



Eco-Innovation

Quality of Life

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Eco-Innovation

To what extent does eco-innovation contribute to quality of life, positive peace and happiness?

Introduction

By 2050, the earth will host 9.7 inhabitants as it has been estimated that the world population will grow by another two billion people. At the same time, the earth's natural resources are limited, and humankind is already living at the credit of the blue planet: last year's overshoot day was the 2nd of August. As a consequence, the current state of affairs in which continuous expansion is praised cannot be sustained and change regarding our way of life appears to be the only viable solution. A more sustainable form of self-organization of our society is needed in order to secure its long-term development. As such "eco-innovation has been identified as one of the key drivers of change that needs to be harnessed for a sustainable future" (Rizos, Behrens & Taranic, 2015, p.1). Eco-innovation which James (1997) defines as the invention of "new products and processes which provide customer and business value but significantly decrease environmental impacts" can be a key factor in creating a new future. Understanding its key role, an increasing number of universities, research institutes and policy makers are devoting their time to the study of this concept and its application. Furthermore, eco-innovation is not only important with regards to the sustainable use of natural resources, but it also has broader implications for sustainable development in economics and social terms potentially leading to an overall improved level of happiness. Thus, the purpose of this paper is to clarify to what extent eco-innovation contributes to quality of life, positive peace and happiness.

To demonstrate these connections, ecovillages have been chosen as a case study due to their holistic approach to the concept of sustainable development that englobes social, economic

and environmental effects of eco-innovation. As communities, ecovillages are constantly looking at ways to diminish their ecological footprint and develop more inclusive social structures. Their high level of eco-innovation makes them particularly suited for this research since they offer an evidence-based model of sustainability. This research will be based on a review of existing literature.

The paper is structured in four parts. Firstly, the concepts of eco-innovation, quality of life, positive peace and happiness will be defined. These definitions will serve as a basis for the subsequent analysis. Secondly, it will be assessed how these concepts are interlinked and how they correlate. Thirdly, the concept of ecovillages will be introduced, and it will be reviewed how eco-innovation is implemented within these ecovillages. It is then analysed to what extent eco-innovation contributes to quality of life, positive peace and happiness. Finally, the findings of this paper will be examined, and recommendations will be made specifically addressed to Maastricht University.

Concept Clarification

Different concepts will be used throughout this paper and therefore they need to be properly defined to ensure the comprehension of the following parts. First, eco-innovation will be reviewed followed by quality of life. The notion of positive peace will then be explained. Finally, Happiness will be elaborated on.

Eco-Innovation

An innovation can be defined as the result of a process of developing an idea and the inventing or transforming it into a specific process or product. According to the market-and-technology framework, innovations are typically grouped in one of four categories: namely into radical, disruptive, architectural or incremental ones (Rothaermel, 2017). The former two leverage new technology in existing (disruptive) or new (radical) markets. In contrast, the latter two exploit already existent technology in new markets (architectural) or combine the already existent knowledge with a new technological capability stream (incremental).

Eco-innovation, in particular, is defined by Kemp (2011, p. 3) as “[an innovation that is] on a life cycle basis [...] less environmentally harmful than the use of relevant alternatives”. It is, thus, important to notice that eco-innovation does not necessarily require the development of a new technology and accordingly does not have to be disruptive or radical in its nature but can also be architectural or incremental if it results in a more efficient utilization of resources. Carsharing, for instance, is a form of an architectural eco-social innovation. Moreover, it is not a concept which is limited to ecological aims and implications. Instead, eco-innovation is seen as a concept that addresses several challenges of our time, such as demographic change, environmental sustainability or resource scarcity (Gassler et al., 2008). Kemp and Pearson (2008) developed the so-called “Measuring eco-innovation (MEI) classification” which divides the respective

innovative activities in four pillars. Firstly, “environmental technologies”, such as manufacturing processes which require less input for the same output. Secondly, “organizational innovation for the environment”. An example would be a sustainable value chain management enabling businesses and societies to reduce so-called muda. Thirdly, “product and service innovation” offering environmental benefits. These products are most of the time not necessarily developed with the aim to reduce environmental pollution but rather because they have other practical implications, too. Examples are the collaborative consumption or sharing business models, such as Airbnb. Finally, Kemp and Pearson (2008) mention the “green system innovations” which are specifically looking for clean solutions. The renewable energy movement is one form of this type.

These innovations, as most innovations, require a large amount of financing and accumulation of absorptive capacity at the beginning in order to be able to be ultimately commercialized. In addition, based on the fact that the benefits of these innovations are distributed over a large amount of people the incentives for implementing such innovation are sometimes low because of the so-called free-rider problem. The European Commission (2015) tries to reduce these barriers by “accelerat[ing] the transformation of good ideas into business and industrial development by removing economic and regulatory barriers and promoting investments, demand and awareness”.



Eco-innovation is often found in alternative economies where social and/or organizational values are more emphasized. Examples of such economic systems are the resource-based economy, the community capitalism, the shared economy, the participatory economics or the slow money economy. The paper comes back to

these approaches of organizing an economic system and society as a whole in section three.

Quality of Life

The definitions of quality of life are diverse, with variability fuelled not only by use of societal perspectives but also by a range of applicable theoretical models (Felce & Perry, 1995). According to the World Health Organization (WHO), quality of life is defined as “the individual’s perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals.” (WHO, 2018). It is a broad concept which encompasses subjective and objective factors. Therefore, it can be seen as a multidimensional notion outlining both the negative and the positive features of life (Barcaccia, 2013). Quality of life plays a very important role in political and social economics even though its analysis and measurement is considered to be a great challenge for economic scientists (Somarriba & Pena, 2009).

Quality of life is an elusive concept which can be approached at varying levels of generality from the assessment of community wellbeing to the specific assessment on individuals or small groups (Felce et al., 1995). Based on academic research, Eurostat has developed a comprehensive framework which has broken down quality of life and wellbeing into several components, each one defining an indicator for quality of life (Somarriba et al., 2009). The Eurostat measurement for quality of life includes the following nine dimensions which further clarify this broad concept:



Figure 1: Pillars of Quality of Life. Adapted from Eurostat (2018). *Quality of Life Data*. Retrieved from: <http://ec.europa.eu/eurostat/web/gdp-and-beyond/quality-of-life/data>

Positive Peace

Positive peace is a recent concept that can only be understood by reviewing the evolution of the definition of its central core, namely ‘peace’, a word that has been overly used and abused. Peace was first conceived in terms of *absentia belli*. The focus was therefore on the study of war: one must understand the causes of a phenomenon to ensure its elimination. This restrictive stance on peace was however challenged by Johan Galtung who considered that peace was a broader concept encompassing not only the absence of violence but also a form of social justice (Grewal, 2003). Positive peace was therefore construed as the absence of structural violence as opposed to negative peace which was defined as the absence of direct violence. Structural violence was meant to conceptualise violence that is integrated into the structure of society such as inequalities, corruption and injustices (Grewal, 2003).

