JOURNAL OF MODERN SCIENCE

6/60/2024

www.jomswsge.com

DOI: 10.13166/jms/197018

ELŻBIETA WOJNICKA-SYCZ
University of Gdańsk, Poland
ORCID iD: 0000-0002-0016-5580

POSTMATERIALISM IN INNOVATION AND RELIGIOUS FAITH

Abstract

Objective: The postmaterialist paradigm in science is reflected in innovation research. It implies a shift of attention towards the intangible needs of people and the goals of sustainable development, rather than profit and economic growth as the goals of innovation. It reflects Catholic social teaching with its emphasis on social and environmental issues. In the article I explore if the Christian religion is conducive to post-materialist attitudes, and if post-materialism is more prevalent among people more involved in innovative activities in the workplace and in more innovative countries.

Methods: Worlds Value Survey and OECD data were analyzed to explore the relationship between postmaterialism, religious belief, and innovation. The methods used were contingency tables and tests of significance for differences in proportions, and logit models.

Results: The results show that Christian religion is associated with postmaterialist attitudes and work connected with innovation processes. However, postmaterialism also appears to replace religion for atheists, which reflects the human need for spirituality and ethics.

Conclusions: The results show that there is a social background in more developed countries to the transformation toward a postmaterialist innovation ecosystem, including not only business innovation, but also non-profit innovation. Postmaterialist innovation aims not only for individual material well-being, but also for a higher quality of life for entire societies. It is also in line with Catholic social teaching.

Streszczenie

Cel: Postmaterialistyczny paradygmat w nauce znajduje odzwierciedlenie w badaniach nad innowacjami. Oznacza on przesunięcie uwagi w kierunku niematerialnych potrzeb ludzi i celów zrównoważonego rozwoju, a nie zysku i wzrostu gospodarczego jako celów innowacji. Odzwierciedla to katolicką naukę społeczną z jej naciskiem na kwestie społeczne i środowiskowe. W artykule badam, czy religia chrześcijańska sprzyja postawom postmaterialistycznym i czy postmaterializm jest bardziej rozpowszechniony wśród osób bardziej zaangażowanych w innowacyjne działania w miejscu pracy i w bardziej innowacyjnych krajach.

Metody: Przeanalizowano dane Worlds Value Survey i OECD w celu zbadania związku między postmaterializmem, przekonaniami religijnymi i innowacyjnością. Zastosowano tabele kontyngencji i testy istotności dla różnic w proporcjach oraz modele logitowe.

Wyniki: Wyniki pokazują, że religia chrześcijańska jest powiązana z postawami postmaterialistycznymi i pracą związaną z procesami innowacyjnymi. Jednak postmaterializm wydaje się również zastępować religię ateistom, co odzwierciedla ludzką potrzebę duchowości i etyki.

Wnioski: Wyniki pokazują, że w bardziej rozwiniętych krajach istnieje społeczne podłoże transformacji w kierunku postmaterialistycznego ekosystemu innowacji, obejmującego nie tylko innowacje biznesowe, ale także innowacje non-profit. Postmaterialistyczne innowacje mają na celu nie tylko indywidualny dobrobyt materialny, ale także wyższą jakość życia całych społeczeństw. Jest to również zgodne z katolicką nauką społeczną.

Keywords: *postmaterialism, innovation, religion, Christianity, World Values Survey*

Słowa kluczowe: *postmaterializm, innowacje, religia, Chrześcijaństwo, World Values Survey*

Introduction

Paradigms are mental constructs used to study phenomena and processes in a scientific way (Kuhn, 1962). At the beginning of the 18th century, the mechanistic scientific paradigm was constructed (Skyttner, 2001). From an epistemological point of view, the reductionist approach was the research perspective at that time. Based on the analysis of cause and effect, reductionism in science assumes that knowledge of a phenomenon at a lower level can explain the phenomenon at a higher level.

