p < .05$.

Based on these data, the H0 hypotheses is rejected, since the p-value of this variable (.04) is lower than the critical p-value (<.05). Therefore, it can be concluded that there is a significant coherence between the answers of the two variables. In the frequency table, it is visible that many respondents see both a relation between the Sharing and Functional Economy and between the Collaborative and Sharing Economy. The strength of the coherence could be indicated as slightly weak since the Cramer's V is .239.

H_0: There is no significant coherence between the answers of Share_Funct and Funct_Collab.

H_A: There is a significant coherence between the answers of Share_Funct and Funct_Collab.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	13,217[a]	1	,000		
Continuity Correction[b]	11,167	1	,001		
Likelihood Ratio	11,845	1	,001		
Fisher's Exact Test				,001	,001
Linear-by-Linear Association	13,086	1	,000		
N of Valid Cases	101				

a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 4,81.

b. Computed only for a 2x2 table

Share_Funct * Funct_Collab Crosstabulation

Count

		Funct_Collab		
		No Contribution	Contribution	Total
Share_Funct	No Contribution	11	7	18
	Contribution	16	67	83
Total		27	74	101

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	,362	,000
	Cramer's V	,362	,000
N of Valid Cases		101	

Figure 26. Test Statistics Share_Funct*Funct_Collab

Share_Funct*Funct_Collab: The critical value Fisher's exact test (expected count in one cell is less than 5): p < .001

H_0 is rejected when when the observed p-value is larger than the critical p-value.

$\alpha = .05$ and the critical value: $p < .05$.

Based on these data, the H0 hypotheses is rejected, since the p-value of this variable (.001) is lower than the critical p-value (<.05). Therefore, it can be concluded that there is a significant coherence between the answers of the two variables. In the frequency table, it is visible that many respondents see both a relation between the Sharing and Functional Economy and between the Functional and Collaborative Economy. The strength of the coherence could be indicated as above medium since the Cramer's V is .362.

H_0: There is no significant coherence between the answers of Funct_Collab and Collab_Share.

H_A: There is a significant coherence between the answers of Funct_Collab and Collab_Share.

Figure 27. Test Statistics Funct_Collab*Collab_Share

Funct_Collab*Collab_Share: The critical value χ^2: 5,088 ; $p < .05$; 1 df

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5,088[a]	1	,024		
Continuity Correction[b]	3,873	1	,049		
Likelihood Ratio	4,679	1	,031		
Fisher's Exact Test				,041	,028
Linear-by-Linear Association	5,038	1	,025		
N of Valid Cases	101				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 5,08.

b. Computed only for a 2x2 table

Funct_Collab * Collab_Share Crosstabulation

Count

		Collab_Share		
		No Contribution	Contribution	Total
Funct_Collab	No Contribution	9	18	27
	Contribution	10	64	74
Total		19	82	101

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	,224	,024
	Cramer's V	,224	,024
N of Valid Cases		101	

H_0 is rejected when when the observed p-value is larger than the critical p-value.

$\alpha = .05$ and the critical value: $p < .05$.

Based on these data, the H0 hypotheses is rejected, since the p-value of this variable (.024) is lower than the critical p-value (<.05). Therefore, it can be concluded that there is a significant coherence between the answers of the two variables. In the frequency table, it is visible that many respondents see both a relation between the Functional and Collaborative Economy and between the Collaborative and Sharing Economy. The strength of the coherence could be indicated as slightly weak since the Cramer's V is .224.

This information can be used to test hypothesis 21, which tests whether cluster A exists in the actual configuration. For cluster A, H_0 is accepted. The reciprocal feedback loop of the Functional Economy, Sharing Economy and Collaborative Economy is present in the Actual Configuration.

5.3.2 One-sided feedback loops

The earlier described one-sided clusters are based on the Functional, Sharing and Collaborative cluster, where Internet of Things is added. Therefore, only the relations between the Internet of Things with Functional Economy and Collaborative Economy with Internet of Things have to be tested to determine the cluster.

H_0: There is no significant coherence between the answers of IoT_Funct and Collab_IoT.

H_A: There is a significant coherence between the answers of IoT_Funct and Collab_IoT.

Figure 28. Test Statistics IoT_Funct*Collab_IoT

IoT_Funct*Collab_IoT: The critical value χ^2: 14,853 ; $p < .001$; 1 df

H_0 is rejected when when the observed p-value is larger than the critical p-value.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	14,853[a]	1	,000		
Continuity Correction[b]	12,790	1	,000		
Likelihood Ratio	14,403	1	,000		
Fisher's Exact Test				,000	,000
Linear-by-Linear Association	14,706	1	,000		
N of Valid Cases	101				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 6,06.

b. Computed only for a 2x2 table

IoT_Funct * Collab_IoT Crosstabulation

Count

		Collab_IoT		
		No Contribution	Contribution	Total
IoT_Funct	No Contribution	13	23	36
	Contribution	4	61	65
Total		17	84	101

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	,383	,000
	Cramer's V	,383	,000
N of Valid Cases		101	

α = .05 and the critical value: $p < .05$.