Following this expansion of the understanding of peace, a shift in emphasis in peace studies has been observed from preventing conflicts to the conditions that foster continuous peace such as the ability of one state ‘to manage and transform conflict in a peaceful and constructive manner’ (Mahmoud & Makoond, 2017, p.2). Such a shift was also strongly promoted by the United Nations in 2016 through the adoption of identical resolutions on sustaining peace in the Security Council and the General Assembly. Those resolutions emphasise the importance of not only looking at reinstating peace after a conflict but also at preventing conflict as such through structural change (Advisory group of experts, 2015).

In this paper, positive peace will be understood as defined by The Institute of Economics & Peace (2017) which characterised positive peace as ‘the attitudes, institutions and structures which create and sustain peaceful societies’. The Institute of Economics & Peace has come up with a model in which positive peace can be based on eight interdependent but distinct pillars:

well-functioning government, equitable distribution of resources, free flow of information, good relations with neighbours, high levels of human capital, acceptance of the right of others, low level of corruption and sound business environment. Those pillars are used as indicators of peace in the narrow sense as well as a barometer with regard to the resilience of a country meaning its ability to absorb and recover from shocks. As a consequence, those indicators can be used in order to



Figure 2: Pillars of Positive Peace. Adapted from The Institute of Economics & Peace (2017). Retrieved from: <http://visionofhumanity.org/app/uploads/2017/10/Positive-Peace-Report-2017.pdf>

sustain peace in the sense of proactively building peace by reinforcing the structures, attitudes and institutions that underpin it (Mahmoud & Makoond 2017).

Happiness

The term happiness refers to the state of well-being of a group or an individual, or in other words life satisfaction. According to Layard (2003), it can be best described by the state of “feeling good, enjoying life and feeling it is wonderful” (p.4). There are several indexes that aim at measuring the levels of happiness of citizens per country, such as Eurobarometer or the World Happiness

Report. Those measurements demonstrate significant discrepancies between countries, with Scandinavian countries usually topping the rankings and African countries finishing last. Such indexes face considerable challenges as happiness is not a rigid concept and therefore its measurement is quite complex. In fact, the understanding of happiness differs from individual to individual and, in a broader sense, differs also among societies. Cultural factors and history play a role concerning the way “people collectively understand happiness and the meaning of life” (Ortiz-Ospina & Roser, 2017, para. II.4). Additionally, single life events such as marriage or divorce only affect happiness in the short run as adaptation is an important feature of well-being (Ortiz-Ospina & Roser, 2017, para. II.3). In general, happiness can be grouped into three different layers. The society level embraces happiness on the citizen level and includes people who belong to the same society but might not know each other personally. For instance, this is examined by the World Happiness Report. At the community level of happiness, the focus lies on the family, colleagues and friends and how these relationships influence collective happiness. Finally, the individual level refers to the physiological and psychological needs of a person, hereby linking it the concept of Maslow’s pyramid of needs. According to Maslow, personal development is striving towards self-actualization which constitutes the top of the pyramid. Such a state of fulfilment can be compared with the highest level of happiness that can be achieved, however only after physiological needs, safety, love and belonging, and self-esteem are reached successively.

Much research on happiness has focused on its correlation with incomes as wealth was seen as the prerequisite for high levels of happiness. However, Ortiz-Ospina and Roser (2017) show that reported happiness does not only correlate with incomes but also with health, life events

and social environments. Nonetheless, the exact causal mechanism to happiness has not been discovered and might never be.



Figure 3: Maslow's Hierarchy. Retrieved from: <https://figueroasframework-rockandrolldance.weebly.com/maslows-hierarchy-of-needs.html>

Finding Connections

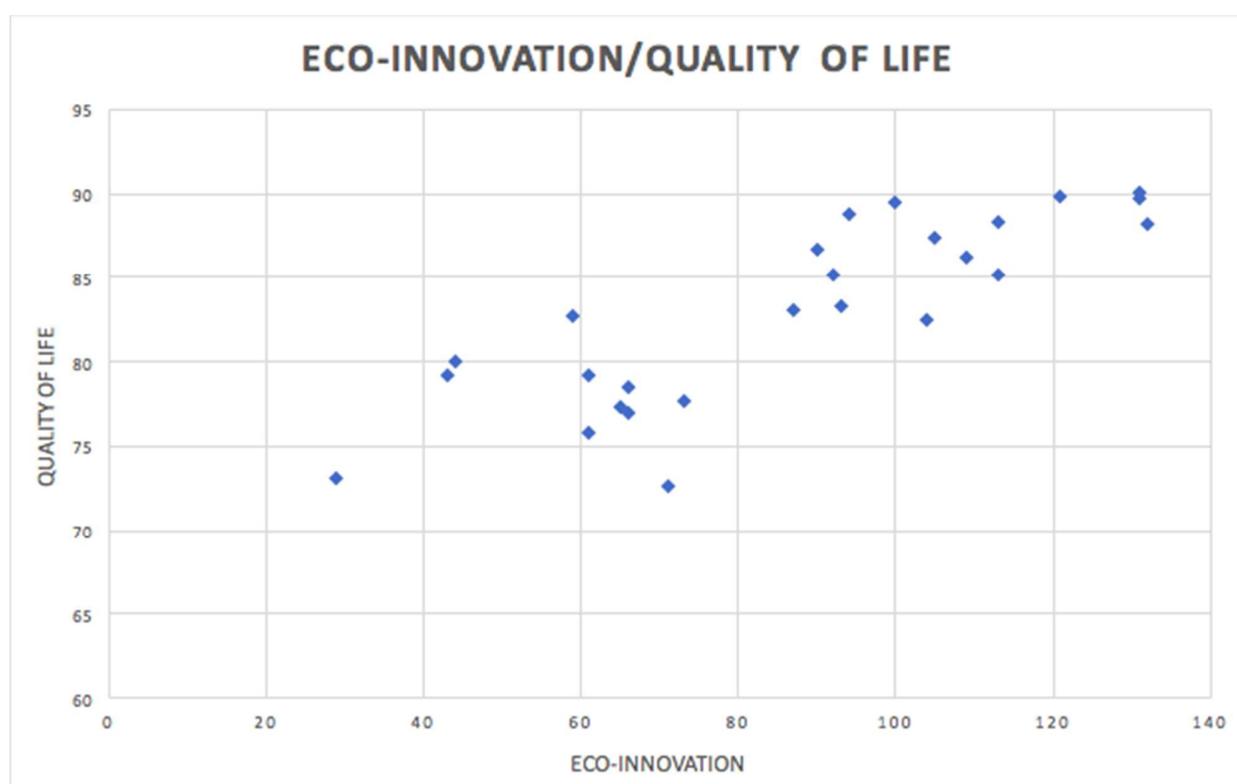
In the following section, it will be assessed how the concepts of eco-innovation, quality of life, positive peace and happiness are connected. Eco-innovation serves as a starting point from which the links between the different topics will be analysed respectively. Each connection will in turn be evaluated in two steps, a qualitative and a quantitative analysis. First, for the qualitative evaluation, previous research on the issue will be displayed and a verbal and intuitive basis will be laid out. Second, for the quantitative analysis, official data for countries of the European Union is used to establish the relations by running correlations and checking for their statistical significance.