Einstein's theory of relativity challenged the determinism that characterises the mechanistic paradigm (Danezis, et al., 2005). The development of particle physics also caused a paradigm shift. A systemic paradigm, now part of the post-materialist paradigm, has emerged on the basis of these discoveries. The systemic paradigm is a way of thinking, solving problems or acting that treats phenomena holistically in their internal and external interdependencies (Skyttner, 2001).

The post-materialist paradigm that is currently emerging in science is related to the spiritual dimension of research and dates back to the turn of the 20th to the 21st century (Shabanova, 2019). The postmaterialist paradigm is characterised by increasing the role of abstraction by intensifying mathematical applications and including subjective and situational factors. Anthropologically, postmaterialism is the opposite of Darwinism, which emphasised man's biological nature and the dominance of physiological and adaptive needs in evolutionary development (Shabanova, 2019).

In a social context, post-materialism establishes an altruism that is directed towards the higher goals of evolution. Moreover, material well-being is not the prerequisite for human happiness. Synergetics, derived from the ancient concept of sinergei or cooperation, is an element of the post-materialist paradigm. Self-organisation relies on collaborative processes involving material and immaterial (spiritual and informational) structures (Shabanova, 2019).

The objective of this article is to show how innovation science has evolved into a post-materialist paradigm consistent with the Catholic Church's social teachings. Using data from the World Values Survey, we test the hypotheses that the Christian religion is conducive to post-materialist attitudes, and that post-materialism is more prevalent among people more involved in innovative activities in the workplace and in more innovative countries. The development of innovation science in this direction is also justified and reflected by the link between postmaterialism and innovation.

Literature review

Postmaterialism

The concept of postmaterialism was proposed by Ronald Inglehart (1977). The two pillars of Inglehart's theory of postmaterialism are the scarcity hypothesis and the socialization hypothesis. Individuals place more value on things that are relatively scarce. According to Maslow's Hierarchy of Needs, people attend to their most urgent needs first, and only when these are satisfied do they attend to other needs. Basic needs are physiological and related to physical and economic security. Once these are met, people seek to satisfy other needs that are less materialistic, such as social relationships, quality of life, or self-actualization (Tormos, 2012).

The spread of postmaterialist values occurs through generational change. The theory predicts that countries that have experienced a sufficiently long period of economic prosperity should increase their levels of postmaterialist values. Inglehart found differences in levels of postmaterialism between age groups. The younger the age group, the more postmaterialistic it was. However, this was not due to an age effect. Inglehart found no evidence of an increase in materialistic values as cohorts aged

(Tormos, 2012; Ingelhart, 1990). Growing dissatisfaction with materialistic goals is creating a shift toward goals focused on quality of life and community. As more and more individuals make this shift, a collective orientation emerges, forcing change on a societal level. This is evident in social movements such as increased ecological sensitivity, corporate social responsibility, and concern for ethical decision-making (Giacalone, et.al., 2012).

The shift from materialist to postmaterialist values is closely linked to 'successful' modernization and industrialization. The shift from religious to state authority is the most important aspect of modernization and post-modernity (Müller, 2004). There is a statistically significant relationship between postmaterialism and left-wing attitudes, cosmopolitanism, and environmentalism (Henn, et. al., 2022). People with stronger postmaterialist attitudes are significantly more likely to respond to political issues (Jeroense, et al. 2022).

Postmaterialism in innovation studies

An innovation is a new or significantly improved product or process, as well as a social, public or eco-innovation. It is a new value that improves the quality of life and, in the case of business, generates revenue.

From a reductionist point of view, product and process innovation can only be inspired by technological change. This view has been the basis for various initiatives in support of technology transfer from academia to business (Schot, Steinmuelle, 2018). Closed innovation is implied by the reductionist approach. In the closed model, innovation is based on people, in-house R&D and self-funding by companies who aim to be first to market with new goods, securing intellectual property (Chesbrough, 2003; Lopes, de Carvalho, 2018). In this model, the producers' view of R&D is that it covers the value chain from design to technology. In this way, in-house R&D is a substitute for the potential contribution of users as innovators (Gambardella, et al., 2016).