Based on these data, the H0 hypotheses is rejected, since the p-value of this variable (.000) is lower than the critical p-value (<.05).
Therefore, it can be concluded that there is a significant coherence between the answers of the two variables. In the frequency table, it is visible that many respondents see both a relation between the Collaborative Economy and Internet of Things and between Internet of Things and Functional Economy. The strength of the coherence could be indicated as quite strong since the Cramer's V is .383.

It can be concluded that the two one-sided feedback loops exist within the perceived configuration. The respondents see a clear cohesion between the trends involved. This information can be used to test hypothesis 22, which tests whether cluster B exists in the actual configuration. For cluster B, H_0 is accepted. The one-sided feedback loop of the Functional Economy, Sharing Economy, Collaborative Economy and the Internet of Things is accepted.

5.4 Conclusion perceived clusters

Based on the statistical analysis, two clusters can be distinguished in the Perceived Configuration. The first cluster is reciprocal and the second cluster is one-sided. The two clusters are visualised below:

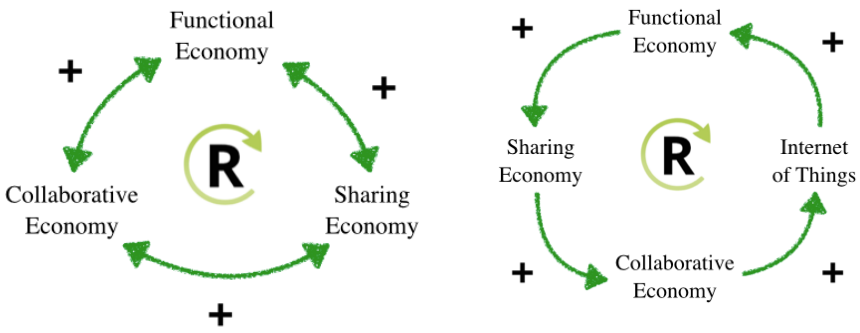


Figure 29. Perceived clusters

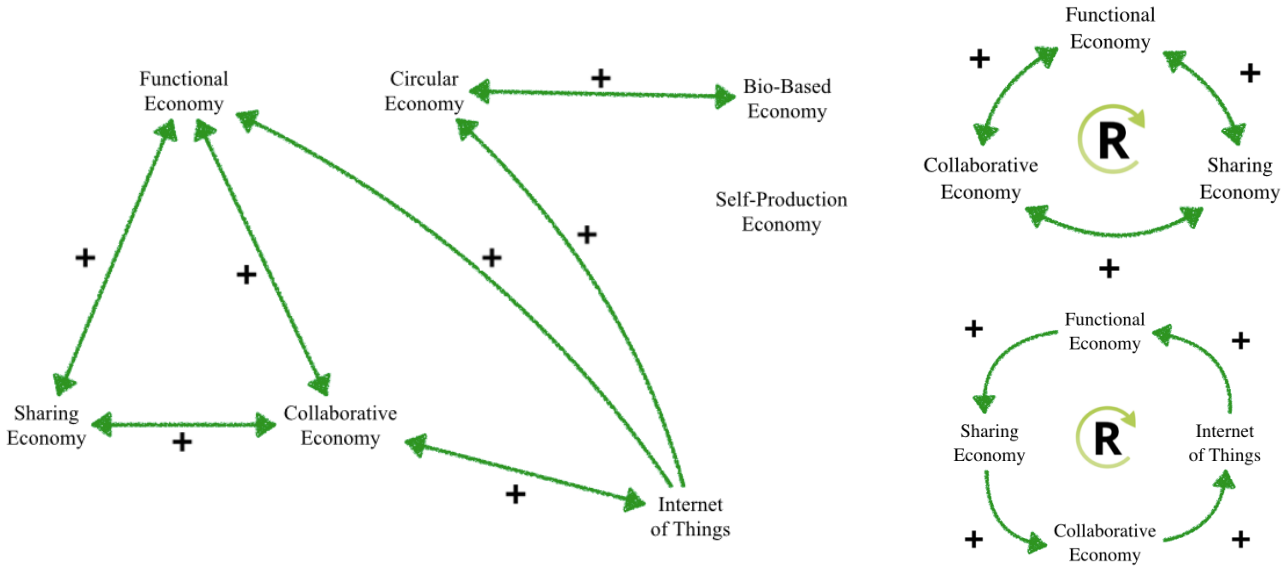
6. Conclusion and Discussion

The conclusion of this research is presented in the first paragraph. In the second paragraph, these research outcomes are further discussed. The third paragraph states the limitations that are present in this research. In the fourth and final paragraph, recommendations are made for further research. These recommendations are based on the discussion points and limitations that are discussed in the previous paragraphs.