Eco-Innovation to Quality of Life

The topic of eco-innovation is a new interdisciplinary matter which has received more attention only recently due to the current challenges the global community has to face. Consequently, previous research on the topic is limited and it academic work on the direct impact of eco-innovation on quality of life is non-existent.

However, an intuitive reasoning may help to establish a first linkage between eco-innovation and quality of life. As noted by Reid (2008), eco-innovation is becoming a more integrated part of national innovation systems and contributes to an improved resource productivity and lessened environmental effects. Enhanced productivity then directly leads to a higher GDP per capita (Jones, 2013). Although it is debatable whether GDP per capita, often referred to as the standard of living, and quality of life are interchangeable terms, it surely holds that GDP per capita is one of the major determinants of quality of life not only through the direct effect of income but also because of its positive indirect effects on education, health, safety and other aspects determining quality of life.

In turn, richer economies, which generally have a higher quality of life, have a particular interest in being innovative to maintain their leading role in the world economy as has been shown by Krugman (1979). With more innovation overall and eco-innovation becoming more integrated in the national innovation systems, increased eco-innovation is expectable and, thus, also a positive two-way relationship between eco-innovation and quality of life.



Graph 1: Scatterplot of Eco-Innovation and Quality of Life.

Indeed, this is exactly what can be seen in the correlation output based on the data from countries of the European Union. A positive value of 0,662, indicates a strong positive correlation (Table 1, Appendix). Furthermore, the result is significant at the 1% level which means a positive relationship cannot easily be rejected and there is little evidence against our initial hypothesis.

Even though the correlation shows a strong positive relationship and is highly significant it is important to address shortcomings of our data and to point out certain concerns with the empirical methodology in general. Firstly, a correlation analysis by no means enables us to establish causality between the two subjects. Secondly, due to the lack of global data availability on eco-innovation and quality of life, and the following restriction on the European Union, the correlation suffers a sample selection bias and its implications can be rightfully doubted. Unfortunately, those problems reoccur in the upcoming sections in which the connections of quality of life to positive peace and of positive peace to happiness are examined.

Nonetheless, especially in combination with the other mentioned literature, the picture of a positive relationship emerges. Thus, we conclude that eco-innovation and quality of life go hand in hand potentially reinforcing each other.

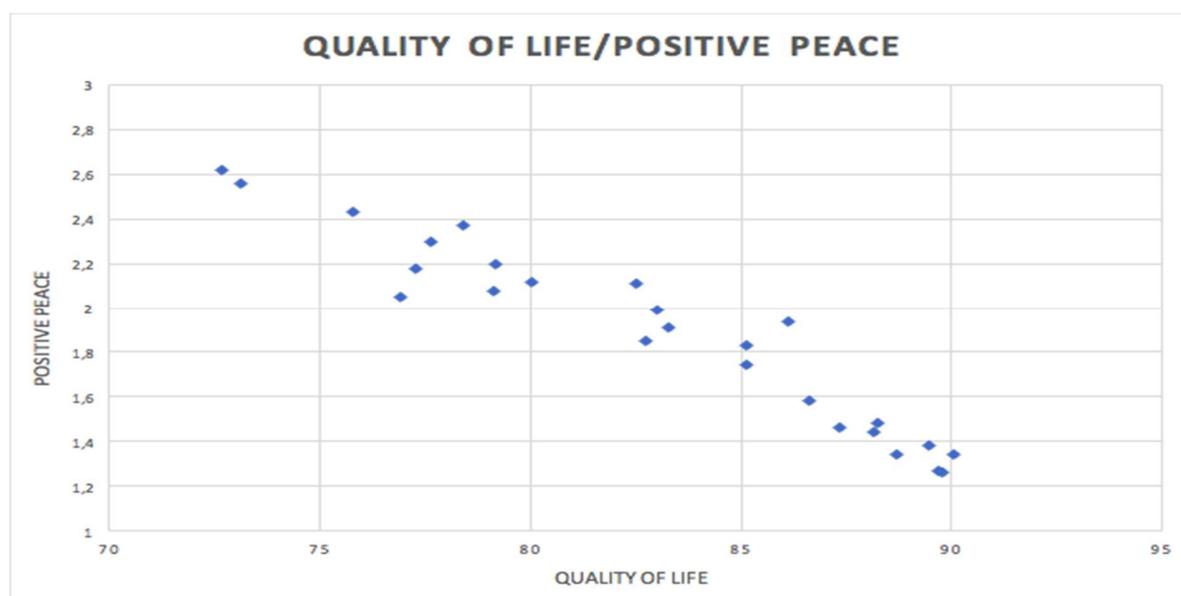
Quality of Life to Positive Peace

As defined earlier, quality of life is a concept that encompasses the overall general well-being of individuals and societies. Positive peace on the other hand is a concept that describes a certain state of peace. It goes beyond the mere absence of violence (negative peace) which is a pre-condition for positive peace. It also comprises the presence of social justice and the absence of all sorts of structural violence meaning inequalities, injustices or corruption. The emerging question is thus, how these concepts correlate.

It can be argued that a high quality of life is effectively supporting the establishment of positive peace. Logical connections can be drawn from the factors determining quality of life and positive peace. Material living conditions, physical safety, as well as governance and basic rights are factors which account for a high quality of life. However, it can also be stated that they contribute to the establishment of peace because they are important for the absence of violence.

Barakat and Wardell (2005, p.44) for example stress the importance that bad material living conditions are likely to stipulate conflict and good conditions are thus fostering peace.

According to the Institute for Economics and Peace (2017), positive peace is based on eight pillars. For many of them it is possible to establish a direct connection with the factors that determine a high quality of life. Governance and basic rights, for example, are factors for quality of life. It can be assumed that if a country is performing well in this category, it will also perform well in some of the positive peace categories. Hence, a country with good governance and high protection of basic rights will most probably also have a well-functioning government, acceptance of the rights of others, low levels of corruption, free flow of information and good relationship with neighbours. These are already five of eight factors that contribute to positive peace. Nevertheless, the concepts are distinct from each other. Whereas quality of life focuses on the situation of the individual (health, occupation, leisure), positive peace is concerned with the societal and institutional level and includes factors such as the relation with neighbouring countries.



Graph 2: Scatterplot of Quality of Life and Positive Peace.

The connection of the two concepts can also be shown at empirical level. Graph 2 already indicates a negative relationship between quality of life and positive peace. Running a correlation between the two concepts reveals a correlation of -0.566 which is statistically significant at the 1% level (Table 2, Appendix). This means that the higher the value for quality of life, the lower the value for positive peace and vice versa. But because a high value in the Positive peace index implies a low level of positive peace and a low value a high level, this reveals a positive correlation between quality of life and positive peace. It can be concluded that the higher quality of life is, the closer the country is also to positive peace.

