

Innovation and Sustainable Development: From Mainstream Innovation Theory to Sustainable Innovation Research

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1. Introduction
2. Challenges for Sustainable Innovation
3. Case Study: Development and Implementation of the Sustainability Strategy of Rheinland-Pfalz
4. Conclusions

- Innovations are important from both sides:
 - ❖ from economic mainstream perspective and
 - ❖ from the perspective of sustainable development.
- Innovation from an economic mainstream perspective is per se good:
 - ❖ if an innovation brings success in the market and
 - ❖ increase economic growth in an economy.
- From the perspective of sustainable development the positive effect is given when all three dimensions (ecology, economy and the social dimension) are considered in the development of the innovation.

1. Introduction

- Innovations in the context of the mainstream are often seen as the result of technical progress.
- Technical progress is seen as the motor of economic growth.
- The competition and the dynamics of growth in a market economy are dependent from innovations.
- The incentive for the innovator is to achieve at least a temporary monopoly or innovational returns.
- From the macroeconomic perspective the number of patents over a special period of time is the “success indicator”.

1. Introduction

- In the 1980^s and 1990^s some economists understood individual innovations as part of innovation systems.
- But also in this context economists realized and analyzed the economic success of innovation systems.
- Therefore the paradigm of sustainable development call for specific requirements.
- Sustainable innovation has to be integrated in the trial of ecological, economic and social considerations.

1. Introduction

- Non of the three dimensions can be neglected when analyzing the effects of innovations.
- The sustainable innovation research had the focus on the ecological sustainability until now .

2. Challenges for Sustainable Innovation

- It is necessary first to present the economic mainstream of innovation research and then the specific requirements of the sustainable innovation.
- The economic mainstream of innovation research starts with:
 - ❖ process innovation (introduction of a new production process) and
 - ❖ product innovation (new products for the market).
- Another important differentiation is:
 - ❖ basic innovation (based on the work of Nikolai Kondratieff) and
 - ❖ process and product modifications (more or less comprehensive change to an existing process or product).

2. Challenges for Sustainable Innovation

- Limiting our understanding of innovation to technical innovations is more and more a subject to criticism.
- Innovation goes beyond process and product innovation and includes new management and organizational processes.
- The term innovation is used to a growing extend for non-technical improvements.
- Current empirical research includes more and more organizational innovation.

- The way from Schumpeter to Lundvall:
 - ❖ Schumpeter described the “process of creative destruction”,
 - ❖ Lundvall generally described an innovation system which is based on the interacting elements and relationships in the production and the research area.
- Freeman developed the innovation system to a network model.
- In this context social capital generates and develops the innovation process.
- Innovation systems are further differentiated into national and regional innovation systems.

2. Challenges for Sustainable Innovation

- National innovation systems are subdivided into three subsystems which are linked to the paradigm of sustainable development:
 - ❖ **Production system** recognizes different categories of firms that have different attitudes about innovation,
 - ❖ **Education and research system** recognizes different educational categories and research sectors,
 - ❖ **Political system** promotes the research and development policy or innovation strategy.
- This three subsystems can be integrated in the context of sustainable development.

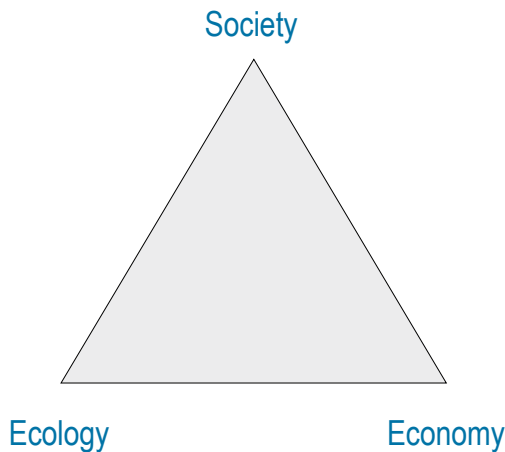
2. Challenges for Sustainable Innovation

- **Example:** The Technical University of Kaiserslautern has a sustainability strategy where the three fields “Education, research and administration” are part of the strategy.
- In a broader sense the sustainability strategy of Rheinland-Pfalz is a new innovation system.