6.1 Conclusion - The Actual Configuration

The Perceived Configuration is compared to the Potential Configuration in the previous chapter, by testing the hypotheses that are based on the literature review. Based on this analysis the Actual Configuration is established. This Actual Configuration consists of relations and clusters that are established in both the Potential and Perceived Configuration. The similarities of the relations are the hypotheses where the H_0 is rejected. The clusters in both configurations are similar when H_0 is accepted.

The main question of this research is: *What is the Configuration of the seven WEconomy trends?* The relations and clusters together form the Actual Configuration of the WEconomy trends. These relations and clusters are visualised as the following:



Relation missing in potential configuration	Relation missing in perceived configuration
Collaborative Economy contributes to the Self-Production Economy	Internet of Things contributes to the Sharing Economy
Collaborative Economy contributes to the Circular Economy	Bio-based Economy contributes to the Self-Production Economy
	Circular Economy contributes to the Self-Production Economy
	Sharing Economy contributes to the Self-Production Economy
	Functional Economy contributes to the Circular Economy
	Self-Production Economy contributes to the Circular Economy
	Self-Production Economy contributes to the Bio-based Economy
	Sharing Economy contributes to the Internet of Things

Figure 30. The Actual Confguration of the WEconomy trends

This outcome does not mean that the Actual Configuration is definite. There could be other relations or clusters present in the configuration of the WEconomy trends, for example, the indecisive relations from the quantitative research. Further research should be executed to include or exclude the relations and clusters that are unclear at this moment. These clusters and relations are further elaborated on in the next paragraph.
Figure 31. shows that relations are excluded in the Actual Configuration, when compared with the Potential or Perceived Configuration. The excluded relations are summarised in the following table:

6.2 Discussion

The discussion paragraph starts with an overall evaluation of the process and outcomes of this research. In the second part, the scientific and practical relevance of this study are discussed. The third part offers possible explanations of why there are differences between the Potential and Perceived Configuration. In the final section, the effects of time are discussed for the configuration of WEconomy trends.

6.2.1 Evaluation of the Research

The process of this research went with ups and downs. It is interesting to analyse what went right, but also the things that went wrong or could have been done better. To start off, it is necessary to know that the initial project was aimed to get a configuration of the WEconomy trends and the impact the trends and this configuration could have on business models. This research could have been feasible since the researcher could have used data that was gathered within another WEconomy project for another course. This data would

have been analysed and would have resulted in a configuration for the WEconomy trends. In that case, there would have been enough time left to test cases qualitatively on the impact the WEconomy has.

Unfortunately, the data from this project was not suitable, because the response rate was too small. Furthermore, the theoretical foundation of the WEconomy was larger than expected beforehand. On first thought, it was only necessary to prove there could be relations between the WEconomy trends, so only one relation should have been proven. This line of thought was a very limited perspective, since the WEconomy is more complex than just deciding whether or not there could be relations between trends within the WEconomy. In the final research design, all possible relations between the WEconomy trends are analysed and established (12 relations are established), which resulted in a better overview of what could be possible between WEconomy trends. The results of these setbacks were that the whole research design had to be restructured. Because of the theoretical implications, the time span and the feasibility of the research, it was chosen only to focus on the configuration of the WEconomy trends by comparing literature with the vision of the practical field. The advantage of this choice is that the configuration is analysed more thoroughly, which resulted in a more detailed configuration (both relations and feedback loops are analysed and established) and more detailed findings about the possibilities and shared vision of the WEconomy.
Besides the earlier mentioned setbacks at the beginning of the research, the process went well and resulted in the Actual Configuration of WEconomy trends. Furthermore, the results present a Potential Configuration which introduces all possible relations from the literature review and the Perceived Configuration which established the shared vision of the practical field about the WEconomy. The information of these three configurations are relevant for science and practice, but there are still some implications here. Within the survey, the respondents were sometimes indecisive whether a relation between trends existed or not. Furthermore, there are some missing relations that were present in the Potential Configuration, but not in the Perceived Configuration and the other way around. Therefore, while this research offers much information and more understanding about the WEconomy, there still is some research that could be conducted to expand the concept of the WEconomy further and integrate it with impact measuring on business models. In the following paragraphs, more discussion points and limitations are presented which eventually result in directions for future research.

