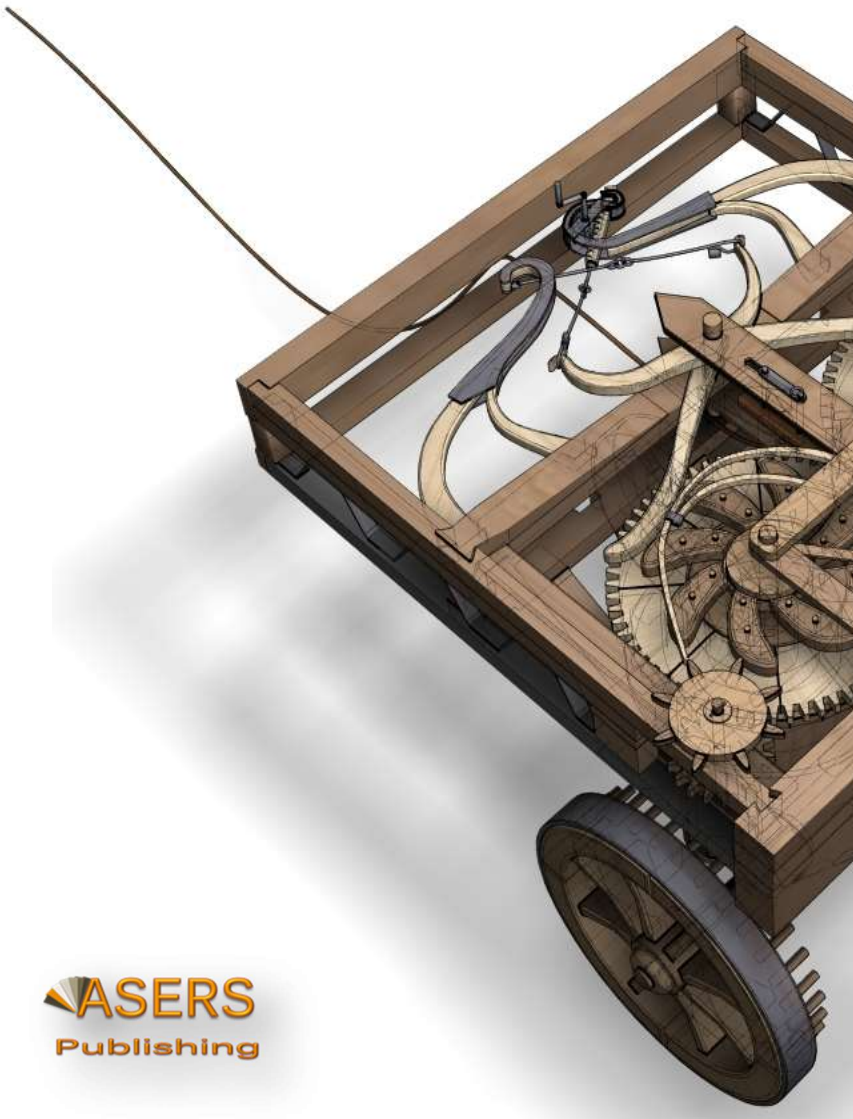
Theoretical and Practical Research in Economic Fields



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BEHAVIOURAL ANALYSIS OF STAKEHOLDERS TOWARDS SOCIO-ECONOMIC CHANGE: THE ENERGY TRANSITION JOURNEY IN THE AREA OF GELA

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Abstract:

This work is divided into three parts. Part One describes the reference literature and in particular the Rogers curve, which is helpful to understand the stage of adoption of innovations in which the population of the Gela area is. According to this theory, the process of acquisition of new technologies follows a customary pattern that may be useful to describe in detail the current attitude of the population towards the conversion in place and to assess or change the implementation of any interventions. Part Two involves the preparation and distribution of a questionnaire of 20 closed-answer questions to investigate: personal data, lifestyle to protect the environment, daily habits on recycling, waste and sustainable mobility, interests in circular economy and potential inclination of the area for its economic development. Part Three concerns the analysis of the answers to the questionnaire, in the light of the Rogers curve, to understand whether or not the data confirm the existence of innovators, in order to understand the impact on the success of the conversion in place and suggest possible correction strategies.

Keywords: circular economy; energy; history; innovators; sustainability; transition; Rogers curve.

JEL Classification: N54; O35; P18; P28.

Introduction

The history of energy has always been very dynamic in its evolution. The expression 'energy transition' is not new; in fact, starting from the 18th century, the transition from wood to coal, and later to oil, gas and nuclear power are all examples of energy transitions. These transitions have been driven by innovation and technological progress. They have been slow but unstoppable, and their impact on society, the economy and global geopolitical balances has been profound. The world today is witnessing a new energy transition to renewables, which is proving to be faster and more disruptive than previous ones. Once again, this transition is changing the energy sector. The conventional energy paradigm, based on the production of energy from fossil

fuels, is no longer sustainable: not only for environmental reasons, but also for economic reasons. The accelerated economic development of the twentieth century and the demographic growth of the world population, which has increased from 3 to 7 billion people in just one hundred years, have pushed on the consumption of fossil energy resources, causing two problems:

- Depletion of energy resources. Depletable energy resources are present in absolute quantities. Every unit consumed is equivalent to one less unit available. The regeneration times for oil, coal and natural gas are geological and go far beyond the human vision of time.
- Pollution. The combustion of fossil energy resources first caused local pollution. With the development and growth of production, pollution has taken on an international and global scale. The capacity of the environment to absorb pollution is now insufficient. In other words, pollution changes the environment in which man himself lives.

The shift from the use of non-renewable to renewable energy sources is part of the wider transition to sustainable economies through the use of renewable energy, energy saving techniques and sustainable development (Ferrajolo 2015). It may consist in the replacement of production plants, or their conversion or repowering, and is currently a crucial issue for Gela, a city where the construction of a huge industrial plant in 1963 (Magini 1976, 187-188), larger than the city of Gela itself, at the time of construction, represented a great upheaval and impact of a landscape, economic and socio-cultural nature for the local reality. Until the early sixties, in fact, Gela was a purely agricultural reality partially devoted to sheep farming and fishing activities, which due to the petrochemical plant has abruptly changed its economy and today in the midst of a general socio-economic crisis finds itself having to change its inclination as much radically.

An important step for the revitalization of the area was the Memorandum of Understanding for the Gela area signed on 6 November 2014 by: Ministero dello Sviluppo Economico, Regione Siciliana, Comune di Gela, and Eni S.p.A, Eni Mediterranea Idrocarburi S.p.A., Raffineria di Gela S.p.A., Versalis S.p.A., Syndial S.p.A., and Filctem CGIL, Femca, CISL, Uiltec UIL, UGL Chimici, CGIL, CISL, UIL, UGL Territoriali and Confindustria Centro Sicilia.

Pursuant to Article 2 of the Memorandum of Understanding for the area of Gela, identify and acknowledge the following main objectives:

1) to develop new activities based on innovative environmental technologies, enhancing the industrial strengths present in the territory of Gela and focusing on the manufacturing approach of the area and on the professionalism of the resources present in the site;

2) to launch new hydrocarbon exploration and production activities in the Sicilian Region and in the off-shore area next to it, as well as to develop and exploit the potential of fields already in operation, both offshore and onshore;

3) to ensure employment in line with the restructuring process of the industrial area of Gela and also to encourage the development of additional local businesses operating in the energy sector, green chemistry or diversified sectors in accordance with the objectives of the Memorandum.

In 2014, Eni declared its intention to build a biorefinery in Gela by 2019, which is estimated to have a throughput of approximately 750,000 tonnes/year and a production of 530,000 tonnes/year of green diesel. The project consists in converting the traditional refining scheme of the Gela industrial site with the use of crude hydrocarbon oil into a biocycle, capable of producing high-quality biofuels through the application of Eni's proprietary technological solutions and 'Ecofining' technology. Gela biorefinery will process loads consisting mainly of palm oil (530,000 tonnes/year) and will produce green diesel, green naphtha, green LPG and potentially green jet fuel for a total of approximately 630,000 tonnes/year. Intervening on existing plants, in addition to allowing a significant reduction in investment costs compared to the construction of a new biorefinery, allows the redevelopment of an industrial site and positive effects on the territory through work and local socio-economic development. When fully operational, the biorefinery plant will use not only crude palm oil but also second-generation loads such as animal fats and waste cooking oils, and will significantly reduce the impact on the environment compared to the traditional cycle.

In the light of the objectives present in the Memorandum, the question has been raised as to how incisive the *human factor* can be with regard to the possibility of developing the various environmental technologies. In particular, the behaviour of consumers and the social acceptance of changes taking place in the Gela area. Technology can accelerate change, but people are the real key players: involvement, at all levels, and motivation are crucial today to obtain real benefits. In helping to create the conditions for the area as a productive organism as a whole to reproduce and continue to produce, it is important to activate relationships that are not only aimed at guaranteeing economic development factors. In particular, the link with human capital

is significant: a company that aims to activate qualified workers must be able to guarantee a high quality of life for the local communities where they will reside. In the light of these considerations, it was necessary to investigate the perception of the inhabitants of the area regarding green innovation, through the distribution of customized questionnaires.

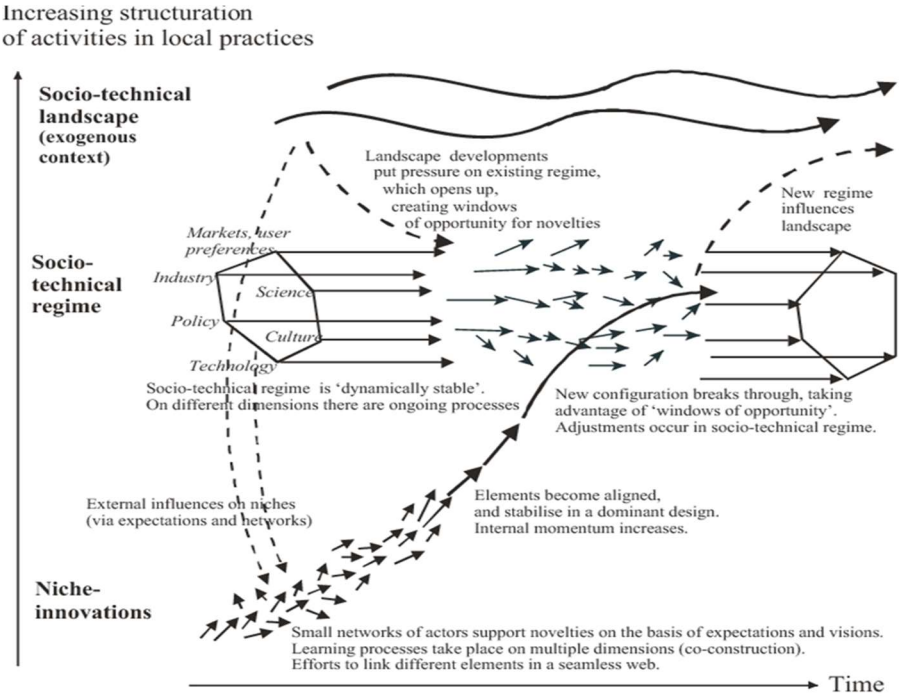
1. The Research

The analysis starts from the essential concept of transition. From the point of view of integrated systems, we define the concept of transition as a change in a system from one dynamic equilibrium to another (Stanley 1971). The underlying mechanism is co-evolution, as different subsystems co-evolve with each other, leading to irreversible patterns of change. Therefore, a transition is the result of developments in different domains. In other words, a transition can be described as a set of related changes that strengthen each other, but take place in several areas, such as technology, economics, institutions, behaviour, culture, ecology, belief systems and can be seen as a strengthening spiral. Since transitions have a multi-dimensional nature, with different dynamic levels, it will be natural for a significant number of developments to occur in different fields. To use a mechanical metaphor, all social phenomena act as an impulse for transitions, but only a few are able to provide a driving force (Rotmans *et al*. 2001). Thus, a transition can be accelerated by events that occur just once, such as a war or a major disaster, such as Chernobyl, or a crisis, such as

the oil crisis, but it can not be caused by such events. The process that causes the trigger is the co-evolution of a set of slow changes that determine the tendency substantial change (Bowles *et al.* 2003).