3. Development and implementation of the sustainability strategy of Rheinland-Pfalz

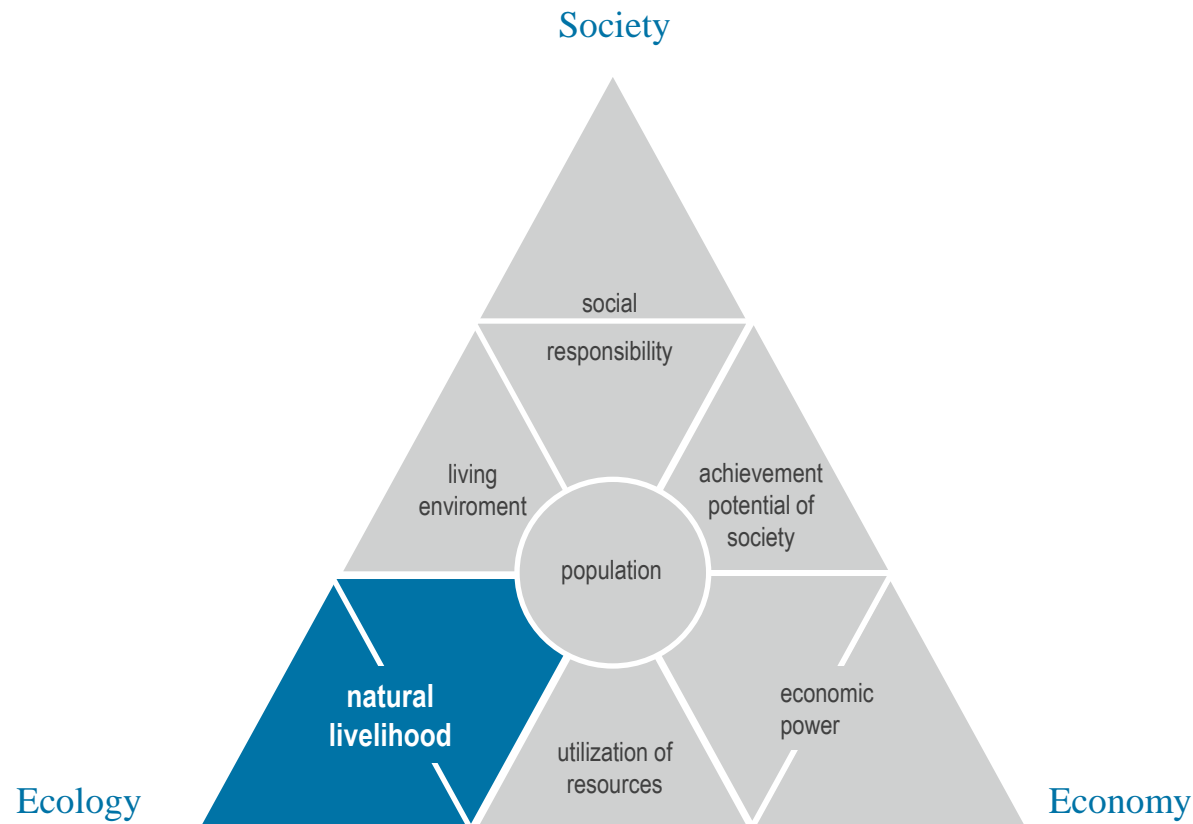
- Sustainable development or the implementation of a sustainability strategy demands the analysis of issues as they relate to the three dimensions both in terms of integration and differentiation.