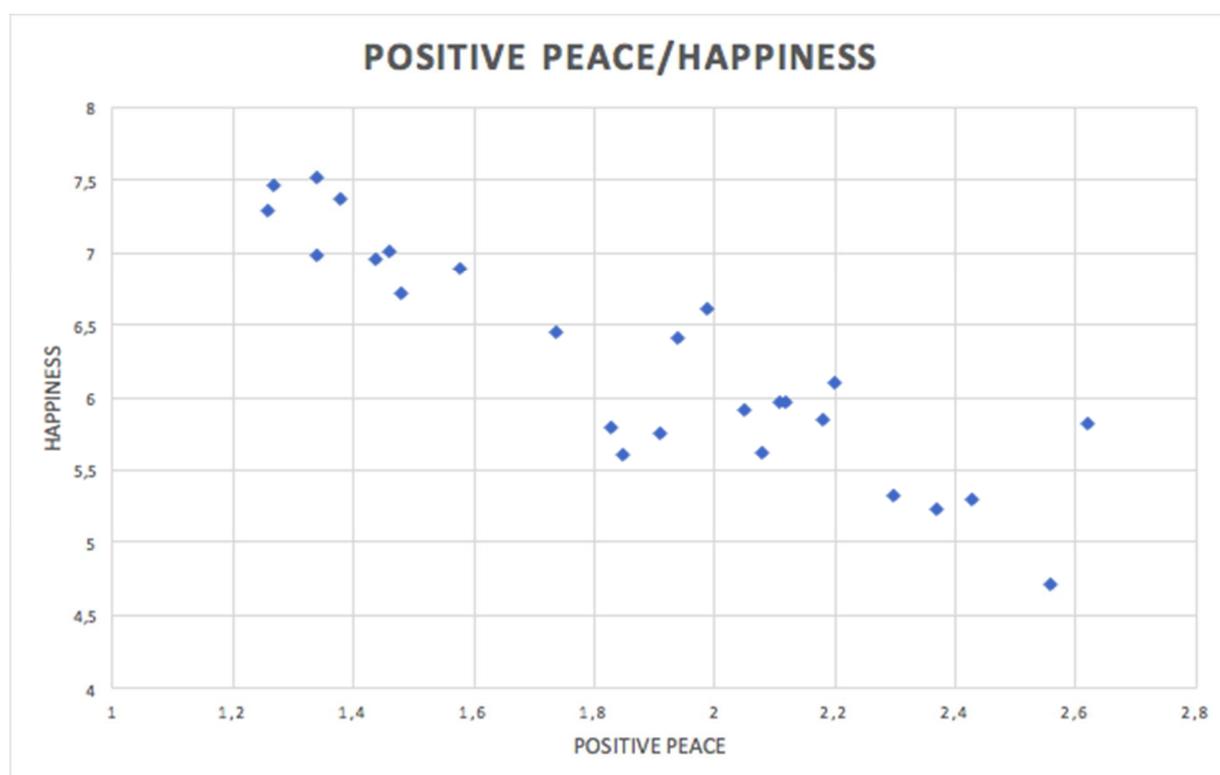
Positive Peace to Happiness

Positive peace and happiness are very closely connected. The two concepts overlap primarily due to the fact that some of the indicators and measurable factors of the two concepts are similar. As the two concepts are multi-dimensional, both happiness and positive peace have been broken down into several indicators, each of which has measurable factors which when combined together give us the respective indexes.

Starting with a well-functioning government and low levels of corruption, two indicators of positive peace, a clear overlap can be seen with the rule of law and democracy and freedom as indicators of happiness. In fact, when calculating well-functioning government, the Institute for Economics and Peace takes the rule of law as one of its main indicators (Institute for Economics and Peace, 2017). In addition, the positive peace pillar of equitable distribution of resources is a part of the equality indicator of happiness. However, it must be noted that the equitable distribution

of resources is only a small part of equality and there are other factors that are taken into account when assessing this indicator such as gender equality and treatment of minorities.

Finally, the positive peace pillar of sound business environment and the happiness indicators of low unemployment and high income can be seen as overlapping factors. A sound business environment provides for increased employment and improved access to capital for individuals (Institute for Economics and Peace, 2017). This means that once a country is able to achieve such an environment, unemployment will decrease and the countries average income per capita will also increase. These three sets of similar indicators show that the attainment of positive peace will have a positive impact on happiness.



Graph 3: Scatterplot of Positive Peace and Happiness.

The scatterplot above shows a positive relationship between positive peace and happiness (as positive peace is measured using a reversed scale the relation is negative in statistical terms yet positive in 'practical' terms). The countries in Europe with higher measures of positive peace tend to be happier than those with a lower positive peace score. Furthermore, the correlation output shows a significant correlation of -0.473 (Table 3, Appendix). The reasons for this are most likely the overlapping indicators discussed above as well as the inextricable link between the two concepts.

Maslow's pyramid of needs outlines a five-stage model towards achieving happiness. The second layer of the pyramid is safety needs, which encompasses security and safety. Peace is a major contributor to the safety of individuals as it entails the absence of conflict, a major cause of physical unsafety. This shows that peace, either negative or positive, will contribute to happiness as it contributes to the attainment of one of the major deficiency needs of individuals (McLeod, 2007). Furthermore, positive peace is more than just the mere absence of physical violence, it is peace with positive content such as the constructive resolution of conflict, restoration of relationships and the creation of social systems that serve the needs of the entire population (Galtung, 1969). This means that the effects of positive peace can also spill over into the Maslow's third tier of belongingness and love.

All in all, positive peace can be seen as a contributor to happiness and the connection between the two means that when a country improves its positive peace the happiness of the individuals living in that country will increase.

Summary

This section has shown the positive relationships between eco-innovation and quality of life, quality of life and positive peace, and positive peace and happiness. The direct effect of eco-innovation works through those three channels, yet all those concepts are interrelated themselves and supplement each other.



Figure 4: The connection between the four concepts of this paper, namely Eco-Innovation, Quality of Life, Positive Peace and Happiness.

From Maslow's pyramid of needs it is visible that happiness increases the higher an individual is located within the framework. Only at the highest tier, self-actualization, eco-innovation will take place. It is a vision of individuals that they will only try to realise when their other needs are satisfied. This establishes a feedback connection between happiness and eco-innovation and shows that the relationship of eco-innovation and happiness is circular rather than one-way. Eco-innovation positively influences happiness through quality of life and positive peace and is being reinforced by happiness consecutively.