6.2.2 Theoretical and practical relevance

The WEconomy trends are relevant as a solution to stimulate more ecocentric and altruistic behaviour and increase sustainability overall. There is much information about the individual WEconomy trends, but there is still much research to be carried out in order to understand the process of a transition and increase sustainability. At this moment, there is not a significant theoretical background of how the WEconomy trends are related to each other. There is a theoretical gap within the concept of the WEconomy because the relations between the trends are not defined. Therefore, a literature review is executed to determine potential relations between and clusters of WEconomy trends. Furthermore, a quantitative study is conducted to determine the

Perceived Configuration in the practical field. The Potential and Perceived Configurations are compared and analysed to determine the Actual Configuration of the WEconomy. The outcome of this research is the Actual Configuration which defines the relations between and clusters of WEconomy trends. The Actual Configuration fills the theoretical gap within the concept of the WEconomy. The outcomes of this research also offer various directions for expanding the concept of the WEconomy and its impact on sustainability. These implications are further discussed in paragraph 6.4.

The relations and cluster are confirmed and could be used to develop a method to measure the impact of the WEconomy trends on the transition towards a more sustainable world. This could be done by measuring the impact these relations and clusters have on the business models of organisations. Besides that, the outcome of the research shows which WEconomy trends are related and this could be used for strategy development and (sustainable) business model innovation. The research shows practitioners what could be theoretically possible regarding sustainable business models. Organisations will become more sustainable if they understand the concept of the WEconomy better and can create more sustainable business models. Therefore, this research is relevant for organisations (creating different ways of value, sustainable innovation) as well as society (organisations could become more sustainable because of a better understanding of the WEconomy).

6.2.3 Differences between the potential and perceived configuration

Based on the missing relations table, the Actual Configuration of the WEconomy and the tested hypotheses two main areas are determined that are almost entirely responsible for the differences between the Potential Configuration and the Perceived Configuration. The first difference is that in the Potential Configuration the Sharing Economy was one of the trends with the most relations within the configuration. This is not the case in the Perceived Configuration. Three potential relations of the Sharing Economy are missing in the Perceived Configuration. Contrary to the Sharing Economy, the Collaborative Economy is regarded as more important in the Perceived Configuration. Two relations that are both related to the Collaboration Economy are missing in the Potential Configuration. Botsman argues that the Sharing Economy is part of the Collaboration Economy, which could be a possible explanation for this research finding (Botsman, 2016). The second difference is that the Self-Production Economy is involved in six missing relations in total. In the Actual Configuration, the Self-Production Economy does not have any relation with another trend at all. One possible explanation for this phenomenon is that the respondents do not know the possible relations mentioned in chapter 4. Another interesting finding is that the participants were indecisive about five possible relations where the Internet of Things was involved. This result supports the statement of Jonker that the impact the Internet of Things could have on the transition is unknown yet (Jonker, 2015).

6.2.4 Time horizon

The final point of discussion is that the Actual Configuration of the WEconomy could change over time. This research tells something about the configuration at this moment in time, but it is important to realise this

configuration will probably not stay the same over time. For instance, an indecisive relation could evolve, get adopted by more organisations or get supported by scientific research. This way practitioners and experts could notice and perceive the relation as well. This way, the relation between the two trends evolved and should be included in the actual configuration. Furthermore, new trends might occur that contribute to a more sustainable society. These trends should be tested and possibly included in the configuration of the WEconomy trends as well. It might be wise to design a longitudinal study to test if the configuration is still the same and develop the configuration further.

6.3 Limitations

Despite the fact that this research covers a lot of ground and will give much information about the concept of the WEconomy, there are some limitations within this research. The limitations are focused on the kind of relations that are established and the strength of these relations. Besides that, there are limitations focused on the respondents and their country of residence.

6.3.1 Positive relations

One limitation of this research is that it is only focused on the positive effects of the WEconomy trends on each other. This choice resulted in the reinforcing relations and feedback loops. There could, however, be implications for the Actual Configuration when possible negative relations are taken into account. It could be possible that there are trends that have a negative effect on another trend. The cloud platform, in which the Internet of Things operates, is extremely vulnerable to hacking and data leaks (Pacella, 2011). This potential threat could result in the fact that people are not eager to collaborate or share on an IoT platform. Another example is that the Self-Production Economy could cause a decrease of people sharing products and services and an increase of individuals owning products. The Self-Production could have contradicting effects with the Functional and Sharing Economy. This shows that, while the research shows all reinforcing effects of the trends on each other, balancing effects could be present and be a significant part of the configuration of the WEconomy trends. Measuring the impact of the WEconomy on the transition will probably change when there are balancing forces present in the model.

6.3.2 Strength of the relations

In this research only variables are used with a nominal measurement level. This methodological choice resulted in a limitation regarding the statistical tests that could be used. With this research design, it was not possible to be able to test how strong the trends interact with each other since the measurement level should be at interval and ratio level. Furthermore, constructs for each particular trend should have been developed, since each WEconomy trend consists of multiple elements which should all be operationalized. This approach would have been a lot of work and would have resulted in an entirely different research design. Therefore, it is chosen not to research and analyse the strengths of the relations and clusters.