The ontology of innovation studies reflects the shift towards a holistic approach in science. The distinction between technological and non-technological innovation was abandoned in the OECD and European Commission Manual on Definitions and Statistics in Innovation – the OSLO Manual 3rd edition of 2005. It created new categories of product, process, marketing and organisational innovation. It thus paid attention to innovations that do not have a technological source.

National and regional innovation system concepts reflect the next holistic paradigm – the systemic paradigm. The innovation system consists of knowledge and innovation generating institutions and units, supporting institutions and links between them. It is a part of a particular environment and is a function of the environment. The strength of the innovation system lies in the diffusion and recombination of existing knowledge (Nelson, 1993).

The 1990s saw the emergence of the national innovation systems model of innovation policy. A key assumption is that there is a need for policy intervention to support those functions of the innovation system that are not performing well enough. These policies support a wide range of capabilities such as sharing, collaborating and interacting in producing and commercialising knowledge and innovation (Edler, 2016). Learning and knowledge spill-over is essential to the innovation system concept and generates economic benefits through transformation (Freire-Gibb, Gregson, 2019). The inclusion of open innovation at the micro level is the key change from the mechanistic paradigm to the systemic paradigm. Open innovation integrates external and internal knowledge through extensive collaboration between external entities and the firm (Chesbrough, 2003).

It has become visible in innovation studies in terms of character and types of innovation and in terms of non-profit and intangible purposes. Intangible factors that are difficult to codify are often involved in innovation, such as tacit knowledge. Public sector innovation is a new non-profit goal of innovation that is characteristic of the holistic post-materialist paradigm in innovation studies. Public innovation aims to bring about qualitative change in a specific context (Hagen, Higdem, 2019). Besides public sector innovation, innovation now also includes value innovation, business model innovation, social innovation, frugal innovation and eco-innovation. New recommendations for measuring innovation, adapting definitions to include a broader vision of innovation-generating entities and emphasising the systemic nature of innovation, are provided in the latest OSLO Manual (2018).

In a social development perspective, innovation refers to social occurrences or enterprises that are often the result of interpersonal relationships that promote the development of social capacities. Social Innovation is the process of re-engineering social relations to respond to social problems (Silva-Flores, 2019).

Distributed design, knowledge and democratic participation are the essence of social innovation. Solutions to social problems can be created by decoupling innovation from economic growth (Pansera, Fressoli, 2021). The user innovation model favours the decentralisation of innovation also to the users (Gambardella, et. al., 2016), while in the open innovation model firms remain the site of innovation production. Another new type of innovation, which goes beyond economic objectives, is eco – or sustainable innovation, or green technology innovation (Stål, Babri, 2020), which refers to new and modified products, processes and ideas to reduce negative ecological effects.

At present, a new model of innovation policy is emerging that reflects a shift towards non-market innovation: social innovation or green innovation. The UN Sustainable Development Goals for 2030 embody the aspirations for transformational change. These include eliminating poverty and inequality in all its forms globally, promoting inclusive and sustainable consumption and production systems, and combating climate change. S&T policy should address social needs and promote sustainable development and social inclusion (Schot, Steinmuelle, 2018).

Postmaterialist innovation values in Catholic religion

The Catholic social sciences are close to the values of post-materialism. St Thomas emphasised that human beings, as opposed to animals, influence the development of higher social forms through the work they perform. Work was a noble occupation that provided sustenance, according to St Paul. Christianity recognised work as a factor in the progress and improvement of the human being in the physical, moral and spiritual spheres (Kowalik, et. al., 2023).