The relationship between socio-technical innovation in a sustainable key and local contexts is a particularly significant research topic for social sciences, especially in recent years. Several scholars have proposed interpretative and analytical frameworks, aimed at understanding the ways of sustainable innovation, trying to design a model of ecological transition able to connect national and supranational regulatory schemes with social practices located in local contexts (Markard *et al.* 2012). In this field, one of the most well-known theoretical contrasts is certainly the one that sees on the one hand the so-called Multi-Level Perspective (MLP) and on the other the theory of sustainable innovation practices. In the first case, authors such as Geels and Schot (2007) propose a model of dynamic and holistic regulation, within which ecological innovation originates in specific socio-technical niches. Starting from locally and temporally circumscribed experiences, the transition is transferred to increasingly wider levels of formalization (and social legitimacy), first in regimes (meso level), then in real socio-technical scenarios (macro level), as represented in Figure 1.

Figure 1. Schematic explanation of the multi-level perspective (MLP) of transition theory framework



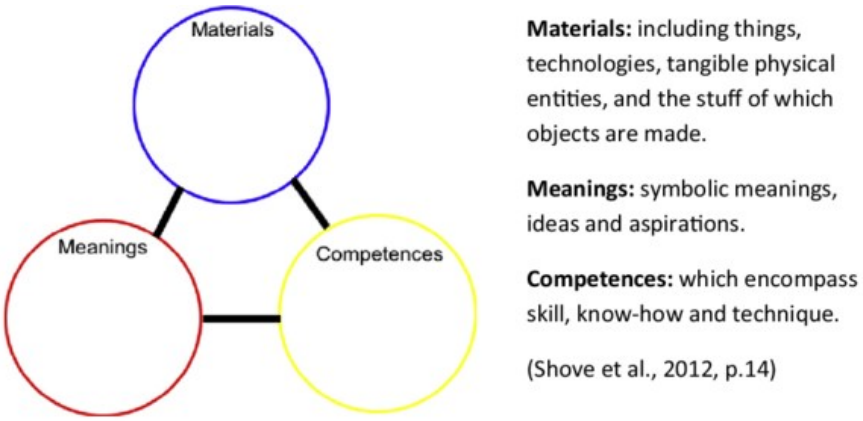
Source: Geels and Shott (2007).

In this scheme (Figure 1) the transition is understood as a process of non-linear interaction of three socio-technical levels: the 'niches', *i.e.* limited and protected places where radical innovations are created and developed; the 'regimes', *i.e*. the areas of social practices and rules and institutions that bind actions in existing systems; the 'landscape', *i.e.* the general background in which macro-processes are located. According to this scheme, innovations develop in niches, but have the chance to spread in regimes - which tend to self-conserve themselves - when changes in the landscape are such as to destabilize them from the outside. In this sense, the alignment between niches, regimes and landscape allows radical innovations to produce technological leaps that can promote important social changes by changing socio-technical regimes.

In contrast, for scholars of sustainability practices (Shove 2012), ecological transition is produced by changes that are defined within configurations that connect the symbolic-cultural dimension (meanings), know-how (competences) and technologies (materials), as shown in Figure 2.

In short, albeit in different ways, both approaches give the local dimension a significant importance, despite a very intense debate on the very possibility of achieving a modelling of these dynamics.

Figure 2. Schematic explanation of social practices theory, Shove 2012



Having clarified the mechanism of a transition, it is easy to understand that the spread of renewables and efficiency, the engine of energy transition, cannot take off if they do not take into account culture, communities and individuals (Walker *et al.* 2010). The transformation of the prevailing model of energy production from fossil sources to renewables and the climate issues related to it and to the sustainability of the current development model, have so far been addressed only by adopting the categories of economic sciences and engineering. The focus of the research has been on hardware rather than software, i.e. human and social aspects. The history of human development is a history of transitions from one energy production system to another that has produced major social changes (think of the impact of coal and oil on society in the 19th and 20th century) (Spaargaren 2011).

However, the current energy transition requires us to consider, on the contrary, the impact of the human factor on the possibility of developing different enviromental technologies. According to some research approaches analyzed (Magnani 2018), renewable energy is conceived as a great social experiment that requires multi-level changes. The policies to support renewables in Europe in the 2000s were mainly based on the introduction of incentive rates as a solution to help fight what was believed to be the only problem and obstacle to the acceptance of renewables. Every country in the world has on its agenda the commitment to increase the contribution of renewable sources in their energy needs. Some countries have set themselves ambitious targets and have created an environment for the development of new technologies and for renewable technologies that is very fertile from a technical and economic point of view. However, as the penetration of plants for the production of energy from renewable sources increases, it can be observed that the diffusion is not as efficient and fast as expected: there is one factor that has so far been largely neglected and that frequently appears to be an obstacle to the development of projects: social acceptance. This aspect was neglected in the 1970s and 1980s, during which time programmes for the creation of energy policies started. Opinion polls showed that the population widely accepted renewable energy technologies so politicians, developers, companies and local authorities did not consider the issue of social acceptance. The first problems arose when it was necessary to decide where to install the first wind turbines: the problem of choosing the site often turned out to be a problem that involved a large number of actors with sometimes diametrically opposed interests (Corrias, Felici 2019). Despite this, until the 1990s the question of social acceptance was never

studied in depth. Among the first consequences found the most important socially is what was called the 'NIMBY Effect', the expression (Not In My Back Yard) coined in 1980 by W. Rodger, of the American Nuclear Society and linked to the British politician N. Ridley (1929-1993), Secretary of State of the Conservative Party for the Environment. The acronym NIMBY - Not In My Back Yard - refers to the protest by members of a local community against works of public interest on their territory (*e.g.* major roads, quarries, settlements or industrial developments, waste-to-energy plants, landfill sites, stores of hazardous substances, power plants and the like), who would not oppose their construction in another place nevertheless (De Luca 2012). But most of the sociological studies that have analyzed the conflicts surrounding renewable energy plants in industrialized countries criticize this simplistic label.

The *NIMBY* syndrome implies a vision that is characterized by attitudes of selfishness, i.e. focus only on one's own special, local interests, irrationality and excess of emotionality, lack of balance and weighting in risk assessment, superficiality and ignorance. However, through empirical research, both qualitative and quantitative, several studies have highlighted the substantial groundlessness of these accusations up to the point of speaking of a true myth. In the last 30 years in the OECD countries was rooted the belief that technological improvement alone would be enough to control energy consumption and mitigate the problem of global warming. Decades of policies based on this hypothesis have not led to the expected energy savings. The reason for this failure was initially sought by analysing the weaknesses of efficiency policies and by looking for market barriers.

Technological improvements, the development of new equipment and the continuous increase in process efficiency alone are not sufficient to reduce energy consumption and pollutant gas emissions. Very efficient equipment can be used in a completely inefficient way, thus frustrating the energy savings that can be achieved. The purchase of systems and equipment with low energy consumption is important, but in order to achieve a society with sustainable energy consumption it is also necessary to focus attention on aspects concerning lifestyle, habits, values, behaviour, procedures and standards. A sustainable energy model can be achieved by acting in two directions (Disconti 2011):

- by producing energy from renewable sources (wind turbines, photovoltaic panels, etc.);
- by saving energy (greater efficiency of processes and systems, lifestyles with lower energy intensity, etc.).

Both directions are encountering non-technical-economic obstacles that slow down their development. Renewable technologies feature some substantial differences compared to traditional plants:

- smaller size. They are essentially smaller plants and consequently there is a need for more sites for their installation, so that more people are actively involved;
- lower energy density. They have a lower 'energy density', i.e. the visual impact per MWh of output is much greater than traditional plants, which very often use underground mines or environments already put to the test by previous uses;
- undefined externalities. External costs (externalities) are not yet taken into account when assessing the cost of energy produced by traditional plants, renewable technologies cannot compete on a 'neutral field'.

Instead, the importance of other explanatory variables was underlined (Spaargaren 2011): the question of the conflict between expert knowledge and knowledge based on experience and the history of places; questions of distributive environmental justice concerning the cost-benefit distribution between social groups and territories, but also the procedural one such as the presence in spatial planning of a transparent and participatory decision-making process able to provide information for all relevant stakeholders and the possibility to express their different opinions. This often prevents the local community from participating in or benefiting from projects dealing with renewables. Sociological studies state that there is a need to overcome the usual approaches to places of transition: both the one that considers places of renewable energy production essentially as backyards, courtyards dominated by NIMBY oppositions, and the one that considers renewable energy projects as 'sites to be developed', which is the perspective chosen by experts and that focuses on the search for technical characteristics of potential places, such as the average wind speed, proximity to the power grid, soil characteristics, accessibility, visual impact, etc. (Patrucco 2018).

Technical, economic and ecological aspects are important, but the locations for renewable energy projects are not only sites with topographical, ecological or archaeological characteristics. They are also territories interwoven with symbolic or emotional elements, memories, stories and myths, and also with relationships and provisions of share capital, which make them more or less fragile and mediate the way in which the same technology can be implemented. Empirical research shows that public opposition occurs more frequently in social contexts where attachment to and identification with the place are altered. There is currently

no single definition of *'social acceptance' of a technology*. One of the broadest and most agreed definitions is the one proposed by W*ü*stenhagen (*et al*. 2007). In this definition social acceptance is divided into three distinct dimensions: socio-political acceptance, community acceptance and market acceptance, represented in Figure 3.