6.3.3 Argumentation of the respondents

The Perceived Configuration is established by conducting quantitative research in the form of a closed-question survey. This type of survey resulted in clear choices whether or not to include a relation within the Perceived Configuration of WEconomy trends. There are, however, some missing and indecisive relations. It would have been useful to see why respondents did or did not see a particular relation. Perhaps they noticed something in the practical field that is not discovered with the literature review, or they did not notice a particular development in science or the practical field.

6.3.4 Country of residence of the participants

A final limitation is that there could be differences between countries and regions regarding the WEconomy. In this research, there is not a particular focus on a country or a region while there could be a significant difference between countries or regions. Differences in countries could, for example, be a result of the economic model (Rhineland versus Anglo-Saxon model) (Mitchell et al., 2006), differences in National Culture Dimensions (Hofstede, 1991) and differences in perspectives on sustainability (e.g. governmental support etcetera).

6.4 Further Research

The recommendations for further research are arranged in the order they should be executed. First, the Actual Configuration of WEconomy trends should be further established. After this, the relations and clusters within the Actual Configuration could be further defined by their strengths and possible adverse effects. Finally, the impact of the WEconomy trends and its configuration could be tested on the business models of organisations.

6.4.1 Establishing the actual configuration of WEconomy trends

The first possible research that could be conducted is to establish the Actual Configuration of WEconomy trends further. There are some potential relations on which the participants were indecisive. Besides that, there are some differences between the Potential Configuration and the Perceived Configuration. Qualitative research could result in insight about the reasons why these configurations differ from each other. Experts and practitioners that participated in this research could be asked why they did or did not see a particular relation. Furthermore, other experts and practitioners could be asked whether they see a relation. This research approach results in definite inclusions or exclusions of relations that at this moment are not included in the Actual Configuration because there were no results. When this research is executed, the Actual Configuration of WEconomy trends is fully understood.

6.4.2 Further defining the relations between and clusters of WEconomy trends

When the Actual Configuration of WEconomy trends is fully understood, it could be further defined by adding the strengths and potential balancing effects to the model.

The adverse effects could be established by asking experts and practitioners what WEconomy trends have a negative contribution to another trend. This way, it could be possible that balancing effects or feedback loops appear within the actual configuration. The inclusion of possible negative relations within the WEconomy creates a better understanding of how the trends interact with each other. This approach is necessary to be able to establish the actual impact the WEconomy has on the transition towards a more sustainable society.

Besides that, the outcomes of this research are a sound basis to execute further research to determine the strengths between the trends within the Actual Configuration. To determine the strengths, the Actual Configuration of WEconomy trends should be established entirely (see 6.4.1). Particular relations are now excluded from the Actual Configuration which results in a more feasible research design as when all the possible relations should be tested on their strengths. Now, quantitative research could determine how strong the established relations and clusters within the Actual Configuration are. These strengths create a better understanding of how strong particular relations and clusters are within the WEconomy.

Both outcomes will be helpful to create a dynamic model about the WEconomy. System dynamics is a technique that helps to understand the behaviour of complex systems. This model would be useful to quantify the relations and develop particular scenarios for the transition and to understand the interacting trends within the WEconomy better. Ways to use the system dynamics approach for impact measuring of the WEconomy configuration could therefore be another useful research direction.

6.4.3 Measuring the impact of the WEconomy trends on business models

When the Actual Configuration of WEconomy trends is established entirely, it becomes possible to measure the impact of the WEconomy on business models. This way, the impact of the WEconomy on the transition towards a more sustainable world can be measured. The impact on the business models could be measured both qualitatively and quantitatively. It is advised to define elements of business models where the impact can be measured on first. Furthermore, this theoretical framework should be tested qualitatively to validate it. When the framework is validated, it could be used for quantitative research in order to generalise the impact of the WEconomy trends (and its configuration) for a particular population, for instance, industries, manufacturing/service organisations or organisations in general. These possible outcomes could prove the positive effect the WEconomy has on sustainability and create insights in how the WEconomy works exactly. This would further stimulate the transition towards a more sustainable future because it will, hopefully, inspire and stimulate more organisations, groups and individuals to become more sustainable.