In the encyclicals that followed, the Catholic Church preached the social sciences in the interest of the working person. Work must be seen as specifically human activity for which people deserve just compensation. John Paul II cited a *personalist argument*: *Work is always the cause and therefore the primary value, and capital, as a set of means of production, remains only an instrument* (Kowalik, et. al., 2023). There should be no discussion of the priority of the person over the material. The Church, through social science, is the framework for the treatment of ecology and the environment. Pope Francis links the activity of the human person to the care of the natural environment,

of which the human person is the most important part (Kowalik, et. al., 2023). The focus on the human being reflects the call for a greater say in post-materialism, and the care of the natural environment is emphasised by post-materialism and the current critical role of eco-innovation.

The spirit of Protestantism fostered values such as entrepreneurship and creativity, which included innovation, Max Weber argued. Some public intellectuals were concerned about Catholicism's collectivist tendencies and their potential fusion with communism (Tatarczyk, 2023). Indeed, this is similar to the call for greater post-materialist and collective justice, including social and public renewal.

Data and Methods

Inglehart's theory predates the World Values Survey (WVS), arguing since 1971 that changes in values in postindustrial societies indicate a shift from 'materialist' to 'postmaterialist' values (Müller, 2004). The WVS has been in existence since 1981 and has a repetition cycle of about every five years. It represents all major continents. WVS relies on representative sampling, either full probability or a combination of stratification sampling methods (McCarthy, et. al., 2023). Based on the WVS responses, two indices of postmaterialism are formulated.

In the four-item post-materialism index, people ranked one of four possible political issues most important and one of the remaining three issues second. These are: *1. maintaining law and order, 2. increasing the political voice of citizens, 3. preventing price increases, 4. protecting freedom of speech*. Respondents choosing issues (2) and (4) are considered the most postmaterialist, receiving 2 and 1 points respectively as first and second choice, giving a scale of 0-3' (Jeroense, et. al., 2022).

Table 1. *Waves of WVS research and participating countries according to their level of GERD in 2021*

Wave of WVS	high GERD (over 2% of R&D in GDP)		medium GERD (1-2%)		low GERD (less than 1%)	
2017-2022	Germany, Japan, Korea, Netherlands, United States, China	Switzerland	Australia, Türkiye, Russia	Czech republic, Greece	Chile, Colombia, Mexico, Argentina, Romania	Slovak Republic
2010-2014		.		Estonia		.
2005-2009		Finland, France		Hungary Italy Norway		.
2017-2022 & 2005-2009	United Kingdom		Canada	.	.	.
2005-09 & 2010-14	Slovenia, Sweden		Poland, Spain		.	.
2010-14, 2017-22	Singapure, Taiwan		New Zealand		.	.

Source: WVS database and OECD data.

Another postmaterialist index uses 12 items. It is the sum of the total number of high priority postmaterialist items. The values range from zero – none of the five post-materialist points are rated highly, to five – all five post-materialist points are rated highly. The following items represent the postmaterialist values *giving people more say in how things are done at work and in their communities*; *giving people more say in important government decisions*; *protecting freedom of speech*; *moving towards a less impersonal and more humane society*; *moving towards a society where ideas count more than money* (Furusawa, 2008). One of the six points of post-materialism: *trying to make our towns and countryside more beautiful* is treated as neutral (Furusawa, 2008).

Research and development expenditure as a percentage of gross domestic product (GERD) was used as an indicator of countries' innovation. The Organization for Economic Cooperation and Development (OECD) data on GERD in 2021 were combined with the WVS response database from 2005-2022. The response databases analyzed are from the three waves of the World Values Survey: 2017-2022 (wave 7), 2010-2014 (wave 6), and 2005-2009 (wave 5). Table 1 shows the countries covered by the WVS survey in each wave,

along with their assignment to groups by level of innovation. The presentation of the survey results also indicates which WVS waves the data come from.