Figure 3. The triangle of social acceptance of renewable energy innovation

Source: Wüstenhagen *et al*. 2007

Socio-political acceptance

The *socio-political dimension* of social acceptance is understood at a more general and extended level. It concerns the population and organisations.

In general, opinion polls show a high acceptance of technologies and policies for the diffusion of renewable technologies. For this reason, policy makers have never considered the social acceptance of these technologies problematic, but moving towards a local level, where the citizen sees his own interests and space undermined, the problem exists and opposition movements can arise that can block the development of the project.

Community acceptance

This dimension of social acceptance refers to the acceptance of the choice of sites for the installation of the plants by the local community or citizens living in the immediate vicinity of the project and local institutions (in this dimension of social acceptance the NIMBY phenomenon, about which we have already talked, is expressed).

A study focused on the acceptance of wind power plants (Wolsink 2007) shows that community acceptance follows a U-shaped curve. People give good support in the initial phase when they express their support 'in a general way'. Acceptance falls sharply when they are confronted with a project proposal in their neighbourhood or area of residence and then rises to a good level of acceptance after the construction of the plant.

Another very important factor is the perception of a 'cost-benefit distribution'; it must be as fair, just and clear as possible.

Market acceptance

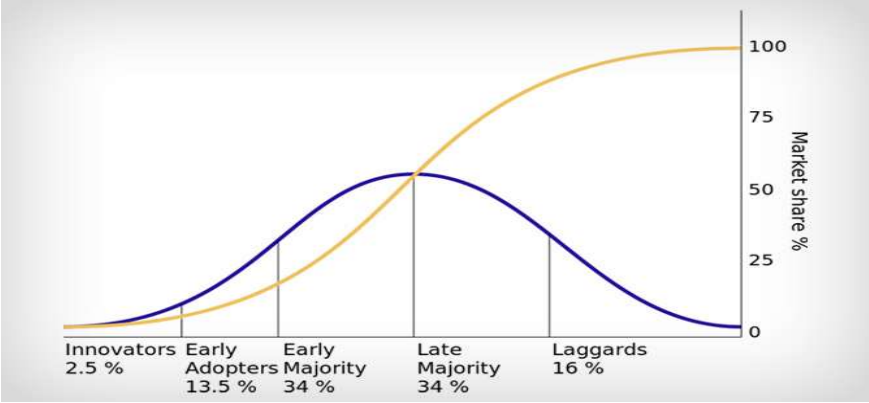
Social acceptance for renewable energy plants and new technologies can be interpreted as market acceptance, i.e. as the process of 'adoption and implementation' of an innovation by the market. According to this perspective it is possible to analyse social acceptance using the analyses present in the literature on the processes of introduction, development and diffusion of an innovation. This is possible in part because, unlike most innovative consumer products, renewable technologies are strongly linked to infrastructure, the area and are of a certain size. The strategies that can be identified in the literature apply to small plants, such as domestic power generation plants.

A perspective focused on the territory rather than on the productive potential of a site does not aim to ensure the acceptance of a technology by the population, but to identify the ways in which the technology can be adjusted to the place (Shove, Warde 2002); that is, the extent to which residents believe that the proposed project does not alter the specificity of a place and allows continuity with the past. Adjustment also concerns the relationships between local and non-local actors that renewables produce and the extent to which local social actors are able to incorporate technological innovation into the relational structure. Energy consumption and saving has always been a crucial issue in the relationship between energy and society (Urry 2000).

The science of energy saving was initially exclusively technical and economic, focused on increasing the technological efficiency of energy production, transmission and consumption. However, at some point, social sciences began to take an interest in the issue of the variability of energy consumption, and to try to understand why people do not adopt the most energy-efficient behaviour, even when this is technically possible. The point is that when people use goods and services they do not consider their activities to be about energy consumption, but rather they think they are doing normal activities such as cooking, travelling, cleaning. Consumption, in fact, is within the practices and cannot be seen. People are not interested in consuming energy in itself, but they are interested in the services it makes possible. In this perspective, the change and evolution of energy consumption is strongly dependent on the ability of new technologies to be effectively integrated into everyday life practices (Schumacher 1973). Innovation is at the heart of economic change, it is the gateway to change, however, without diffusion there is no change: an inseparable pair. It is a complex phenomenon with multiple aspects (technological, social, economic, political), but above all it is a dynamic phenomenon, characterized by long-term changes with profound effects on the evolution of the economy. It is seen by businesses as a means of increasing profits and market share; by governments as a means of improving the country's economy, and by individuals as an improvement in their living conditions. The diffusion of a new technology, of a new consumption model, is a dynamic process that often features a spatial model characteristic over time. Without diffusion an innovation would have a limited socio-economic impact. Diffusion, in the context of innovation, is the process by which the individual or company adopts a new technology without predecessors (within a company or an economy), or replaces an old technology with a new one. The most important determinant of the benefits arising from the adoption of a new technology is the degree of improvement that it provides on the previous technology and how easily these benefits can be identified by the adopter. Thus, one explanation for the possible slow adoption of a technology is that the relative advantage of new technologies is often rather limited at the time of their first introduction. Uncertainty in purchasing is often due to the fact that the benefits are normally diluted over time while the costs need to be dealt with immediately, making it necessary to estimate the life cycle of the technology. Uncertainty slows down the adoption rate (Lissoni 2000).

Understanding the dynamics of 'diffusion' is therefore fundamental to this research to give a complete reading of the status quo but, above all, to draw conclusions and recommend possible solutions. The author who has contributed most to the development of studies on the diffusion of innovation is Rogers (2003). According to this theory, the process of acquiring new technologies follows a usual pattern described in this graph:

Figure 4. Rogers adoption/innovation curve



The innovation adoption curve of Rogers (2003) is a model that classifies those who adopt innovations into different categories based on the idea that some individuals are inevitably more open to innovation than others. The concept of categories is important because it shows that all innovations must go through a natural, predictable, and sometimes long process before they become widely adopted within a population.

The categories Rogers identifies are:

- innovators (2.5%);
- early adopters (13.5%);
- early majority (34%);
- late majority (34%);

- laggards (16%).

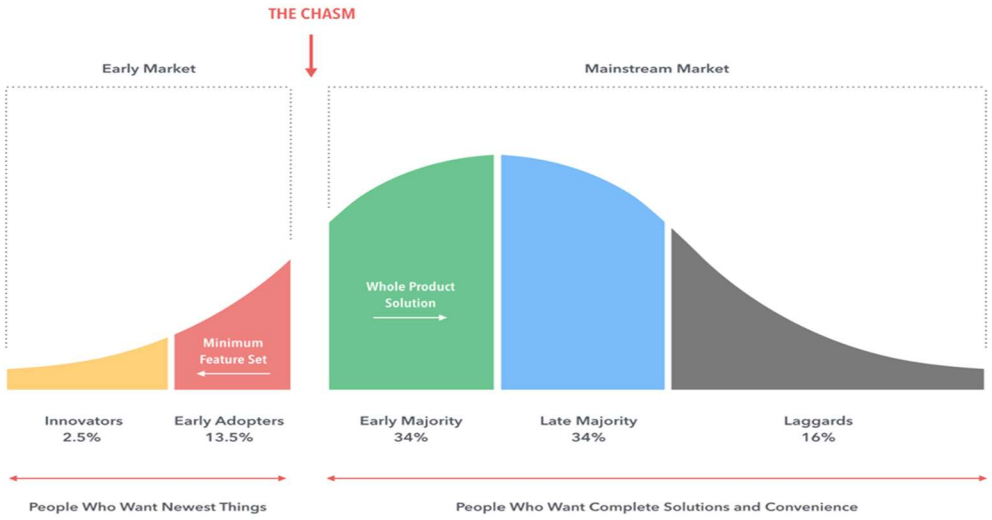
The identified categories of adopters are important because:

- a person's propensity to adopt an innovation affects the rate of absorption of the innovation over time;
- different groups have different propensities to invest in innovation and do so for different reasons and with different expectations;
- people who belong to the categories of innovators and early adopters are easier to convince to adopt new solutions;
- (both early and late) majority, which account for 68% of a population, is the one that determines the success or the failure of innovation;
- the majority have different needs from early adopters in terms of support, different emphasis on technology and teaching;
- innovators may require more flexibility and less control, whereas the majority may require more stability and support;
- innovators and early adopters only account for a small percentage of the population (2.5% and about 13%) and are not enough to have an impact on the success of innovation within an organization.

Early and late majority (called *mainstream adopters*) account for 68% of a population and represent the part of the population that can make a difference in the success of innovation within an organization. The former are usually more practical: they analyse the pros and cons of a new solution before adopting it, and help make it more tangible and acceptable. But if the support and infrastructure do not prove suitable, they are ready to change their mind. The latter, on the other hand, have fixed habits and are predictable. They want to know the rules, they love systems. The point to make is that when they don't find the rules, they start to get them themselves. Laggards tend to behave in the same way, and only adopt an innovation when it has become a standard current practice. Basically, the success of innovations goes first through a period of slow adoption, then experiences a sudden period of rapid adoption and then a gradual levelling (typical S-shaped curve). The rapid expansion of most successful innovations occurs when social and technical factors allow and feed them (Stone 1999).

Rogers's Diffusion of Innovation Theory was further refined several years later by Geoffrey A. Moore (1991). He points out that there is a sort of 'chasm' (Figure 4) between innovators/early adopters and the masses of consumers: conquering the former is therefore fundamental, because they are those who are able to evangelize the masses and thus spread the new products/services presented on the market like a virus.

Figure 5. Conceptual graph of crossing the chasm



The existence of a 'chasm' between 'early users' and 'early majority' creates difficulties, since it is very difficult for new technologies to move from the early innovators/users market to the mainstream one. This chasm derives from the deep differences existing between the two categories: the 'visionaries' think and spend big with the aim of being the first to have new products; whereas the 'pragmatists' are cautious and want to stay within reasonable boundaries of expectations and budgets proceeding slowly and cautiously in the innovation process (Mascia, Mills 2018).

The chasm is generated when the early user market is saturated and the mainstream market is not yet ready to buy (Moore 2013). So, there is no one to sell to (Loudon, Bitta 1979). The unawareness of the existence of the chasm, or its inadequate consideration, can create crises; therefore, it is necessary to make the time between the saturation of one market and the opening of the other as short as possible, with specific marketing strategies for the different categories. The aim is to minimise time in the chasm precisely because the more time one spends in this state, the more one risks failure.

Social factors can weaken the incentive mechanisms designed only for rational actors who are supposed to act on the basis of a pure cost-benefit calculation. Non-economic barriers, in fact, slow down the spread of renewable sources and of actions, behaviours and choices based on sustainability (Wejnert 2002).