The sustainability triangle



The pillars are randomly positioned at each corner.
Source: Internal

3. Development and implementation of the sustainability strategy of Rheinland-Pfalz



Source: Abbildung nach Ministerium für Wirtschaft, Klimaschutz, Energie und Landesplanung Rheinland-Pfalz: Perspektiven für Rheinland-Pfalz - Nachhaltigkeitsstrategie: Fortschreibung 2011, S.17

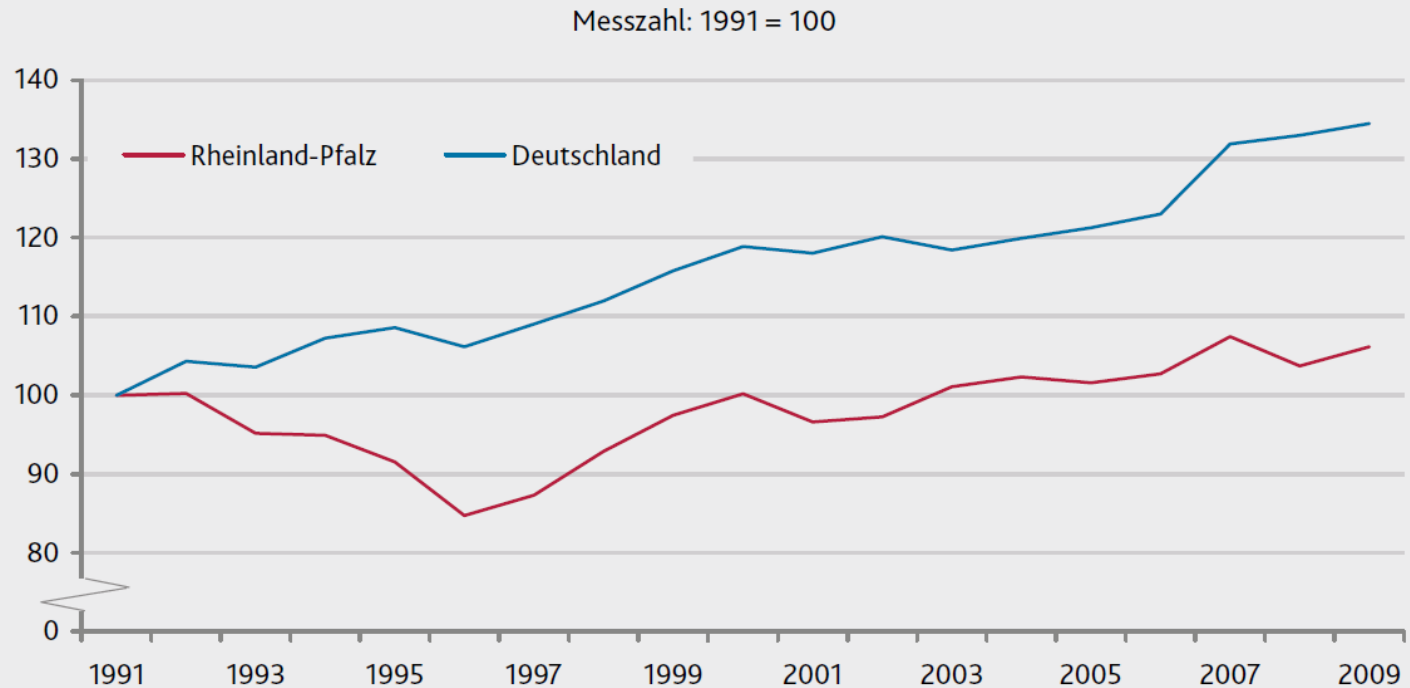
3. Development and implementation of the sustainability strategy of Rheinland-Pfalz

sphere of activity	indicator
A.a biodiversity	agricultural area with a high value of nature
A.b environment	Ecological state of the watercourses groundwater quality air quality condition of the woods
A.c climate protection and renewable energy	greenhouse gas emissions renewable energy

Source: Tabelle nach Ministerium für Wirtschaft, Klimaschutz, Energie und Landesplanung Rheinland-Pfalz: Perspektiven für Rheinland-Pfalz - Nachhaltigkeitsstrategie: Fortschreibung 2011