The results of the study were presented in the form of dichotomous variables, where 1 indicates the presence of a characteristic and 0 indicates its absence. Contingency tables were constructed showing the co-occurrence of the two traits: the intensity of the postmaterialistic attitude in groups of adherents of Christianity and other religions, and according to other dimensions, especially those related to innovation. This made it possible to calculate the proportion of people with postmaterialist attitudes in different groups. Subsequently, a statistical analysis of the significance of the differences in the proportions between groups was carried out according to the percentage and size of the study population (Szymczak, 2010). In addition, a model was estimated using logit regression to assess which characteristics of the respondents (religion, location in a city and country with a certain level of innovation, marital status, number of children, income level, innovation-related work, cooperation with others in different organizations, etc.) increase the likelihood of having a postmaterialist attitude. It was also examined whether a postmaterialist attitude increases the chances of having a job more related to innovation, such as employer, manager, or specialist. An odds quotient was also calculated to determine how much more likely a person with a particular trait is to excel in terms of postmaterialist attitudes and innovation-related work. Logistic regression analysis was also used in Henn et. al. (2022) and Jeroense et al. (2022) to examine the relationship between postmaterialist/materialist values and other variables.

Results

Comparisons of the significance of differences in the proportions of people with a postmaterialist approach in different groups show that it is highly correlated with innovation at the individual level, that is, work that requires it, as well as with higher education and cooperation with others in different organizations, reflecting the systems paradigm in innovation. The proportion of people who could be considered postmaterialists on the 12-item index was

higher in countries with high and medium levels of GERD, and on the 4-item index, especially in countries with high levels of GERD. At the country level, however, the differences were small. In contrast, the proportion of postmaterialists was significantly higher among those with creative work – about 17% for both postmaterialism indices and about 9% for each among those with routine work. Similarly, those whose work involves mainly cognitive tasks to a greater extent than those who do manual work are characterized by postmaterialism: about 15.5% versus about 9%. An occupation that implies a greater association with innovative processes – such as being an entrepreneur who founded a company based on an innovative idea, or being a manager who implements innovative strategies and a professional who invents and supports them – is also more likely to be chosen by those who are more postmaterialistic (more than 16% compared to around 9-10% for manual workers and the armed forces). Cognitive tasks and innovation today require working with a computer, and among those who frequently use a computer, there are about 17% of postmaterialists, while among those who never use a computer, there are only 6-7%. Among those with higher education, 18.4% were postmaterialists, while among those with secondary and lower education, only 11.9% were postmaterialists.

For a holistic postmaterialist perspective on innovation, cooperation in the innovation system that stimulates knowledge exchange is important. Such an exchange can take place, among other places, in different membership organizations. Among people who are members of professional organizations directly related to innovation, there are about 19-20% postmaterialists, compared to about 12% of all people surveyed between 2005 and 2022. Among those who belong to organizations associated with environmental protection, and therefore associated with the green innovation trend, there are even 22%-26% postmaterialists (depending on the index used). There were smaller differences when comparing groups of people who considered environmental protection and creativity important, but the proportion of postmaterialists in these groups was also higher than in the overall sample.

Table 2. *Comparison of the share of postmaterialists in different groups*

Attribute (n)	Postmaterialism 4-item index (% n)	Postmaterialism 12-item index (% n)	WVS wave
Christian (57,674)	12.76***	11.27 ***	
Other religion (18484)	*9.33*	*9.8*	5-7
Not believe in God (39,348)	14.15***	14.36***	
Believe in God (51,593)	*11.27*	*11.01*	6-7
Low GERD country (29,648)	*12.05*	*9.33*	
Medium GERD country (36,786)	12.43*	12.72***	nd
High GERD country (51,569)	13.08***	13.11***	
Routine work (28,474)	*9.47*	*8.83*	
Creative work (13,678)	17.37***	17.18***	5-6
Manual tasks (24,233)	*9.49*	*8.90*	
Mixed tasks manual and cognitive (17,771)	11.87***	12.39***	5-6
Cognitive tasks (19,175)	15.52***	15.53***	
Whole sample (118,003)	*12.62*	*12.04*	
Member of religious organization (11,823)	15.65***	14.45***	7
Member of conservation, environment, animal rights organization (4250)	22.28***	25.62***	
Member of professional organization (6,677)	19.18***	19.98***	
Important looking after environment (38,170)	13.14***	12.91***	5
Important new ideas and being creative (32233)	14.19***	13.82***	
Never use PC (27,690)	*7.43*	*6.25*	5-6
Frequent use PC (31,355)	16.45***	15.55***	
Secondary and lower education (26,938)	*11.86*		7
Bachelor, master (11,380)	18.41***		
Manual, armed force (14,701)	*10.66*	*8.84*	
Employer, manager, professional (13,459)	16.78***	16.32***	5