We need to understand what prevents us from investing our money in a renewable energy system or in the thermal efficiency of our homes, rather than in a flat screen TV or in a super-equipped car. Our lives are made up of daily choices and despite the fact that we are increasingly talking about sustainability, climate change, alternate number plate days, eco-passes, fine dust, biodegradable bags, GMOs, etc., there still seem to be a lot of resistance to a real paradigm shift. It is not simply a question of providing the right information and motivation. Consumers should not be considered as isolated and rational individuals, but rather as people with habits and customs (CBC Radio 2010) regarding what is 'normal to do' or what is 'comfort', and be included in wider routine connections, consolidated knowledge and technological paths.

Energy systems, and the possibilities for their change, are not only economic or technological, but also involve social life patterns, representations, organizational models and relational structures. In order to generate the social preconditions for the transition to a low-emission society, focused on a growing production of energy from renewable sources and on greater sustainability of consumption, it is therefore urgent to reaffirm the centrality of a sociological approach to energy.

The introduction to the literature has shown us that energy systems, and the possibilities for their change, are not only economic or technological, but also involve social life patterns, representations, organizational models and relational structures. The qualitative survey will be used to investigate, following the Rogers curve that describes the impact on the success of innovation and adaptation to change, consumer behaviour and social acceptance of the changes taking place in the Gela area with particular reference to the transformation of the petrochemical site into a biorefinery. The most important determinants of the benefits arising from the adoption of a new technology are the degree of improvement that it provides on the previous technology and how easily these benefits can be identified by the adopter. Thus, one explanation for the possible slow adoption of a technology is that the relative advantage of new technologies is often rather limited at the time of their first introduction. Uncertainty in purchasing is often due to the fact that the benefits are normally diluted over time, while the costs need to be dealt with immediately, making it necessary to estimate the life cycle of the technology. Uncertainty slows down the adoption rate, so understanding where on the curve the population of Gela is in the acceptance and behaviour of energy conversion is a good starting point to decipher any problems (Laino 2016).

2. Specific Objective

The research aims to test green behaviours implemented by a sample of the population of Gela in support for the actions of redevelopment of the territory, sustainability, circular economy and innovation that ENI has been trying to achieve in Gela since the signing of the Memorandum of Understanding in November 2014. The data will be organized in such a way as to allow the control of the hypotheses.

The objective is to obtain, with reference to the answers to the questionnaire and the Rogers curve, some data confirming or not the existence of innovators to understand the impact on the success of the conversion in place and to suggest possible correction strategies.

Specifically, the work wants to test the following hypotheses:

H1: The lifestyle of the population advocates circular economy.

H2: The population has begun to implement change by investing in *Green Economy* funding both at the entrepreneurial level and in cultural education.

H3: The population trusts in the transformation of the Company for the economic development of the City.

3. Methodology

A multiple-choice questionnaire will be used as a research tool, in order to avoid dispersion in issues not strictly related to the subject of the survey.

The questionnaire consists of 20 questions divided into three areas:

1) Group 1-6 will collect personal and employment data;
2) Group 7-15 will collect information on consumer behaviour;
3) Group 16-20 will investigate the acceptance of ongoing changes.

The data collected, from the questionnaires distributed by e-mail or handed directly, will be processed through spreadsheets. The analysis of the data will be carried out in two phases, in the first phase the total data of the entire sample will be analyzed, while in the second phase the data will be analyzed by single category to understand if differences between the different categories emerge and if it is already possible to identify a cluster of innovators.

The sample consists of *100 people* on a population of 70,000 inhabitants and involves distribution to:

58 Citizens
15 Businesses
8 Trade Associations
6 Professional Associations and Boards
1 Environmental Associations
5 Representatives of Political Institutions
5 Educational Institutions
2 Cultural Territorial Attractors

The sampling method followed the criterion of 'reasoned choice', in order to be able to represent all the main categories that have an impact on change and to understand their 'insight' (a term used in psychology and marketing), *i.e.* the 'inner vision' that defines consumers' expectations, the weaknesses, the deep motivations that push them to act and also their subdivision into types of users, because just as there is not one single type of person there is not one single type of customer and behaviour either. On the basis of the data collected, the insights allow us, in fact, to get a snapshot of the 'feeling' of the area regarding the socio-economic changes taking place in order to structure a successful strategy for future action (Laughlin 2015).

Specifically, we have chosen to represent all the categories that live and act in and for the area:

- Citizens, because of their natural active role as key players in the evaluation processes;
- Companies as the hub of social and economic relations;
- Trade associations as representatives protecting the interests of different social and professional partners of the population;
- Professional associations for their dual role of guaranteeing the quality of service to citizens and protecting the professions of the association to which they belong;
- Environmental associations as promoters of environmental protection (the central theme of the change taking place;
- Local political representatives because they are on the front line in managing public affairs;
- Head teachers because they are decision makers in the education of adolescents who are decisive in the process of cultural renewal;
- Cultural attractors, associations that work for growth and social cohesion and take on the role of 'accelerator of innovative processes' on a territorial/district scale.

These categories have been identified and chosen numerically on the basis of their proportional presence in the area and because they collaborate directly or indirectly for the same purpose: the common good.

4. Methodology Description of the Sample

The above sample was thus divided by Sex, Age and Citizenship.

A higher percentage of men corresponding to 56% is shown in *Table 1*, the lowest age of the sample is represented by 2 18-year-old subjects while the highest age is represented by two 72-year-old subjects, the most representative sample is made up of 6 45-year-old subjects as can be seen in *Chart 6* followed by 43-year-old and 56-year-old with representation of 5 subjects by age. The citizenship of the subjects, represented in *Chart 7*, is totally Italian and therefore 100%.

Table 1. Description of the sample by Sex

Female	**43**
Male	**56**
Other	**1**
Tot.	**100**

Chart 6. Description of the sample by Age

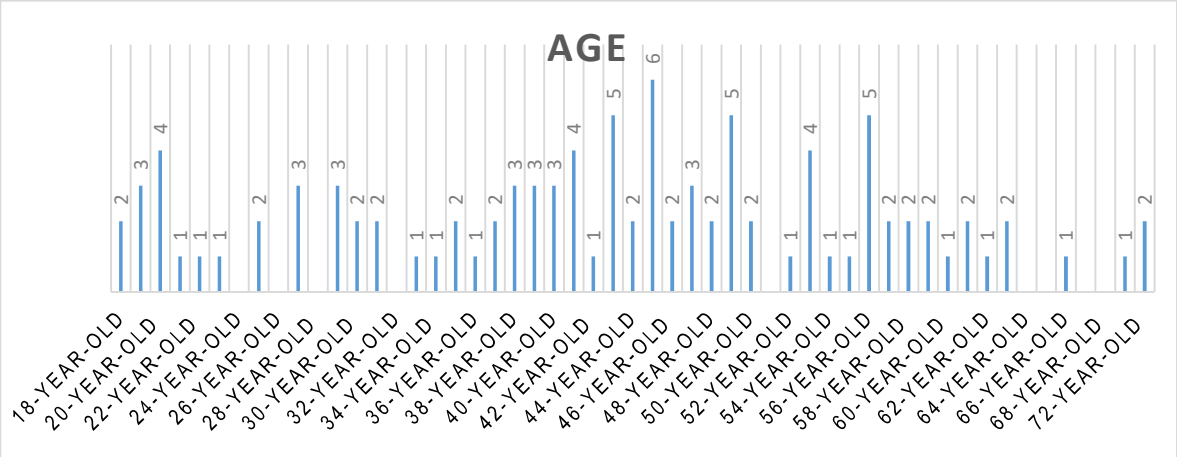
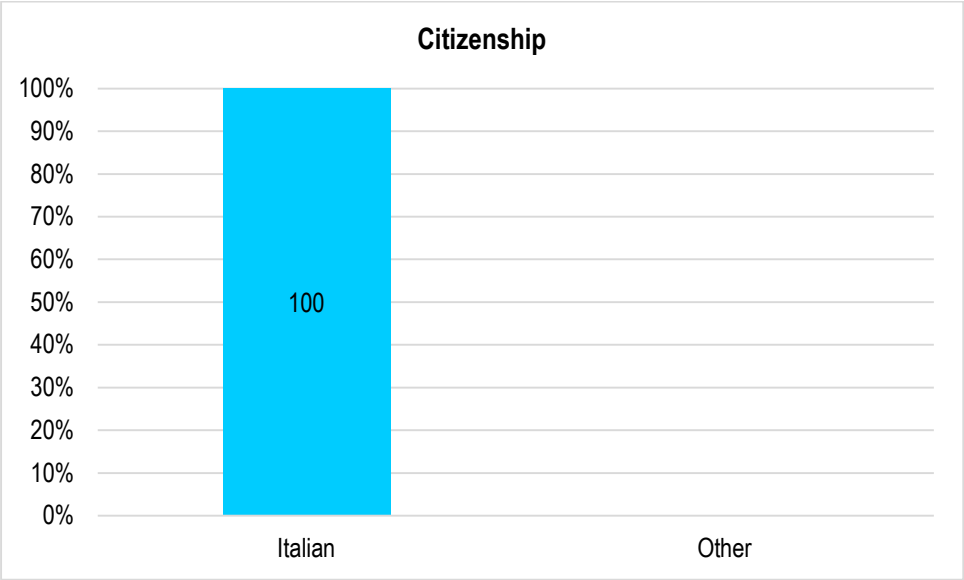


Chart 7. Description of the sample by Citizenship



The place of residence, level of education and employment is instead presented with a higher percentage of the sample 38% living in a residential area *Table 2*, with a very high percentage of graduates as much as 51% *Table 3* and *Chart 8*, and no one without education, that is 0%. With regard to employment shown in *Chart 9*, the highest percentage is represented by freelancers, who represent 27% followed by unemployed 17%, followed by students and workers.