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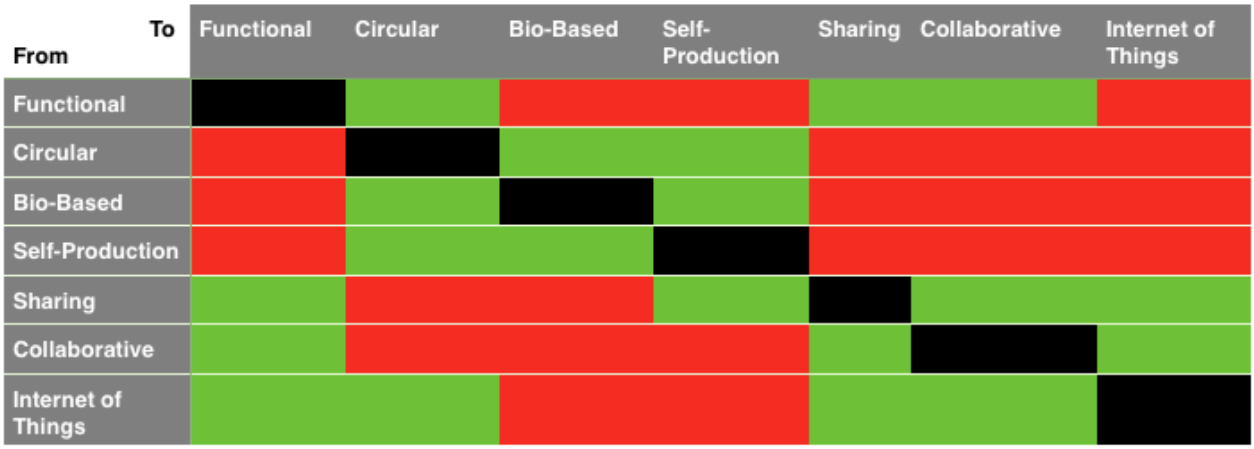
V. Appendices

Appendix A. Morphological Grid

With the morphological analysis all the possible relations within the WEconomy are analysed. The grid below



represents the results of this analysis and is a summary of the outcomes of the literature review.

Appendix B. Hypotheses

1. Sharing Economy - Collaborative Economy

The literature review shows that there could be a reciprocal relation between the Sharing Economy and Collaborative Economy. This relation assumes that the two economies contribute to each other. The corresponding hypotheses are:

Hypothesis 1: The Sharing Economy contributes to the Collaborative Economy

H_0: The Sharing Economy does not contribute to the Collaborative Economy.

H_A: The Sharing Economy contributes to the Collaborative Economy.

Hypothesis 2: The Collaborative Economy contributes to the Sharing Economy

H_0: The Collaborative Economy does not contribute to the Sharing Economy.

H_A: The Collaborative Economy contributes to the Sharing Economy.

2. Functional Economy - Circular Economy

The literature review shows that there could be a one-sided relation between the Sharing Economy and Collaborative Economy. This relation assumes that the Functional Economy contributes to the Circular Economy. The corresponding hypothesis is:

Hypothesis 3: The Functional Economy contributes to the Circular Economy

H_0: The Functional Economy does not contribute to the Circular Economy.

H_A: The Functional Economy contributes to the Circular Economy.

3. Functional Economy - Sharing Economy

The literature review shows that there could be a reciprocal relation between the Functional Economy and Sharing Economy. This relation assumes that the two economies contribute to each other. The corresponding hypotheses are:

Hypothesis 4: The Functional Economy contributes to the Sharing Economy

H_0: The Functional Economy does not contribute to the Sharing Economy.

H_A: The Functional Economy contributes to the Sharing Economy.

Hypothesis 5: The Sharing Economy contributes to the Functional Economy

H_0: The Sharing Economy does not contribute to the Functional Economy.

H_A: The Sharing Economy contributes to the Functional Economy.

4. Bio-Based Economy - Circular Economy

The literature review shows that there could be a reciprocal relation between the Bio-Based Economy and Circular Economy. This relation assumes that the two economies contribute to each other. The corresponding hypotheses are:

Hypothesis 6: The Bio-Based Economy contributes to the Circular Economy

H_0: The Bio-Based Economy does not contribute to the Circular Economy.

H_A: The Bio-Based Economy contributes to the Circular Economy.

Hypothesis 7: The Circular Economy contributes to the Bio-Based Economy

H_0: The Circular Economy does not contribute to the Bio-Based Economy.

H_A: The Circular Economy contributes to the Bio-Based Economy.

5. Sharing Economy - Self-Production Economy

The literature review shows that there could be a one-sided relation between the Sharing Economy and Self-Production Economy. This relation assumes that the Sharing Economy contributes to the Self-Production Economy. The corresponding hypothesis is:

Hypothesis 8: The Sharing Economy contributes to the Self-Production Economy

H_0: The Sharing Economy does not contribute to the Self-Production Economy.

H_A: The Sharing Economy contributes to the Self-Production Economy.

6. Sharing Economy - Internet of Things

The literature review shows that there could be a reciprocal relation between the Sharing Economy and the Internet of Things. This relation assumes that the two economies contribute to each other. The corresponding hypotheses are:

Hypothesis 9: The Sharing Economy contributes to the Internet of Things

H_0: The Sharing Economy does not contribute to the Internet of Things.

H_A: The Sharing Economy contributes to the Internet of Things.

Hypothesis 10: The Internet of Things contributes to the Sharing Economy

H_0: The Internet of Things does not contribute to the Sharing Economy.

H_A: The Internet of Things contributes to the Sharing Economy.