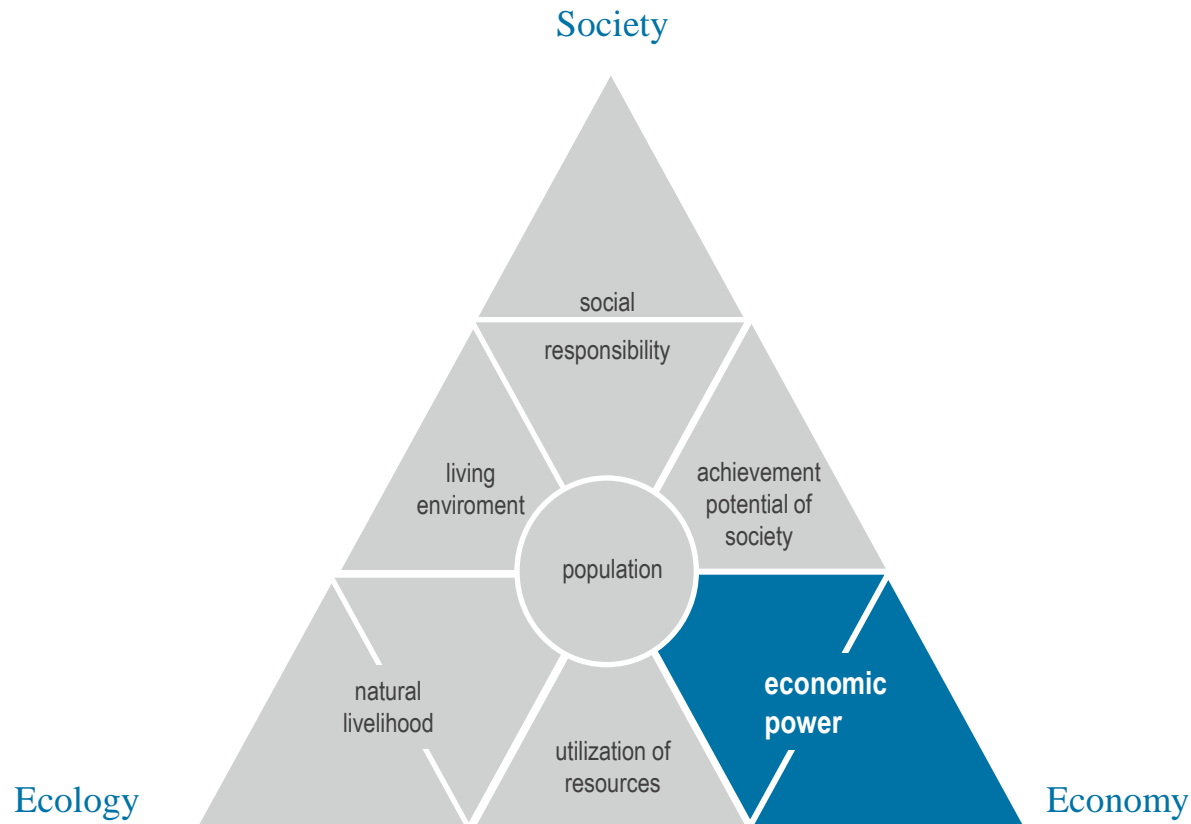
3. Development and implementation of the sustainability strategy of Rheinland-Pfalz

G 16 Energieproduktivität in Rheinland-Pfalz und in Deutschland 1991–2009



Quellen: Energiebilanz Rheinland-Pfalz, Volkswirtschaftliche Gesamtrechnungen der Länder, Statistisches Bundesamt

3. Development and implementation of the sustainability strategy of Rheinland-Pfalz



Source: Abbildung nach Ministerium für Wirtschaft, Klimaschutz, Energie und Landesplanung Rheinland-Pfalz: Perspektiven für Rheinland-Pfalz - Nachhaltigkeitsstrategie: Fortschreibung 2011, S.65