Table 2. Description of Residence

Centre	30
Outskirts	30
Residential area	**38**
No answer	2
Tot.	100

Chart 8. Description of Education

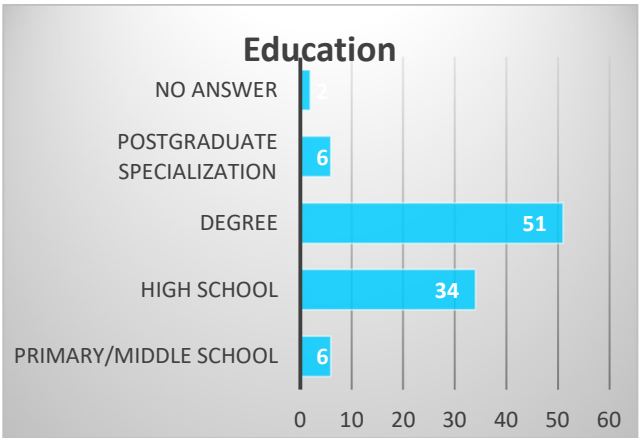
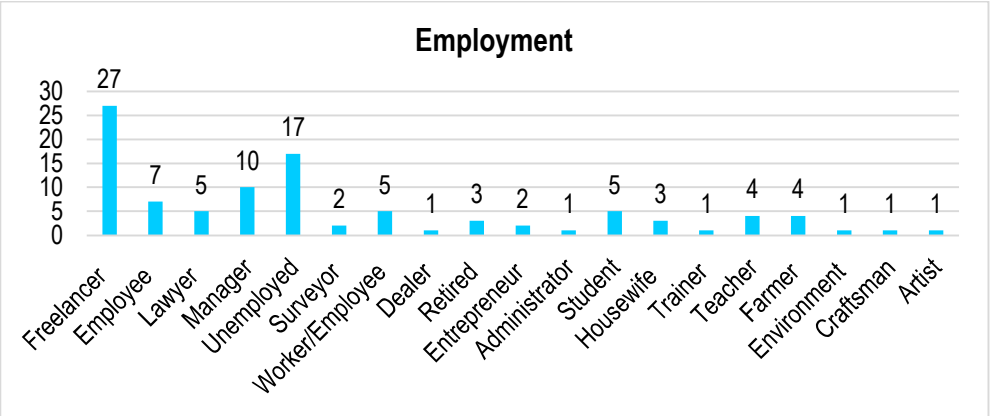


Table 3. Description of Education

None	0
Primary/Middle school	6
High school	35
Degree	**51**
Postgraduate specialization	6
No answer	2
Tot.	100

Chart. 9 Description of Employment



5. Results

In order to assess hypothesis H1 and to verify whether the population advocates a lifestyle in support of the circular economy, we will analyse the data collected in the questionnaire questions that correspond to questions 7, 8, 9, 10 and 11.

Chart 10. Answers to question 7 'Do you lead a sustainable lifestyle that protects the environment ?

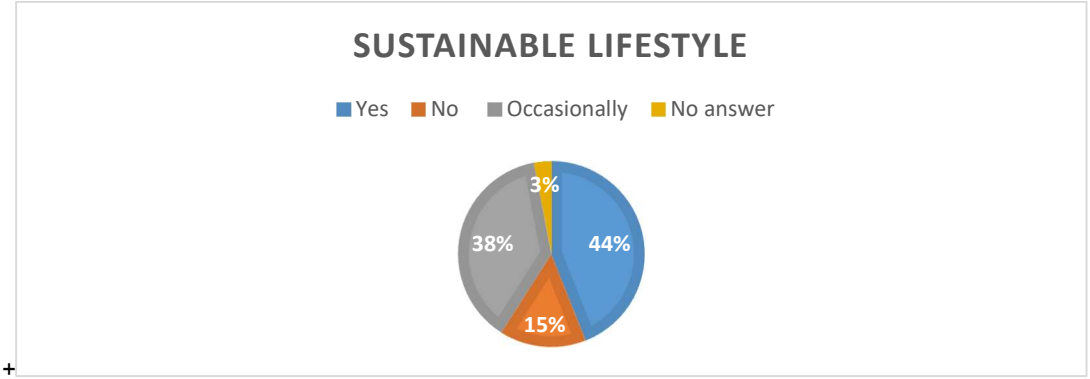
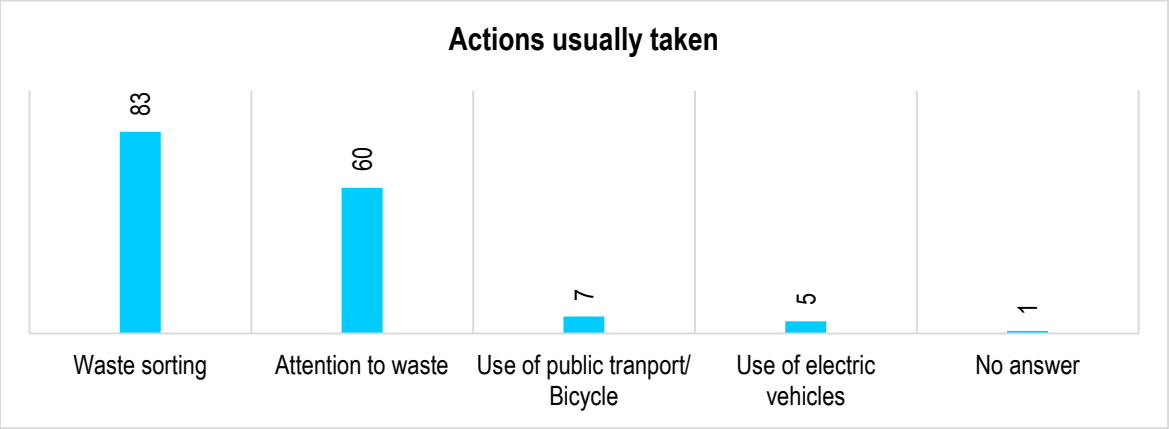


Chart 10 shows us that the majority of subjects, i.e. 44%, claim to lead a sustainable lifestyle that respects the environment, followed by subjects who claim to do so occasionally, and finally only 15% who claim not to lead a sustainable lifestyle at all.

Chart 11 illustrates the actions related to the above statements, which interviewees specifically take in carrying out a sustainable lifestyle. It can be seen that the action taken by 83% of the subjects is to sort waste, followed by the action of paying attention to waste, while only 5% use electrical vehicles.

Chart 11. Answer to question 8 'Which of the following actions do you usually take?' (Multiple answers are possible)



Graph 12 shows, on the other hand, that most of the subjects in the sample have the habit of recycling objects, and this represents as much as 80% of the sample.

Chart 12. Answer to question 9 'Have you ever recycled anything?' (*e.g.* plastic or glass bottles, shopping bags, old cartons, textiles, etc.)

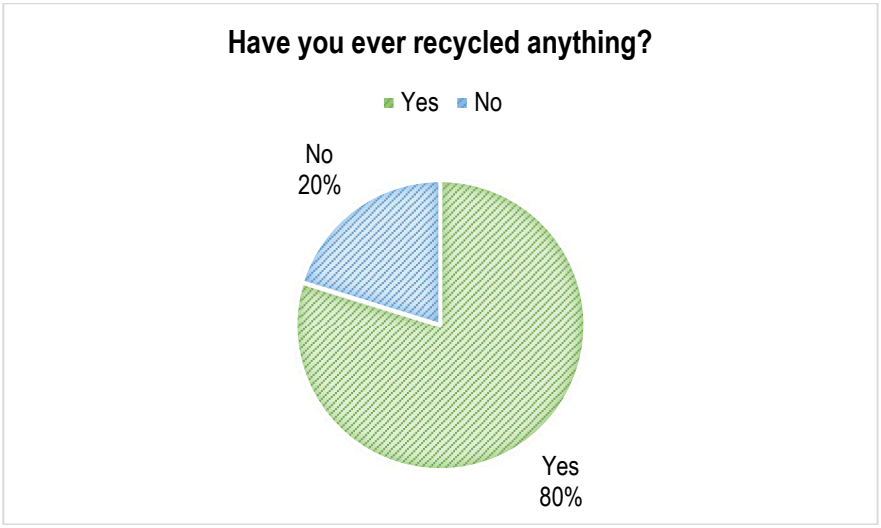


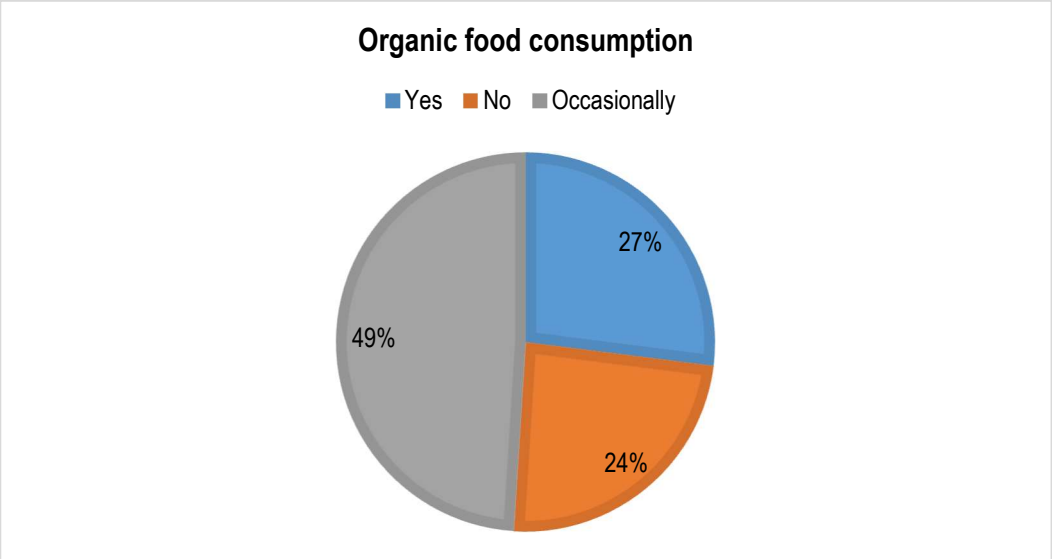
Table 4 shows the supporters of the circular economy, who represent the majority of the sample, but 29% say they do not know how to express themselves on the subject.

Table 4. Answer to question 10 'Are you a supporter of the circular economy?'

Yes	**57**
No	13
I don't know	29
No answer	1
Tot.	100

Chart 13. It shows that the highest percentage is made up of people who sporadically consume organic food, 49% answer 'Occasionally', leaving a very small gap between those who consume it and those who do not, representing 27% and 24% respectively.

Chart 13. Answer to question 11 'Do you consume organic food?'



Questions 12 and 13, reported in charts 9 and 10, illustrate the attitude of the population in terms of cultural change, the answers to these questions will try to verify hypothesis H2 indicating if the population under analysis has begun to implement a change, by keeping informed and investing in green economy funding, both at the entrepreneurial and cultural level by participating in initiatives and meetings on eco-sustainability.

Chart 14 shows that only 28% of the sample participated in cultural initiatives in support of eco-sustainability, while the vast majority, i.e. 71%, did not.

Chart 15. It confirms the trend in Graph 14, showing that the majority of the population surveyed, i.e. 63%, did not move in the direction of green investments, an action carried out by 36% of the subjects.

Chart 14. Answer to question 12 'Have you participated in cultural initiatives/meetings on eco-sustainability in the last year?'