7. Functional Economy - Collaborative Economy

The literature review shows that there could be a reciprocal relation between the Functional Economy and Collaborative Economy. This relation assumes that the two economies contribute to each other. The corresponding hypotheses are:

Hypothesis 11: The Collaborative Economy contributes to the Functional Economy

H_0: The Collaborative Economy does not contribute to the Functional Economy.

H_A: The Collaborative Economy contributes to the Functional Economy.

Hypothesis 12: The Functional Economy contributes to the Collaborative Economy

H_0: The Functional Economy does not contribute to the Collaborative Economy.

H_A: The Functional Economy contributes to the Collaborative Economy.

8. Collaborative Economy - Internet of Things

The literature review shows that there could be a reciprocal relation between the Collaborative Economy and the Internet of Things. This relation assumes that the two economies contribute to each other. The corresponding hypotheses are:

Hypothesis 13: The Collaborative Economy contributes to the Internet of Things

H_0: The Collaborative Economy does not contribute to the Internet of Things.

H_A: The Collaborative Economy contributes to the Internet of Things.

Hypothesis 14: The Internet of Things contributes to the Collaborative Economy

H_0: The Internet of Things does not contribute to the Collaborative Economy.

H_A: The Internet of Things contributes to the Collaborative Economy.

9. The Internet of Things - Functional Economy

The literature review shows that there could be a one-sided relation between the Internet of Thins and the Functional Economy. This relation assumes that the Internet of Things contributes to the Functional Economy. The corresponding hypothesis is:

Hypothesis 15: The Internet of Things contributes to the Functional Economy

H_0: The Internet of Things does not contribute to the Functional Economy.

H_A: The Internet of Things contributes to the Functional Economy.

10. Bio-Based Economy - Self-Production Economy

The literature review shows that there could be a reciprocal relation between the Bio-Based Economy and Self-Production Economy. This relation assumes that the two economies contribute to each other. The corresponding hypotheses are:

Hypothesis 16: The Bio-based Economy contributes to the Self-production Economy

H_0: The Bio-based Economy does not contribute to the Self-production Economy.

H_A: The Bio-based Economy contributes to the Self-production Economy.

Hypothesis 17: The Self-production Economy contributes to the Bio-based Economy

H_0: The Self-production Economy does not contribute to the Bio-based Economy.

H_A: The Self-production Economy contributes to the Bio-based Economy.

11. Self-Production Economy - Circular Economy

The literature review shows that there could be a reciprocal relation between the Self-Production Economy and Circular Economy. This relation assumes that the two economies contribute to each other. The corresponding hypotheses are:

Hypothesis 18: The Self-production Economy contributes to the Circular Economy

H_0: The Self-production Economy does not contribute to the Circular Economy.

H_A: The Self-production Economy contributes to the Circular Economy.

Hypothesis 19: The Circular Economy contributes to the Self-production Economy

H_0: The Circular Economy does not contribute to the Self-production Economy.

H_A: The Circular Economy contributes to the Self-production Economy.

12. The Internet of Things - Circular Economy

The literature review shows that there could be a one-sided relation between the Internet of Thins and the Circular Economy. This relation assumes that the Internet of Things contributes to the Circular Economy. The corresponding hypothesis is:

Hypothesis 20: The Internet of Things contributes to the Circular Economy

H_0: The Internet of Things does not contribute to the Circular Economy.

H_A: The Internet of Things contributes to the Circular Economy.

Hypothesis 21: Cluster A

H_0: Cluster A is present in the perceived configuration

H_A: Cluster A is not present in the perceived configuration

Hypothesis 22: Cluster B

H_0: Cluster A is present in the perceived configuration

H_A: Cluster A is not present in the perceived configuration

Hypothesis 23: Cluster C

H_0: Cluster A is present in the perceived configuration

H_A: Cluster A is not present in the perceived configuration

Hypothesis 24: Cluster D

H_0: Cluster A is present in the perceived configuration

H_A: Cluster A is not present in the perceived configuration

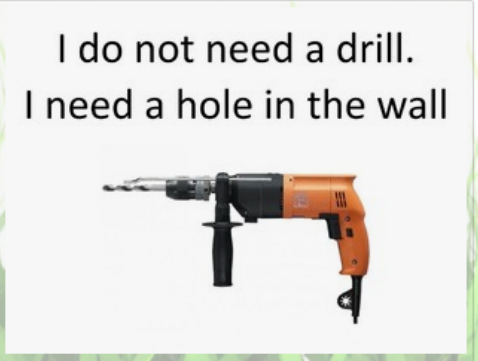
Appendix C. Questionnaire

Which of the trends stated below contribute to and strengthen the **Self-Production Economy**?