3. Development and implementation of the sustainability strategy of Rheinland-Pfalz

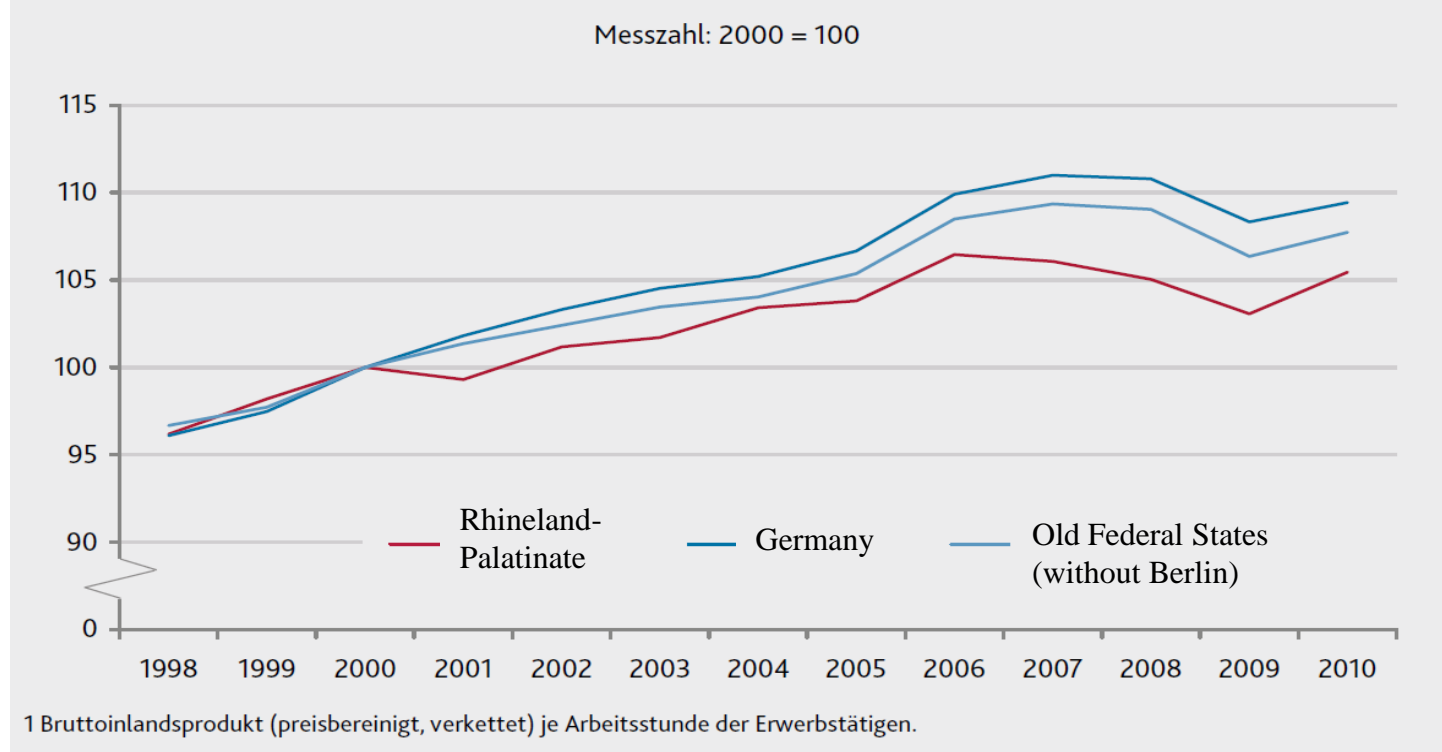
sphere of activity	indicator
C.a value creation	labor productivity
C.b economic precaution	gross capital investment
C.c innovation	expenditure for research and development

Source: Tabelle nach Ministerium für Wirtschaft, Klimaschutz, Energie und Landesplanung Rheinland-Pfalz: Perspektiven für Rheinland-Pfalz - Nachhaltigkeitsstrategie: Fortschreibung 2011