Case Study: Ecovillages

Introduction to Ecovillages



The concept of ecovillages is increasingly receiving more attention by the general public, as well as by academic research (Lockyer and Veteto, 2015). It is often being associated with an ‘off-the-grid’ system and a lifestyle in which people try to live in autarky. However, contrary to the general belief, ecovillages are not limited to a rural setting or to small marginalised communities. As described by Jackson (2004) and the Global

Ecovillage Network (GEN) (2018) ecovillages are rather defined by the people inhabiting the village, their vision, cultures and lifestyles rather than the location or setup of the community. The GEN hence distinguishes between three general categories: urban, traditional and intentional. While urban is rather self-explanatory, it is an attempt and vision to make life in a city or metropolitan area more sustainable, participatory and collaborative by establishing a community or an eco-neighbourhood. The traditional way coincides to a larger extent with the common perception of ecovillages. Those existing rural communities are trying to use less resources and being more sustainable through participatory and innovative processes. The third category, intentional, reflects the starting stage of an ecovillage in which there is solely a common vision and purpose shared between people that brings them together in the journey to build their home.

Although the environments in which ecovillages exist might differ, what connects them all is a holistic approach to their community life which incorporates different dimensions in a whole system: social, cultural, economic and ecological. Ecovillages are constantly reinventing themselves and experiencing new ideas, techniques, governance etc. It is therefore important to mention that the GEN which is currently made up of roughly 10,000 communities views ecovillages as an ongoing process of transformation and participation rather than a final outcome.

In the following case study, focusing mainly on traditional ecovillages, we will try to display how eco innovation is used in their process towards creating a more sustainable and regenerative world and how eco-innovation effects the quality of life and the happiness of the inhabitants of those communities. The economic, organizational and social aspects of eco-innovation respectively are therefore analysed.

Economic Eco-Innovation Aspects

This part of the paper connects the ecovillages concept with eco-innovation in regard to economic aspects. It aims to find evidence for the increased level of eco-innovation in these villages.

According to Hall (2015), there has to be a balance between collectivistic and individualistic wealth-maximisation in ecovillages. This is in strong contrast to the rational self-interest principle of Adam Smith which says people are only rational if they act egotistically which is best for the economy. However, the point is that many countries de facto rethink whether economic growth coincides with people's well-being. The former Prime minister, David Cameron declared that "[i]t's time we admitted that there's more to life than money, and it's time the focus is not just on GDP, but on GWB – general wellbeing." at a Google conference of 2006 (King, 2006). This general wellbeing, in turn, is guaranteed by sustainable housing which has, according

to Davies (2012), four goals: energy efficiency, reduction of non-renewables, local sourcing and enabling the recycling of such things like water, energy, and waste.

Due to the various changes in the information and communication technology and the liberalization of several emerging markets in the 1980s and 1990s globalisation has significantly increased and thus, domestic sourcing has been replaced. However, the latter does not only reduce the global emissions but would also minimize supply chain inefficiencies because of the distance cutback of product transportation, the lower risk of external factors resulting in delays, such as weather conditions, and cultural similarity which facilitates, according to Hofstede, doing business (Boddy, 2014). There is even evidence of a stronger effect on the reduction of coordination costs of the communication and information technology emergence for domestic sourcing if compared to foreign fragmentation (Ford, 2016).

The recycling of inputs is another factor of ecovillages in general and sustainable housing in particular. This refers also to the shared economy and circular economy principle as opposed to the linear one. The main goal of a circular economy is to “eliminate the concept of waste” or muda how it is called (Bermejo, 2014, p. 269). Tuggelite, one of the first Swedish ecovillages, for instance, uses effective insulation which uses triple-glazed and a special transparent film for their windows. Moreover, the village uses solar energy to improve energy efficiency which is also referring to goal one and two of Davies (2012). Another example is Marielund which uses rain and a local well as their water resources. After using the water, it is drained and brought to a bed of sand where it is micro-organically purified. Since sustainable activities are mostly non-excludable and rival, the environment is a common resource. Everyone wants to exploit it individually and costs are socialised. This is also known as freerider problem. Ecovillages can solve this problem. Marielund, for instance, gets a 25% tax reduction for their efforts (Bernard & Naylor, 1993).

All in all, ecovillages show relatively more economic-based eco-innovation if compared to the total society because of their emphasis on domestic sourcing, shared economy and circular economy resulting in a lower emission per capita. Based on the above given reasoning there is a high positive correlation between ecovillages and eco-innovation. Given the fact that there have to be individual confessions for the collectivistic good this seems to contradict Adam Smith's theory *prima facie* because it is based on non-economic and economic considerations. However, the reasoning in section two shows eco-innovation results ultimately in increased happiness which is, *de facto*, not contradicting with maximising personal utility.

Organisational Eco-Innovation Aspects

As has been discussed, eco-innovation does not only encompass technological eco-innovation but also refers to organisational and societal eco-innovation. As far as organisational eco-innovation is concerned, ecovillages have been a centre of experiments in which new ideas and concepts have been tested and developed in regard to for instance decision-making and conflict resolution (Hall, 2015). Decision-making innovation will firstly be discussed followed by a review of the different ways in which conflict is resolved in ecovillages.

Firstly, decision making is an extremely important part of living in a community and is central to social sustainability. When looking at ecovillages, different approaches have been chosen but the aim behind is always the same: the system of governance should be inclusive and anti-hierarchic (Hall, 2015). Therefore, consensus seems to be one of the prevalent way of making decisions in ecovillages. Nevertheless, more sophisticated and complex systems have also been developed such as sociocracy. Sociocracy is an alternative system of governance which promotes the equality of everyone's opinion and the right to be heard. It is organisationally structured on the distributions of tasks to different circles each having a specific focus: those circles should all have

relative autonomy (Holmes, 2006). The participants all seat in a circle which symbolises equality. A decision is taken with everyone consent which is defined as the absence of a substantial objection (Holmes, 2006). Some groups also only allow a person to object a proposal if the individual can come up with another solution (Kunze & Avelina, 2015). The problematics with this system are the fact that it can be quite time costly and people need to be educated to fully understand the system and to be able to properly use it (Kunze et al., 2015). The choice of a system of governance is extremely important since it defines the way decisions are taken and the absence of corruption which are all linked to ideas of positive peace and happiness. Moreover, it must be noticed that inclusive decision making seems to reinforce the feeling of community among villagers (Van Schyndel Kasper, 2008).

Secondly, conflict resolution is an important component of every society. In an eco-village, the community life is of the essence and therefore, conflicts are usually dealt with at a local level in a peaceful manner (Mychajluk, 2017). A number of approaches are used but as for decision making they share essential characteristics: they all tend to provide a safe space in which people can freely express themselves. Depending on ecovillages, it can take different forms. Some do use the 'Forum' as in Tamera which is a social technology for practicing honesty in community. It can be qualified as transformative conflict resolution: conflict is embraced as a form of spiritual practice and transformation (Hildur, 1999). It focuses on full transparency. The idea is that people are allowed to express their feelings without being judged: it is all about confidence in the circle. Witnesses listen and then give feedback and the whole process is supported by a facilitator. Apparently, people feel empowered through a feeling of community (Kunze & Avelina 2015). Sometimes it is also used as form of decision making. In general, it can be observed that the decision-making technique and the conflict resolution form are intrinsically linked and can be one

and the same process. In other villages, meetings are planned every week during which people can express themselves (Mychajluk 2017). Roles are clearly assigned at the beginning of each meetings and a circular arrangement is used. At the end of the meeting, an evaluation is done. It is very similar to the Forum even though the idea of transcending feelings through an artistic presentation is less influential.