The self-production economy is focused on organizing in which the consumer is involved in the process of production at the beginning of the production cycle.
(For example 3D printing)

Choose as many as you like

A Collaboration between networks of individuals and communities



B Sharing products

C Smart products or objects

D Using renewable resources instead of fossil fuels

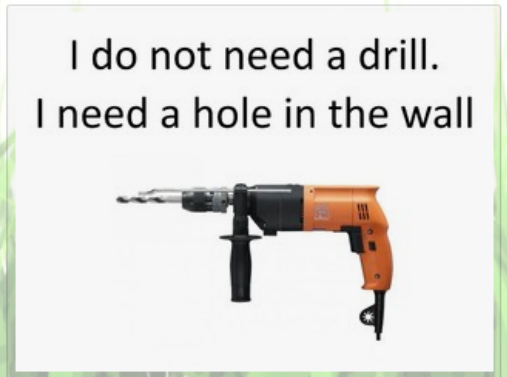
E Products that can be recycled

F Consumers do not own their products anymore

Which of the trends stated below contribute to and strengthen the **Collaborative Economy**?

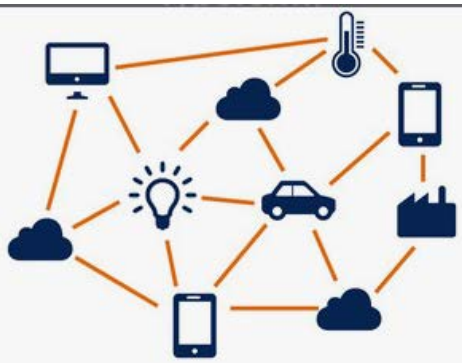
The collaborative economy concerns an economic model built on distributed networks of connected individuals and communities versus centralized institutions, transforming the way we produce, consume, finance and learn.
(For example: collaborative platforms like 3Dhubs, Kickstarter etcetera)

Choose as many as you like



A Sharing products

B The possibility to self-produce



C Smart products or objects

D Using renewable resources instead of fossil fuels

E Products that can be recycled

F Consumers do not own their products anymore

Which of the trends stated below contribute to and strengthen the **Bio-Based Economy**?

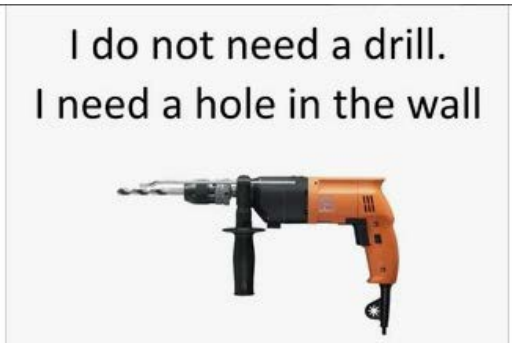
The bio-based economy aims to use renewable resources instead of fossil fuels in an efficient way by using biology, innovation and technology in such a way that the environment can be spared.
(For example: Bio-plastics, bio-medical materials etcetera)

Choose as many as you like

A Collaboration between networks of individuals and communities

B The possibility to self-produce

C Smart products or objects



D Sharing Products

E Products that can be recycled

F Consumers do not own their products anymore

Which of the trends stated below contribute to and strengthen the **Functional Economy**?

The functional economy defines itself by distinguishing the ownership from usage of goods and servic
Companies offer services instead of selling products. The objective of the Functional Economy is to cre
the highest use value for the longest possible time while consuming as few material resources and ene
as possible.
(For example: concepts like Products-as-a-Service, leasing products)

Choose as many as you like

A Collaboration between networks of individuals and communities

B The possibility to self-produce

C Smart products or objects

D Using renewable resources instead of fossil fuels

E Products that can be recycled

F Consumers do not own their products anymore

Which of the trends stated below contribute to and strengthen the **Circular Economy**?

The transition from a linear economy to a circular economy where waste becomes a resource that is recycled in the economic process.
(For example: recycling, Cradle2Cradle etcetera)

Choose as many as you like

A Collaboration between networks of individuals and communities

B The possibility to self-produce

C Smart products or objects

D Using renewable resources instead of fossil fuels

E Products that can be recycled

I do not need a drill.
I need a hole in the wall

F Sharing products

Which of the trends stated below contribute to and strengthen the application of **Internet of Things** technology?

RFID and sensor technology enable computers to observe, identify and analyze the world without the limitations of human-entered data.
(For example: Smart thermostat, Smart city lighting system etcetera)

Choose as many as you like

A Collaboration between networks of individuals and communities

B The possibility to self-produce

I do not need a drill.
I need a hole in the wall

C Sharing products

D Using renewable resources instead of fossil fuels

E Products that can be recycled

F Consumers do not own their products anymore

1 → Which of the trends stated below contribute to and strengthen the **Sharing Economy**?

The sharing economy is defined as an economy in which broad segments of a population make use of under-utilized inventory, via fee-based sharing.
(For example: sharing over platforms like Airbnb, Zipcar, eBay etcetera)

Choose as many as you like

A The possibility to self-produce

B Collaboration between networks of individuals and communities

C Consumers do not own their products anymore

D Smart products or objects