Note: * – statistically significant at p=0.1, *** – statistically significant at p=0.01; in italics values to which a particular group is compared to.

Source: own calculations in Stata based on WVS database and OECD data, https://www.worldvaluessurvey.org and www.oecd.org.

Table 3. *Logit models estimations*

Only 7th wave of WVS	Postmaterialism index 4-item	Employer, manager, professional
Explaining variables	Odds Ratio (Std. Err.) z	Odds Ratio (Std. Err.) z
Students	1.31 (0.096) 3.69***	.
Urban	1.15 (0.05) 3.17***	.
Tertiary level education	1.41 (0.05) 9.35***	.
No children	1.23 (0.07) 3.74***	.
1-2 children	0.88 (0.04) -2.80***	.
Divorced or separate	1.28 (0.09) 3.58***	1.53 (0.25) 2.62***
Married or living together	1.09 (0.05) 1.82*	.
Male	1.16 (0.04) 4.53***	.
Not believe in God	1.39 (0.05) 8.52***	1.75 (0.16) 6.30***
Medium income	1.13 (0.05) 2.90***	.
High income	1.18 (0.08) 2.66***	.
Member of professional associations	1.16 (0.06) 3.02***	.
Member of environmental org.	1.49 (0.08) 7.21***	.
Member of political parties	1.33 (0.07) 5.66***	.
Member of labour unions	0.86 (0.04) -3.03***	.
Member of religious organization	1.31 (0.05) 6.67***	.
Medium GERD country	1.26 (0.06) 4.72***	.
High GERD country	1.1 (0.05) 1.85*	.
Postmaterialism index 12-item	.	1.74 (0.23) 4.20***
Mixed 4-item	.	1.23 (0.10) 2.44**
Christian	.	1.9 (0.21) 5.89***
Good health	.	1.46 (0.14) 4.11***
_cons	0.06 (0.005) -34.84***	0.58 (0.06) -5.18***
R^2	0.03	0.033
n	31,717	2,603

Note: * – statistically significant at p=0.1, ** – statistically significant at p=0.05, *** – statistically significant at p=0.01

Source: own calculations in Stata based on WVS database and OECD data, https://www.worldvaluessurvey.org and www.oecd.org

Postmaterialism is thus linked to innovation, as is clearly reflected in recent innovation trends. As indicated in the literature review, there is also a correspondence between the social teachings of the Catholic Church and postmaterialism. Analysis of the WVS data showed that there was a higher proportion of postmaterialists among those of Christian faith (Catholics, Protestants and Orthodox – around 12.8%) than among those of other religions (around 9.3%), but this proportion was like the overall proportion of postmaterialists in the sample. However, there was a higher proportion of postmaterialists among those who said they did not believe in God (around 14%) than among believers (around 11%). It seems that for those who do not believe in God, postmaterialism in the form of a greater emphasis on freedom of expression, respect for the environment and concern for social issues is a substitute for religious spirituality, reflecting an innate human need for ethics and spirituality. Among those who are more closely associated with religion through membership of religious organizations, the proportion with postmaterialist views was significantly higher than in the whole sample, at around 15-16 per cent against around 12 per cent in the whole sample. The Christian religion is largely reflected in postmaterialism, with more people of this religion being postmaterialists than of other religions. In addition, people who are more actively involved in religion, such as those who belong to religious organizations, also hold postmaterialist views to a greater extent than the global average for those surveyed by the WVS. At the same time, post materialism is highly correlated with innovation.