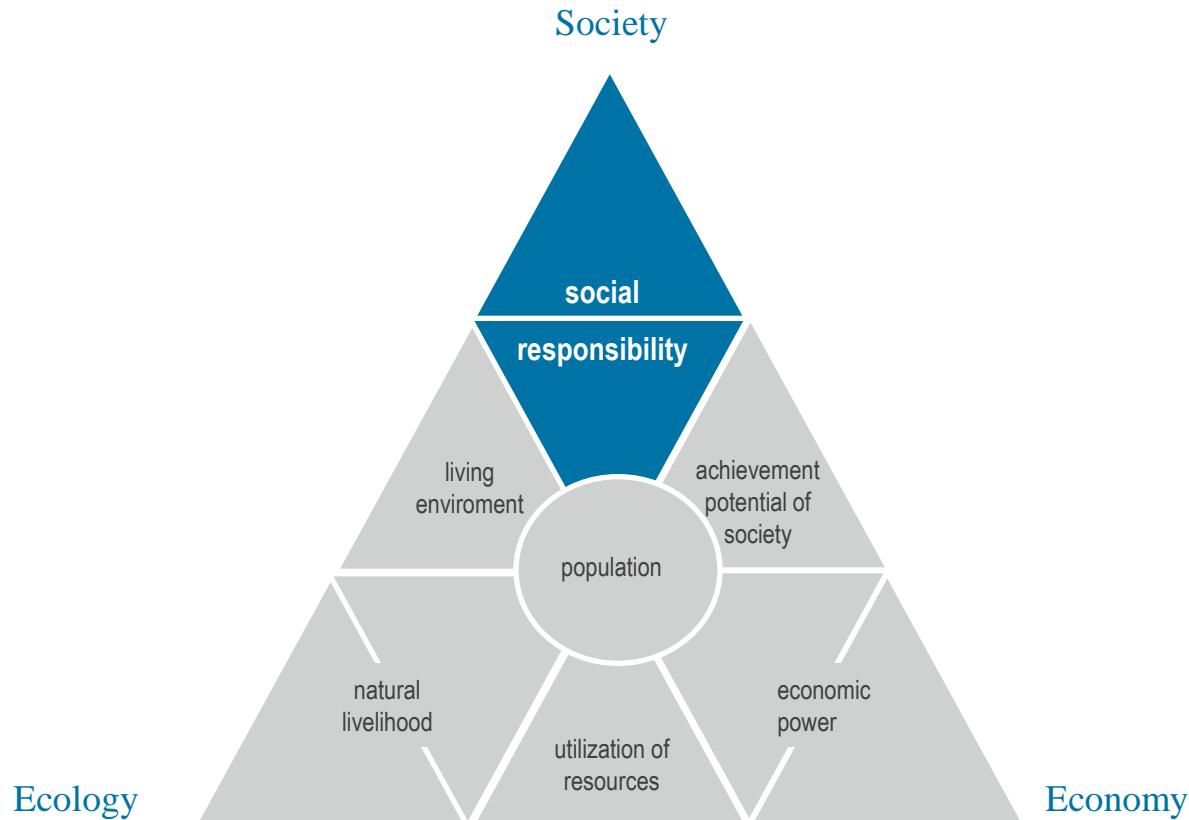
3. Development and implementation of the sustainability strategy of Rheinland-Pfalz

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Labor productivity in Rhineland Palatinate and Germany 1998-2010



3. Development and implementation of the sustainability strategy of Rheinland-Pfalz



Source: Abbildung nach Ministerium für Wirtschaft, Klimaschutz, Energie und Landesplanung Rheinland-Pfalz: Perspektiven für Rheinland-Pfalz - Nachhaltigkeitsstrategie: Fortschreibung 2011, S.117