To conclude, conflict resolution and decision making are intrinsically linked: if people are/feel more included in the decision-making less conflict tend to arise (Hildur 1999, Transit 2006). It has a preventive effect. Solving discord is an important component of well-being (Hall, 2015). Social innovation is essential to achieve a sustainable transition, good systems of governance and of conflict resolution reinforce the feeling of community which is crucial to avoid mental and physical dysfunctions (loneliness and relationships deficits) (Marselis, 2017). It could be inferred that people are happier because they are listened to which leads to social sustainability and therefore to sustainable peace. However, some limitations do exist in terms of existing empirical studies and literature: further research is needed to fully understand the impact of the ecovillages decision making procedure and conflict resolution on the happiness of people.

Social Eco-Innovation Aspects

Communal activities and stable social relations with the neighbourhood are a feature of many eco-village projects. It will be argued in that this has a direct impact on the happiness of the individuals as their individual quality of life is enhanced which also positively affects the atmosphere of positive peace in the neighbourhood. However, such developments are not restricted to ecovillages as such, yet there seems to be some benefit of eco-innovative practices on the social relationships in ecovillages.

In this context, it is important to distinguish the concepts of ecovillages and the concept of co-housing. Whereas the main goal of eco-village inhabitants is environmental sustainability, co-housing is more about the development of a communal neighbourhood based on the “ideas of participation, co-creation, self-organization and everyday practice for and with those living in the projects” (Ache, 2012, p.5). Often the projects of ecovillages and co-housing incorporate both concepts, however they cannot be used interchangeably. Rather, both can be categorized into forms of intentional communities which describes a group of people that has “voluntarily come together for the purpose of ameliorating perceived social problems or inadequacies” (Metcalf, 2004, p.9). For the purpose of this work, the terms eco-village and co-housing will be used interchangeably and represent intentional communities that implement ecologically sustainable as well as co-housing principles.

One of the main goal of ecovillages is the minimization of carbon emissions. When 16 ecovillages and co-housing projects were analysed in 2017, it was found that the average carbon footprint across all the studies was about 35 per cent less than figures in comparable standard communities (Daly, 2017, p. 1368). This shows that intentional communities are successful in considerably lowering polluting emissions. Apergis (2016) showed in a study of a panel of 58 countries that such reductions coincide with the personal well-being of people. He argues that personal well-being could be significantly enhanced by reducing emissions. The study, however, observed the national level and hence does not provide evidence that living in an eco-village with lower emission rates automatically yields higher levels of personal well-being. Yet, a study that was conducted in Germany showed that higher local air pollution and noise levels significantly diminish well-being (Rehdanz and Maddison, 2008). It can be argued that the reduction of carbon emissions particularly enhances local air quality and consequently reductions in these affect the

personal well-being or quality of life positively. It seems that eco-innovation has positive effects on individual happiness simply due to technical innovations that lower carbon emissions. Eco-innovation is, however, not limited to this technical account as, for instance, social eco-innovation also contributes to the bigger picture.

It is evident that the communal effort for more sustainable development in a neighbourhood creates closer inter-personal contact within the community. Furthermore, shared facilities and the use of shared services, such as car-sharing, trigger ‘peer pressure’ among the inhabitants in so far that sustainable behaviour is even intensified. All in all, a feeling of belonging to the respective places is reinforced. Intentional communities are also often comprised of a “very interesting ‘internal’ mix of different social groups in the same project, like young and old, families and single, [and] different nationalities” (Ache, 2012, p. 6). Resulting mutual support and social contacts are alleviating the isolation and loneliness that is often experienced in ordinary neighbourhoods which has direct positive implications on the individual well-being.

Furthermore, integrated social housing and owner-occupied flats as well as solidarity-based funding projects bring together different income groups. Such lifestyles contradict classical rational choice behaviour but can be explained by diminishing returns for happiness with increased income (Easterlin, 2003). Accordingly, the accumulation of wealth does at a certain level not significantly contribute to personal well-being anymore. Resulting excessive income disparities can even have a negative impact on the positive peace of a community due to discontent and grudge that is triggered by the huge discrepancies. Happiness on a personal level is consequently only improved marginally whereas the state of happiness in the community as a whole might even worsen. In contrast, the concept of downshifting is present in ecovillages. Downshifting represents a shift away from a material lifestyle while emphasising leisure time and social relationships.

Inhabitants of intentional communities like ecovillages and co-housing project accept that at some point money does not make one happier and consequently they establish communities that have strong bonds due to mutual support systems, and frequent meeting structures that are reinforced by spillover effects of shared economy structures. Hence, it can be said that ecovillages are a form of eco-innovation and seen as an instrument to reach individual happiness in a sustainable way.

Summary

This section as provided a deeper insight into the working of ecovillages from different perspectives. Firstly, an economic analysis has shown that a substantially higher degree of eco-innovation can be found in ecovillages. This is mostly due to their focus on domestic sourcing and the application of concepts such as circular or shared economy that unlimitedly aim at the elimination of the concept of waste leading to lower emissions per capita. Secondly, insights into the self-governance of ecovillages have been given. The inclusive approach towards decision-making leads to a lower level of conflict increasing the overall level of happiness. Finally, a social analysis has shown, that this higher degree of eco-innovation and the reduction of emissions contribute to a higher level of individual happiness.

Overall this section provided explanation for the higher degree of eco-innovation in ecovillages and showed how this leads to higher level of well-being and happiness.

Conclusion

Over-population, pollution, climate change are only a few of the current challenges facing humanity. They all seem to have different causes, consequences and solutions. However, those challenges are all interconnected and therefore do not require differentiated national approaches but a wide overarching globalised change in the way we live, consume and interact. As such eco-innovation is only one part of the solution but it is a significant one, which can in connection with other factors contribute to the ultimate goal of most human beings: happiness. Happiness may not be a direct result of eco-innovation but may flow from the quality of life that is improved through eco-innovation which in turn strengthen positive peace.

The premise of this paper was a holistic approach encompassing different concepts such as eco-innovation, quality of life, positive peace and happiness. Links between those same notions were suggested and demonstrated resulting in the hypothesis that eco-innovation contributes to happiness. In the first part of the paper, the different concepts of eco-innovation, quality of life, positive peace and happiness were described and the criteria used to measure them were presented. Secondly, the connections between those concepts were established both quantitatively and qualitatively albeit with some notable limitations in terms of literature and bias. It was advocated that eco-innovation leads to a better quality of life which in turns contributes to the attainment of positive peace which ultimately results in happiness. Thirdly, ecovillages were used as a case study to illustrate the connection between those concepts and as an example of a more sustainable way of life. Economic as well as social innovation were particularly emphasised. It should be mentioned that overall literature was lacking which shows the real need of further research not only within each of the theme but more specifically regarding their interconnectedness.