Logit models were estimated for the data set of the 3rd wave of the WVS, i.e. from 2017 to 2022. They showed that the probability of having a postmaterialist attitude was significantly higher (over 30%) for students, graduates, atheists, members of environmental organizations, members of religious organizations and members of political parties. This confirms the trends observed in the comparative analysis. Statistically significant but slightly higher odds of postmaterialist attitudes (by 9-26%) were found among those living in urban areas, those without children, divorced or separated, married or with a partner, men, those with high and medium income, members of professional organizations, and those living in countries with medium and high GERD. This confirms the role of higher individual income, which is more common in countries with higher GERD and therefore more innovative, in postmaterialist attitudes.

The likelihood of having postmaterialist attitudes decreased for those with 1-2 children, which may be due to a reduction in the number of children in the family for material reasons. At the same time, the percentage of postmaterialists was higher in the group with 3 or more children than in the group with 1-2 children (about 12% compared to about 11%). On the other hand, it is easy for those without children to achieve a high material level, and these people are therefore more likely to have a postmaterialist attitude. Similarly, trade union members, who represent workers who often have less creative jobs and lower incomes, were less likely to have postmaterialist attitudes.

The second model showed that postmaterialist attitudes increased the likelihood of an individual being directly involved in innovation processes at work as an employer, manager, or professional. The odds of having such a pro-innovation job were also significantly higher for those who were Christian and did not believe in God, and moderately higher for those who were divorced or separated and in good health. The odds of having a pro-innovation job were slightly higher for those with mixed views on the materialism/postmaterialism scale.

Conclusions

The innovation ecosystem model includes firms, intermediary institutions, science, administration, society and the natural environment, in line with the post-materialist paradigm of innovation. Furthermore, the model includes different types of innovation, not only business innovation, but also social innovation, eco-innovation and public sector innovation (Wojnicka-Sycz, Sycz, 2023). Especially important for social and public innovation, which must be based on social participation, collaboration and knowledge sharing are central to this model. The objective of such an ecosystem is not only economic growth, but also a high quality of life for entire societies. Post-materialism as a paradigm in science refers to the concept of Ronald Ingelhart. Postmaterialists care about community, self-fulfilment, environmental values and quality of life. Open to social change, postmaterialists see political participation as a means of reforming society. Some of the core issues of postmaterialism,

such as discrimination against minorities and environmental challenges, have become more mainstream in recent times (Jeroense, et. al., 2022). In its concern for human progress through work, for the care of the natural environment with man's central role in it, and for the collectivity characteristic of systemic innovation, Catholic social science is similar to postmaterialist values.

Analyses based on WVS data show that postmaterialist values are highly correlated with individual-level innovation, namely work requiring it, as well as higher education and collaboration with others in different organisations, reflecting the systemic paradigm of innovation. Collaboration in the innovation system, which stimulates knowledge exchange, is important for a holistic post-materialist perspective on innovation. There are more postmaterialists than average among the respondents who are members of professional and environmental organisations.

Meanwhile, the share of postmaterialists was highest in the more innovative countries, i.e. the countries with high and middle GERD, and in the high – and middle-income countries, which confirms the higher tendency of people with satisfied material needs to pay attention to intangible needs. The likelihood of having a post-materialistic attitude was also increased by having no children or many children. It was reduced by having 1-2 children.

The Christian religion has a strong impact on post-materialism and more people of this religion are post-materialists than of other religions. Postmaterialist views are also more prevalent among those who are more actively involved in religion, in the sense of belonging to religious organisations. However, atheists tended to be more postmaterialist than those believing in God. It seems that for atheists, postmaterialism is a substitute for religious spirituality in the form of a greater emphasis on freedom of expression, respect for the environment and concern for social issues. This is a reflection of an innate human need for ethics and spirituality.