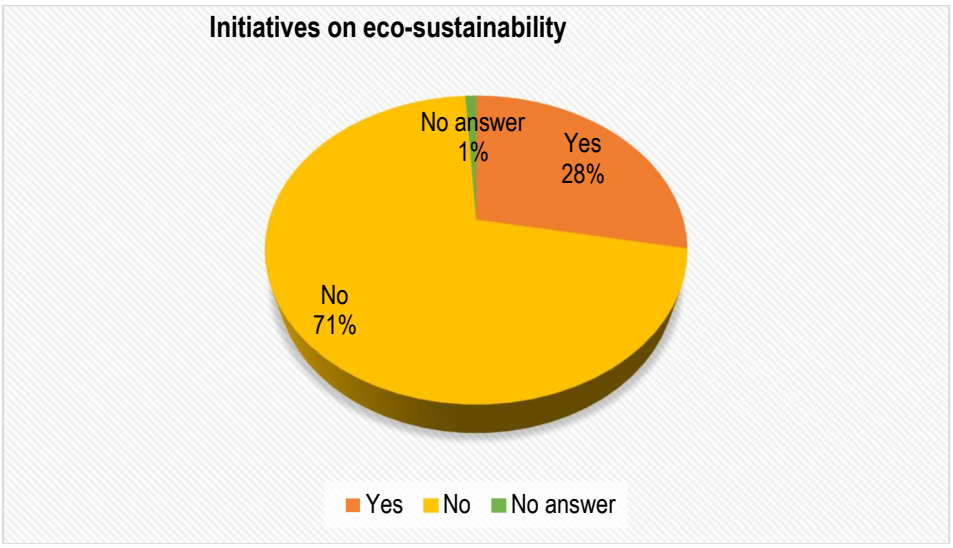
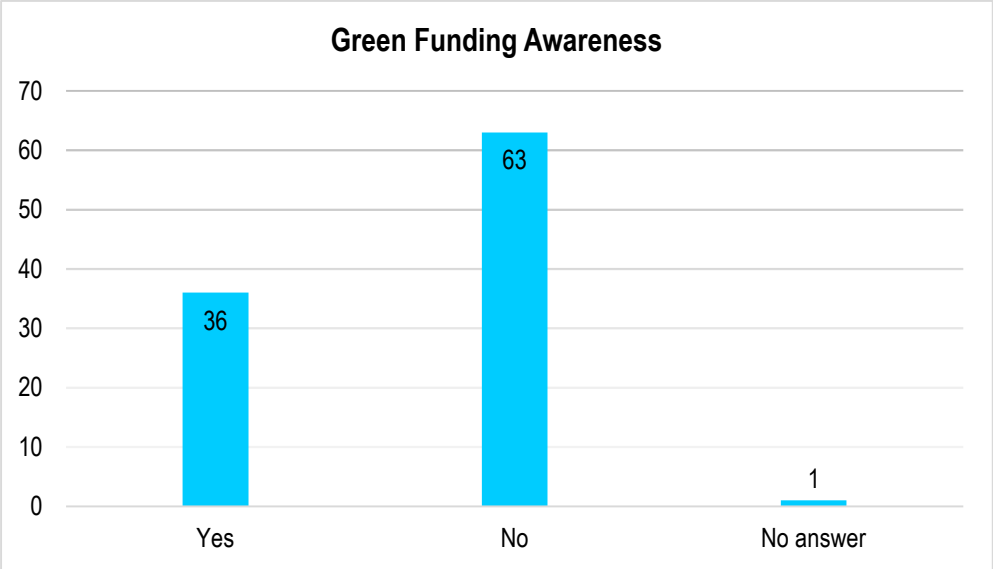


Chart 15. Answer to question 13 'Are you aware of European/regional Green Economy funding?'



Questions 14 and 15 represent a small interval to get a snapshot and understand the consumption habits of the population, whether their purchasing power has decreased in recent years and which consumer good they spend more money on.

Chart 16 shows us that in the last two years purchasing power has decreased for 78% of the sample, while *Chart 17* shows us that the consumer good on which more money is spent is food, followed by clothes.

Chart 16. Answer to question 14: 'Has your purchasing power decreased in the last two years?'

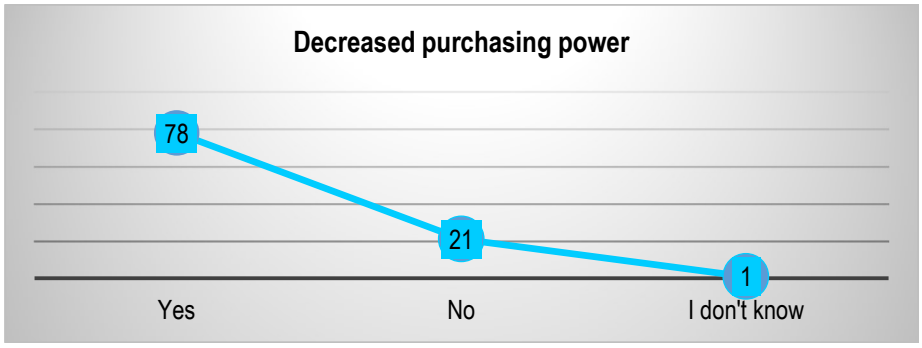
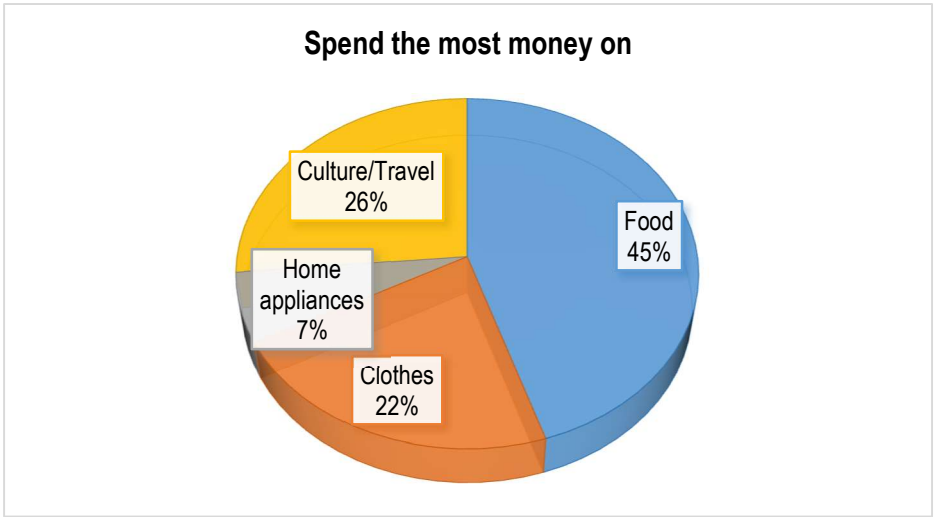


Chart 17. Answer to question 15 'Which consumer good do you spend the most money on?'



Hypothesis H3 must be validated by questions 16, 17, 18, 19 and 20. The answers to these questions will help us to understand if the population relies on the conversion of the old refinery into a biorefinery, for the economic development of the city of Gela.

We will also understand if the population blames the closure of the historic petrochemical plant for the period of economic crisis currently taking place in the area.

The first question (16) is aimed at illustrating the thought of the population on the current economic condition of the City, we can see from *Chart 18* that 95% of the subjects believe that the area is going through a period of crisis. In the next Chart, *Chart 19*, we discover that more than half of the population, 72%, blame the conversion of the petrochemical plant into a biorefinery.

Chart 18. Answer to question 16: 'Do you notice a period of economic crisis in your area?'

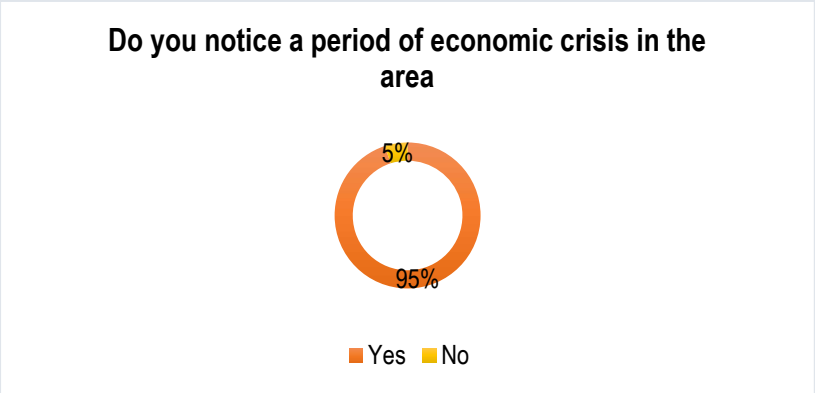
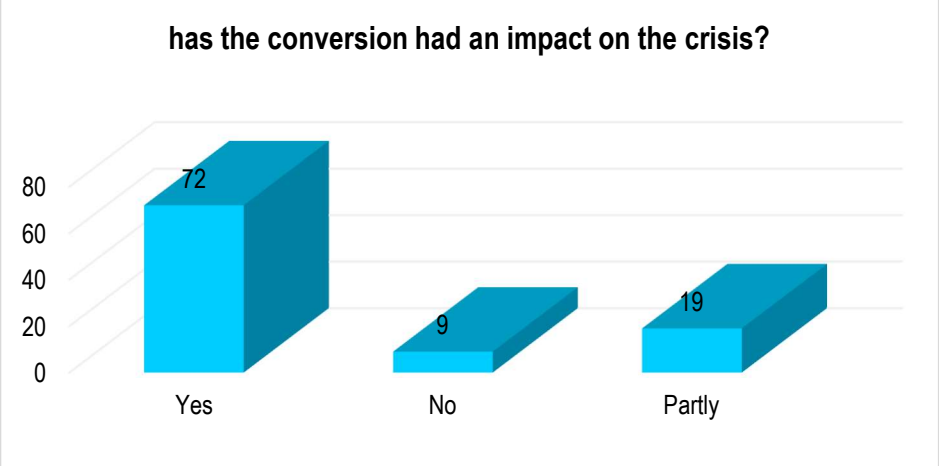


Chart 19. Answer to question 17 'In your opinion, has the conversion of the historic petrochemical site into a biorefinery had an impact on the crisis in the area?



Continuing to investigate the sample's opinion on the conversion, we note from Chart 20 that the percentages are well distributed and that the largest percentage of the sample, 35%, believes that the conversion will benefit the whole area. In the opposite position, with 23%, we find instead a slice of the sample that thinks that it will not bring development for anyone.

Chart 21 shows us how without hesitation, with a percentage of 83%, the sample is convinced that the area has a natural inclination. This inclination is reflected in Chart 22, where 41% of those interviewed believe in tourism and 36% in agriculture, followed by university with 9% and biorefinery with 8%.

Chart 20. Answer to question 18 'A new biorefining hub can bring economic development: to individuals, to companies, to the whole area, to nobody'.