All in all, it can be said that all levels of society (government, economy, society) need to rethink their approach to build a sustainable future for the next generations not only in environmental terms but also in regards to a broader goal of happiness. Universities as centres of research, education and innovation should be at the forefront of those changes in the sense of not only proposing and educating about alternative solutions but also implementing them. That is why some recommendations are included in the next section of the paper.

Recommendations

From the research conducted in this project our team has formulated the following recommendations that we feel the Executive Board of Maastricht University could put into place.

1. Create Eco-Innovation Awareness

The aim of this recommendation is to create and promote awareness for eco-innovation. Throughout our research, our team noticed a lack of academic literature and studies with regard to the effects of eco-innovation beyond the environmental impacts. As our research has shown eco-innovation can contribute to positive peace, quality of life and happiness which all lead to an improved general well-being of individuals. Furthermore, eco-innovation can help create a close-knit community in which individuals feel a sense of purpose and belonging. It is essential to emphasise the implications of eco-innovations on the life of each individual in order to strengthen the willingness of the whole society to get involved. The education plays thus, a fundamental role. Therefore, we propose the addition of an elective course in cooperation with UNU-MERIT. This course should be open to students of all faculties as there are major benefits from interdisciplinary study in this area. Alongside this course, Maastricht University could offer a lecture series on 'Eco-Innovation and Positive Peace'. Within the course there should be a project which enables students

to come up with their own ideas to save resources which can be implemented within the university. The introduction of the course would lead to greater eco-innovation awareness as well as improving the sustainability of the university.

Overview of the Proposed Eco-Innovation Course	
Course Name	Eco-Innovation
Duration	3-4 Weeks (period 3 or 6)
ECTS	4
Pre-requisites	None
Description	This module will introduce the key concepts of eco-innovation, positive peace and quality of life. It focuses on the effects of eco-innovation on positive peace and happiness. Throughout the course student will need to conduct research into the effects of eco-innovation and come up with their own eco-innovative project which can be implemented in the university to improve sustainability.
Teaching Method	Lectures Tutorials
Examination	75% research paper 25% project

Figure 5: Overview of the proposed Eco-Innovation course which should increase awareness of the topic.

2. Implementing Eco-Innovation at UM Guesthouse

A major component of ecovillages is the shared economy. Within the framework of an ecovillage individuals share resources which leads to decreasing amount of wastes and improves the community feeling. This recommendation has two aspects: a ‘library of things’ and ‘food sharing’.

The LIBRARY
of THINGS



We all know the saying ‘one man’s trash is another man’s treasure’ and this is what the concept of a library of things builds upon. This part will entail creating a space in the Guesthouse where

students living there can put things that they no longer need but may be useful for someone else.

Students can then take things that others have left and use them.

Additionally, the library of things will have electrical appliances, games, tools and much more.

Students living in the guesthouse will then receive a card which they can use to borrow these things from the library of things just like borrowing books from a library.



Food waste is one of the major problems of western societies and we feel that the imposition of a ‘food sharing’ concept, borrowed from co-housing and ecovillages, will enable us to curb food wastage. Many students go away for weekends or on trip and have food that will not last until they are back. Therefore, this food ends up being thrown away needlessly.

Therefore, we propose the imposition of a food-sharing system. What this will entail is, similarly to the library of things, there will be a space at the Guesthouse where people can leave their food that they will not be able to eat before it goes off and other student who are still there are free to take this food.

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Appendix

Data used:

Eco-Innovation: Eco-Innovation Index (2015) by European Union retrieved from Eurostat (<http://ec.europa.eu/eurostat/de/home>)

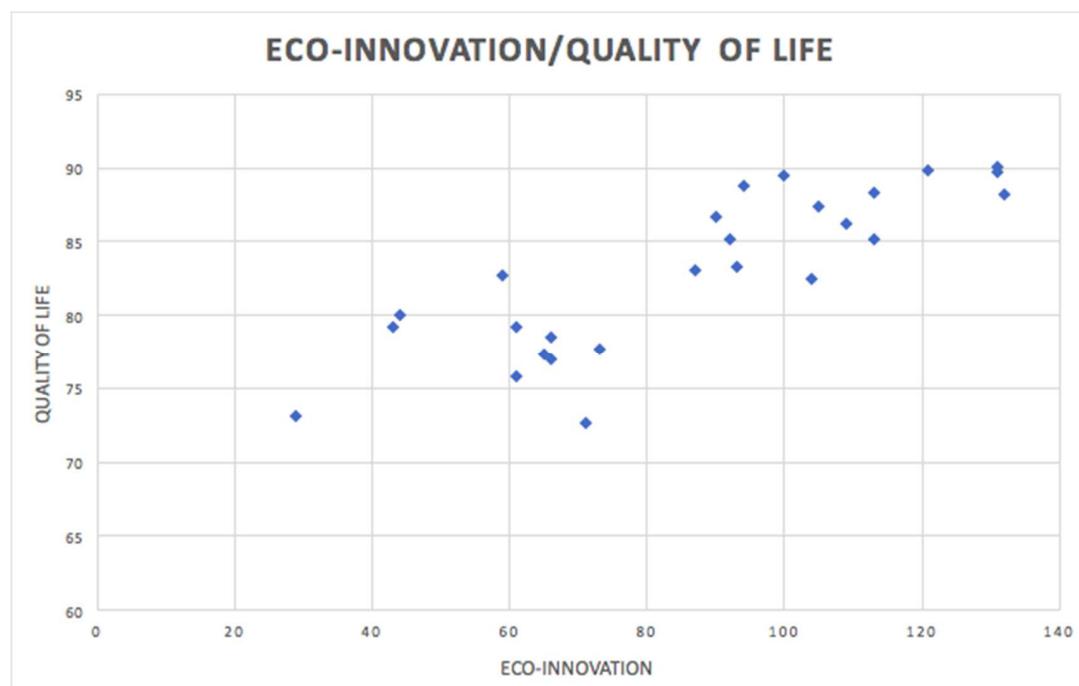
Quality of Life: Social Progress Index (2015) retrieved from <https://www.socialprogressindex.com/>

The ‘Social Progress Index’ is used because it is multi-dimensional and encompasses more different aspects of quality of life than for example GDP per capita/standard of living. In fact it entails the same dimensions as the ‘Better Living Index’ by the OECD, such as education, health, safety, personal rights and safety. While the OECD only provides the indicators for individuals to attach their personal weight to the different aspects and thereby creates a personalised and subjective index the ‘Social Progress Index’ represents a more objective measure. Hence, the preference was given to the latter one.