3. Development and implementation of the sustainability strategy of Rheinland-Pfalz

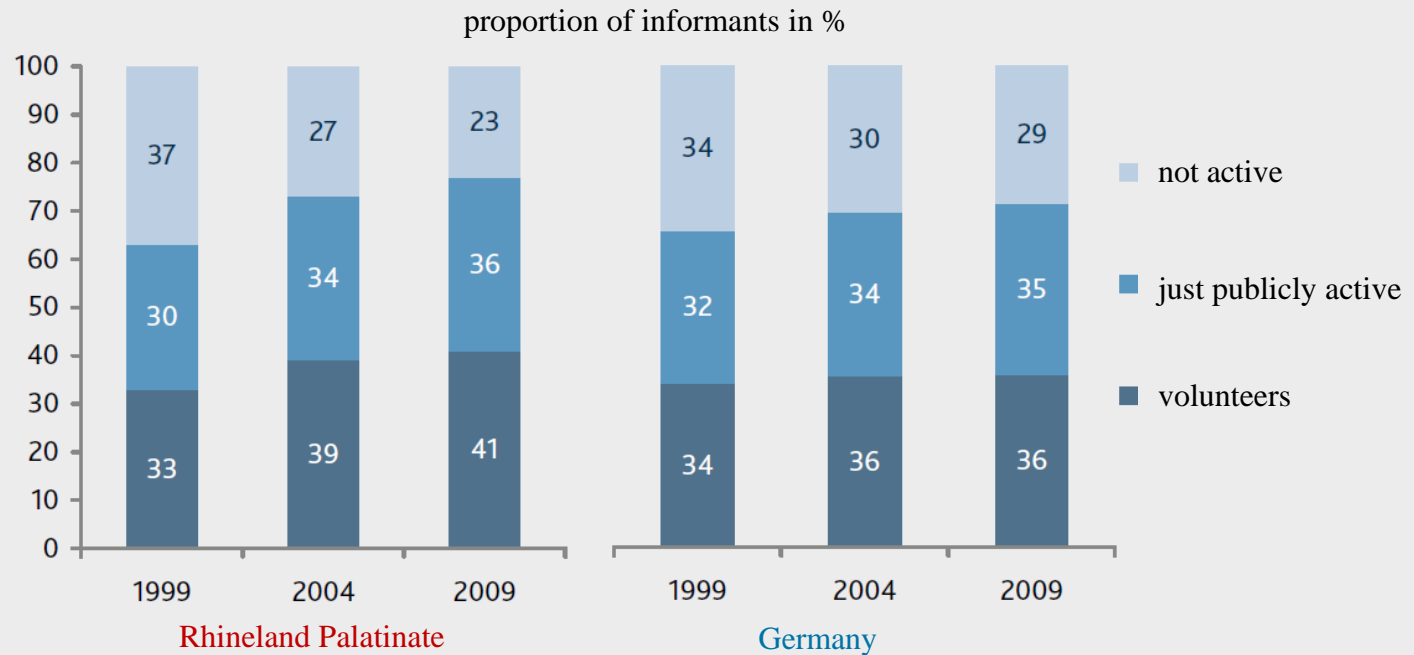
sphere of activity	indicator
E.a citizen commitment	volunteers
E.B safe living together	reported and solved crimes
E.c development policy	public expenditure for development policy

Source: Tabelle nach Ministerium für Wirtschaft, Klimaschutz, Energie und Landesplanung Rheinland-Pfalz: Perspektiven für Rheinland-Pfalz - Nachhaltigkeitsstrategie: Fortschreibung 2011

3. Development and implementation of the sustainability strategy of Rheinland-Pfalz

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Voluntary commitment in Rhineland Palatinate and Germany 1998-2010



1 Personen im Alter ab 14 Jahren.

Quellen: TNS Infratest Sozialforschung, Freiwilligensurveys 1999, 2004 und 2009, GESIS Datenarchiv, Köln; eigene Berechnungen

4. Conclusions

- Innovations are important for all areas of sustainable development.
- Sustainable innovation has to be integrated in the triad of ecological, economical and social considerations.
- The integrative sustainability triangle (IST) presented here provides major assistance in the systematization process.
- During the last years we worked in three research projects with this integrative sustainability triangle.

4. Conclusions

- We developed:
 - ❖ the sustainability strategy for Rheinland-Pfalz,
 - ❖ the concept of “Sustainable Industrial Zones” and
 - ❖ the concept “Sustainable University of Kaiserslautern”.
- In all three research projects we defined areas of action and assigned indicators related to sustainability.