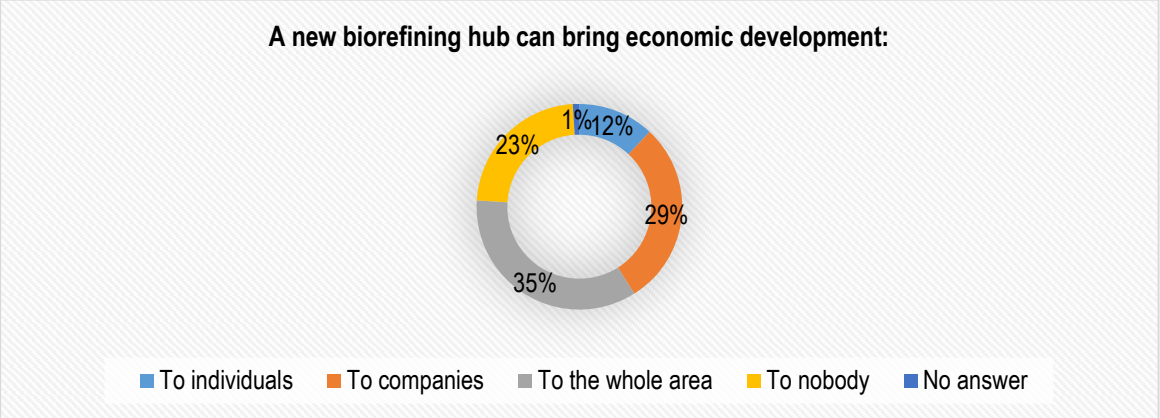


Chart 21. Answer to question 19 "Do you think the area can have a particular inclination?"

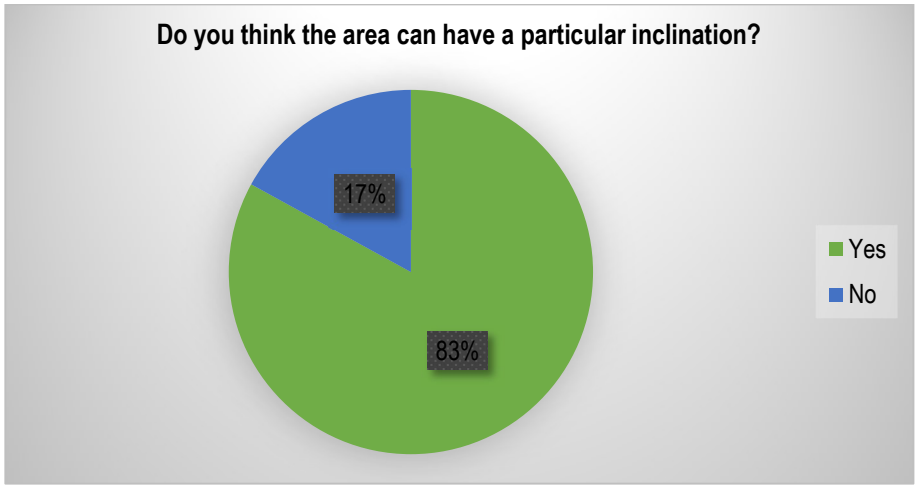


Chart 22. Answer to question 20 'If so, which inclination?'

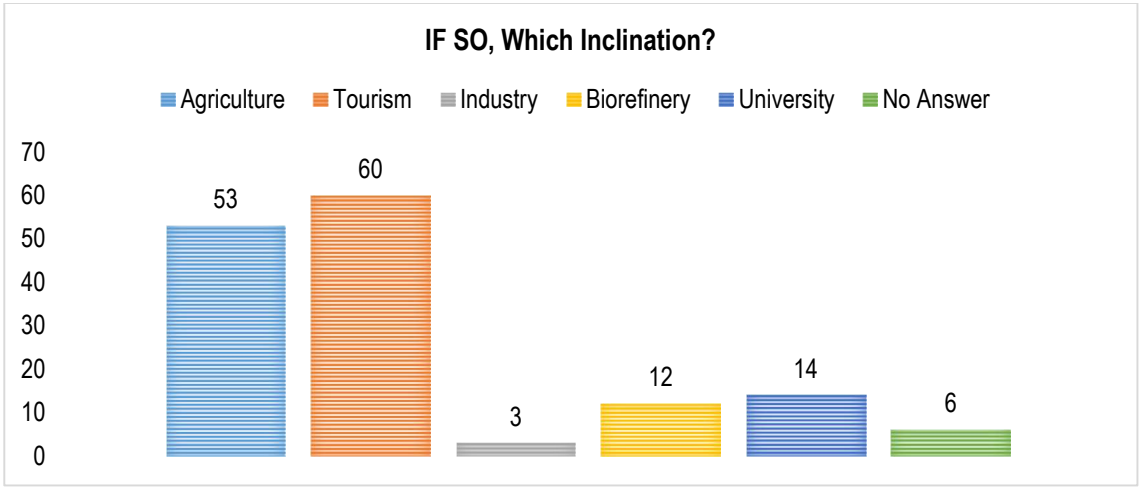
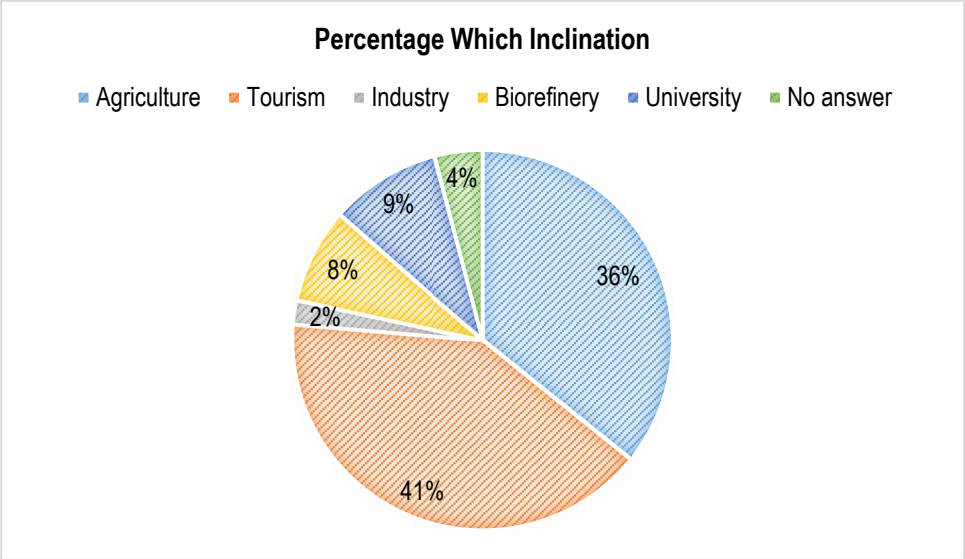


Chart 23. Answer to question 20 'If so, which inclination?' *(In percent)*



In the comparison between stakeholders, analysing questions 12 and 13 in an attempt to identify 'innovators', *i.e.* the category that has begun to implement a change, the data are distributed and illustrated in *Tables 5 and 6*.

Environmental Associations and Social Attractors have taken part in initiatives on eco-sustainability with 100%, followed by Trade Associations with 50%, and Political Representatives and Head Teachers with 40%, and lastly Businesses and Professional Orders with 33%. The lowest percentage, on the other hand, concerns Citizens, where 83% say that they have not participated.

Table 6 shows that it is mostly the Cultural Attractors and Citizens who are not aware of funding to invest in the Green Economy, whereas environmental associations and companies move in the opposite direction.

Table 5. Comparison between stakeholders. Answer to question 12 'Have you participated in cultural initiatives/meetings on eco-sustainability in the last year?'

'Have you participated in cultural initiatives/meetings on eco-sustainability in the last year?'	Yes	No
Citizens	17%	**83%**
Companies	33%	67%
Trade Associations	50%	50%
Professional Associations and Boards	33%	67%
Representatives of Political Institutions	40%	60%
Head Teachers	40%	60%
Environmental associations	**100%**	0%
Cultural Territorial Attractors	**100%**	0%

Table 6. Comparison between stakeholders. Answer to question 13 'Are you aware of European/regional Green Economy funding?'

'Are you aware of European/regional Green Economy funding?'	Yes	No	no answer
Citizens	26%	**74%**	
Companies	73%	27%	
Trade Associations	62%	25%	13%
Professional Associations and Boards	33%	67%	
Representatives of Political Institutions	40%	60%	
Head Teachers	20%	80%	
Environmental associations	**100%**	0%	
Cultural Territorial Attractors	**0%**	**100%**	

Discussion and Conclusion

The results obtained from the research only confirm hypothesis H3, denying H1 and H2.

The analyses carried out show that in the majority of the population surveyed there is still no lifestyle in support of the circular economy, a term that catches 29% of the sample off-guard – when asked 'Are you a supporter of the circular economy?', they answer 'I don't know'.

Despite the fact that 44% of the population say they lead a lifestyle that protects the environment and 38% say they do so occasionally, there are no spontaneous and concrete actions in which this thought is manifested; the vast majority of the sample, 83%, in favour of a lifestyle that protects the environment, say they sort waste (action imposed by the municipality of residence) as the main action, while only 5% use electric vehicles and only 7% use public transport or bicycles.

We can therefore consider hypothesis H1 not true: the population advocates a lifestyle in support of the circular economy.

However, we should highlight the very encouraging data that comes from 80% of the sample that have recycled something in their lives.

71% of the population have never participated in initiatives and cultural meetings on eco-sustainability and 63% are not aware of European or regional funding regarding the Green Economy, this figure is enough to confirm that hypothesis H2 is not true: that is, the population has begun to implement change by investing in Green Economy funding, both at the entrepreneurial level and in cultural education.

95% of the sample noticed a period of economic crisis in the area, to which the conversion of the historic petrochemical site into a biorefinery contributed according to 72% of the sample. Despite this belief, the population still believes that a new biorefining hub can bring economic development to the whole area, the percentage of 35% (the highest for this question) therefore makes us confirm hypothesis H3: *i.e.* the population trusts in the conversion of the ENI company for the economic development of the city of Gela. The very small gap should also be noted between those who believe that it will bring economic development to companies, represented by 29%, and those who believe that it will not bring development to anyone, 23%.

An analysis among stakeholders reveals that the first promoters of change, who have shown a higher percentage of participation in cultural activities, are represented by Environmental Associations and Cultural Attractors, followed by Trade Associations.