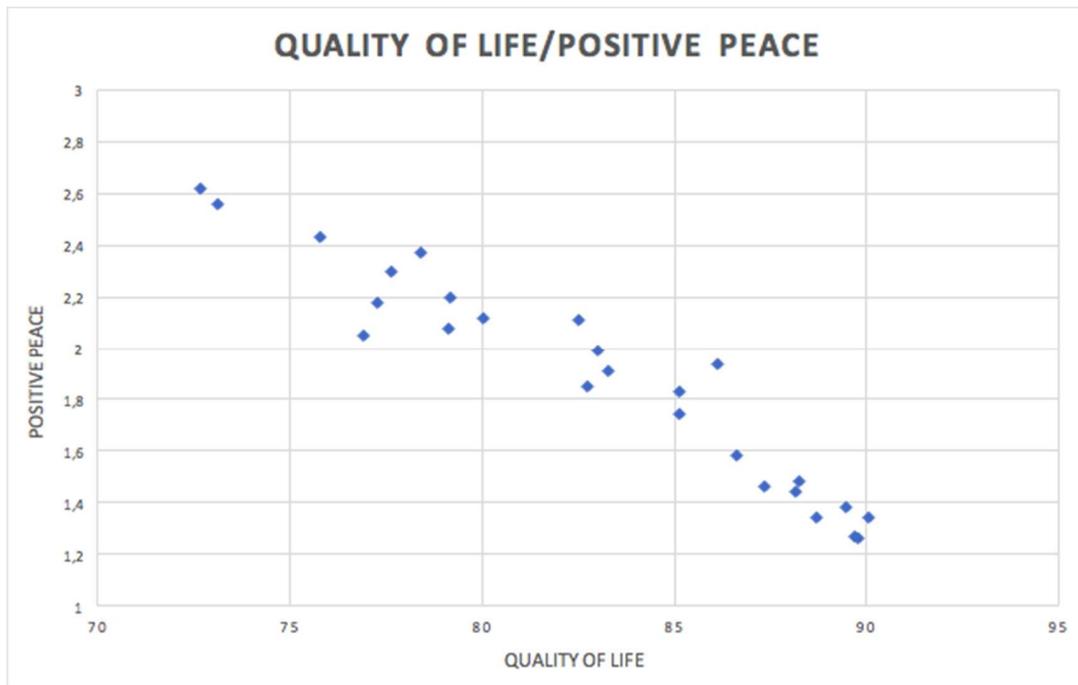
Positive Peace: Positive Peace Index (2015) retrieved from Positive Peace Report 2016.

Happiness: Happiness Index (2015) retrieved from World Happiness Report 2016.

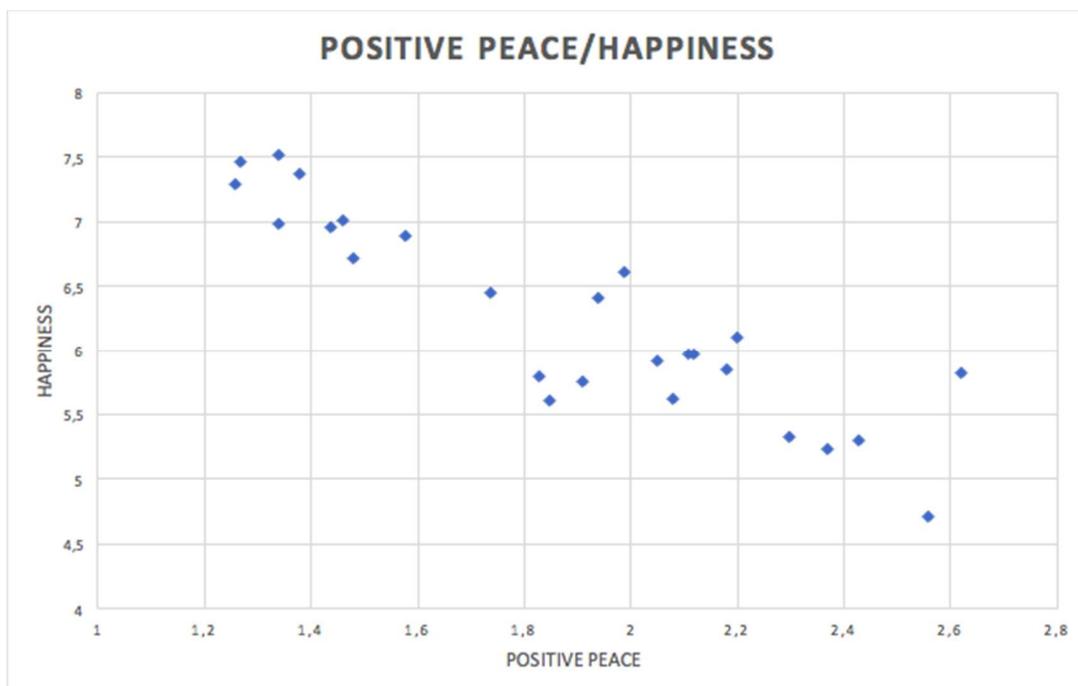
Graphs and Tables:



Graph 1: Scatterplot of Eco-Innovation and Quality of Life



Graph 2: Scatterplot of Quality of Life and Positive Peace



Graph 3: Scatterplot of Positive Peace and Happiness

Correlations

			Eco-Innovation (2015)	Quality of life (Social Progress Index (2015))
Spearman's rho	Eco-Innovation (2015)	Correlation Coefficient	1,000	,677**
		Sig. (2-tailed)	.	,000
		N	28	28
	Quality of life (Social Progress Index (2015))	Correlation Coefficient	,677**	1,000
		Sig. (2-tailed)	,000	.
		N	28	28

** . Correlation is significant at the 0.01 level (2-tailed).

Table 1: SPSS output of the correlation of Eco-Innovation and Quality of Life

Correlations

			Quality of life (Social Progress Index (2015))	Positive Peace (2015)
Spearman's rho	Quality of life (Social Progress Index (2015))	Correlation Coefficient	1,000	-,566**
		Sig. (2-tailed)	.	,002
		N	28	28
	Positive Peace (2015)	Correlation Coefficient	-,566**	1,000
		Sig. (2-tailed)	,002	.
		N	28	28

** . Correlation is significant at the 0.01 level (2-tailed).

Table 2: SPSS output of the correlation of Quality of Life and Positive Peace

Correlations

			Positive Peace (2015)	Happiness (2015)
Spearman's rho	Positive Peace (2015)	Correlation Coefficient	1,000	-,473 [*]
		Sig. (2-tailed)	.	,011
		N	28	28
	Happiness (2015)	Correlation Coefficient	-,473 [*]	1,000
		Sig. (2-tailed)	,011	.
		N	28	28

*. Correlation is significant at the 0.05 level (2-tailed).

Table 3: SPSS output of the correlation of Positive Peace and Happiness



Honours+
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Eco-Innovation

Group Members: Julian Alves (SBE), Manon Baert (FdR), Moritz Hergl (Fasos), Nadine Nerz (SBE), Paul Klopp (Fasos) and Tara Benjamin (FdR)

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