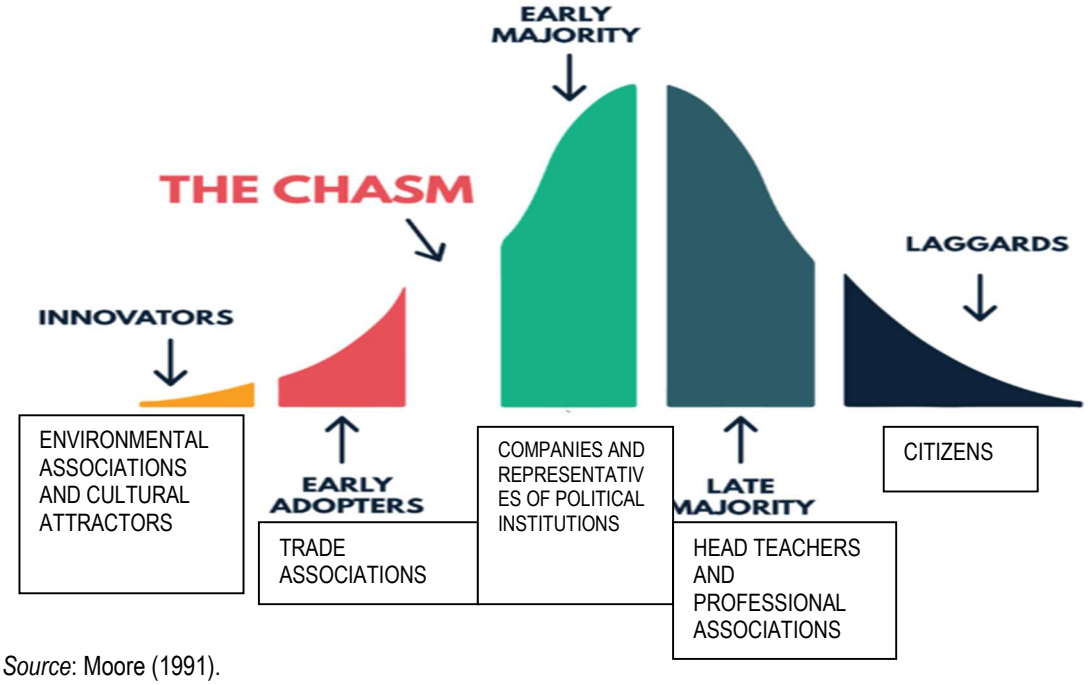
It is always the Environmental Associations, followed this time by Businesses, the leading stakeholders for Green funding.

The return of the data also requires considerations on some main points.

Proceeding in order, question 8 (Which of the following actions do you usually take?) shows that among the actions usually taken, 83% of the sample sort waste, but waste sorting is mandatory in the municipality of Gela, so actually it is a figure that shows a lack of sensitivity to environmental sustainability. When asked question 12 (Have you participated in cultural initiatives/meetings on eco-sustainability in the last year?), 71% answer that they have not participated in cultural initiatives/meetings on eco-sustainability in the last year; this high percentage suggests that such initiatives have probably not been promoted on the area. Continuing on, it is interesting to note that whereas in question 17 (In your opinion, has the conversion of the historic petrochemical site into a biorefinery had an impact on the crisis in the area?), 72% say that the conversion of the historic petrochemical site into a biorefinery has had an impact on the crisis in the area, in question 19 (Do you think the area can have a particular inclination?), 83% are convinced that the area has its own natural inclination, which is for 41% tourism and for 36% agriculture, followed by university with 9% and biorefinery with 8%. Therefore, if on the one hand the population blames the conversion of the petrochemical plant for the crisis, on the other hand they do not believe it is the key to economic recovery.

Finally, tables 5 and 6 with the comparison between stakeholders suggest that Environmental Associations and Cultural Attractors are our 'innovators', followed by Trade Associations. Trying to reconstruct, with our data, the Chart by G. A. Moore would look like this:

Chart 24. "Innovators", chart by G. A. Moore (1991)



Source: Moore (1991).

People were asked to answer these questions because we were interested in understanding, above all, what are not so much the economic and political barriers, but the cultural and psychological ones, which seem to be less evident to the change in environmental sustainability.

The economic crisis, in fact, could make us understand the importance of energy efficiency, of energy produced with renewable sources. When individuals are forced to think about what they can and must do for their survival and subsistence, they actively act on their lifestyles with a problem-solving approach that leads them to empower themselves and develop skills and competences. This may be the time to say that there are different ways of living, ways that are less impacting on one's health and the planet and that allow us to spend less, for example producing energy with a solar panel on a roof or producing food with urban gardens, etc. (Sethi 2017).

The transition town movement is very interesting from this point of view because it acts on values and symbols, you feel part of a movement in which the active role of each one is fundamental to achieve a collective goal, and from our analysis environmental associations and cultural attractors could be potential and essential partners to fill 'The Chasm', define communication strategies and trigger dynamics of involvement and participation, because they are closely linked to the area and the life of the city.

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Appendix

The questionnaire is anonymous.

1 SEX: ☐ Female ☐ Male ☐ Other
2 AGE: _____
3 CITIZENSHIP: _____
4 RESIDENCE:
_____
☐Center ☐Outskirts ☐Residential area

5 EDUCATION:
☐ None ☐ Primary/Middle school ☐ High school
☐ Degree ☐ Postgraduate specialization

6 EMPLOYMENT:
_____ ☐Unemployed

7 DO YOU LEAD A SUSTAINABLE LIFESTYLE THAT PROTECTS THE ENVIRONMENT?
☐Yes ☐ No ☐Occasionally

8 WHICH OF THE FOLLOWING ACTIONS DO YOU USUALLY TAKE? (multiple answers are possible)
☐ I sort waste
☐ I pay attention to waste of water, energy and food
☐ I use public transport and/or bicycle
☐ I use electrical vehicles

9 HAVE YOU EVER RECYCLED ANYTHING? (e.g. plastic or glass bottles, shopping bags, old cartons, textiles, etc.)
☐ Yes ☐ No

10 ARE YOU A SUPPORTER OF THE CIRCULAR ECONOMY?'
☐Yes ☐No ☐I don't know

11 DO YOU CONSUME ORGANIC FOOD?
☐Yes ☐ No ☐Occasionally

12 HAVE YOU PARTICIPATED IN CULTURAL INITIATIVES/MEETINGS ON ECO-SUSTAINABILITY IN THE LAST YEAR?
☐Yes ☐ No

13 ARE YOU AWARE OF EUROPEAN/NATIONAL/REGIONAL GREEN ECONOMY FUNDING?
☐Yes ☐ No

14 HAS YOUR PURCHASING POWER DECREASED IN THE LAST TWO YEARS?
☐Yes ☐No

15 WHICH CONSUMER GOOD DO YOU SPEND THE MOST MONEY ON?
☐Food
☐Clothes
☐Home appliances
☐Culture/Travel

16 DO YOU NOTICE A PERIOD OF ECONOMIC CRISIS IN THE AREA?

☐ Yes ☐ No

17 IN YOUR OPINION, HAS THE CONVERSION OF THE HISTORIC PETROCHEMICAL SITE INTO A BIOREFINERY HAD AN IMPACT ON THE CRISIS IN THE AREA?

☐ Yes ☐ No ☐ Partly

18 A NEW BIOREFINING HUB CAN BRING ECONOMIC DEVELOPMENT:

☐ to individuals ☐ to companies ☐ to the whole area ☐ to nobody

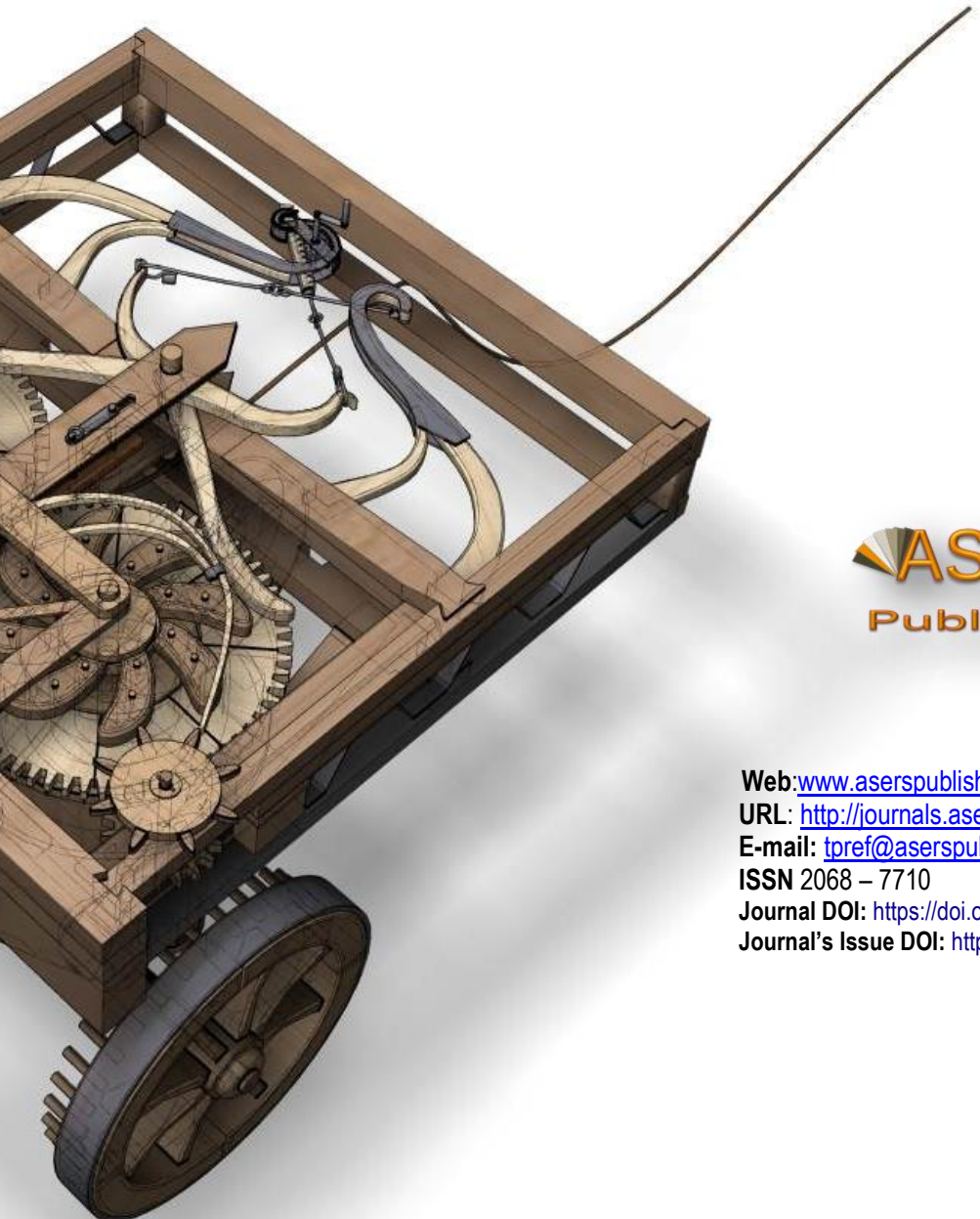
19 DO YOU THINK THE AREA CAN HAVE A PARTICULAR INCLINATION?

☐ Yes ☐ No

20 IF SO, WHICH ONE?

☐ Agriculture ☐ Tourism ☐ Industry ☐ Biorefinery ☐ University

ASERS



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