The results show that there is a social background to the transformation toward a postmaterialist innovation ecosystem embracing social and public innovation. Postmaterialist innovation aims not only for individual material well-being, but also for a higher quality of life for entire societies. It is also in line with Catholic social teaching.

References

Chesbrough, H.W. (2003). *The Era of Open Innovation*, MIT Sloan Management Review, Vol. 44, 3, 2003, p. 35-41.

Danezis, E., Theodosiou, E., Gonidakis, I., Dimitrijevic, M.S. (2005). '*Un-tangible World' and Modern Physics*, European Journal of Science and Theology, December, Vol.1, No.4, 11-17.

Edler, J. (ed.)., Cunningham, P.(ed.)., Gok, A. (ed.)., Shapira P.(ed.). (2016). *Handbook of Innovation Policy Impact*, Eu-SPRI Forum on Science, Technology, and Innovation Policy series, Edward Elgar Publishing Ltd, Cheltenham,.

Freire-Gibb, L.C., Gregson, G. (2019). *Innovation systems and entrepreneurial ecosystems: Implications for policy and practice in Latin America*, Local Economy, 34(8): 787-806, doi:10.1177/0269094219896096.

Furusawa, K. (2008). *Values and Democracy: Postmaterialist Shift versus Cultural Particularity in Russia*, the USA, Britain and Japan. PhD thesis, University of Glasgow.

Gambardella, A., Raasch, Ch., von Hippel, E. (2016). *The User Innovation Paradigm: Impacts on Markets and Welfare,* Management Science, Vol. 63, No. 5.

Giacalone, R.A., Jurkiewicz, C.L., Knouse, S.B. (2012). *The Ethical Aftermath of a Values Revolution: Theoretical Bases of Change, Recalibration, and Principalization*, Journal of Business Ethics, October, Vol. 110, No. 3, pp. 333-343.

Hagen, A., Higdem, U. (2019). *Calculate, Communicate, and Innovate: Do We Need Innovate as a Third Position?*, Journal of Planning Literature, 34(4).:421-433, 2019.

Henn, M., Sloam J., Nunes, A. (2022). *Young cosmopolitans and environmental politics: how postmaterialist values inform and shape youth engagement in environmental politics,* Journal of Youth Studies, 25:6, 709-729, 2022, DOI: 10.1080/13676261.2021.1994131.

Inglehart, R. (1977). The Silent Revolution: Changing Values and Political Styles among Western Publics, Princeton: Princeton University Press.

Inglehart, R. (1990). Culture Shift. In Advanced Industrial Society, Princeton: Princeton University Press.

Jeroense, T., Luimers, J., Jacobs K., Spierings, N. (2022). *Political social media use and its linkage to populist and postmaterialist attitudes and vote intention in the Netherlands*, European Political Science, 193–215, 2022 https://doi.org/10.1057/s41304-020-00306-6.

Kowalik, D., Nowak, K., Kowalik, K., Gogacz, P. (2023). The Role of the Catholic Church against Changes and Threats to the Value of Work. Religions 14: 1207, https://doi.org/10.3390/ rel14091207.

Kuhn, T. S. (1962). *The structure of scientific revolutions*, University of Chicago Press: Chicago.

Lopes, A.P., de Carvalho, M.M. (2018). *Evolution of the open innovation paradigm: Towards a contingent conceptual model*. Technological Forecasting and Social Change, Vol.132, 2018.

McCarthy, D., Stoneman, P., Ka Ki Ho, L. (2023). *Explaining confidence in the police within transitional Hong Kong: the influence of postmaterial values*, Policing and Society, 33:1, 96-110, DOI: 10.1080/10439463.2022.2055019.
Müller, H. (2004). *The application of Inglehart's materialism/postmaterialism index in non-industrialised countries: a critique*, Acta Academica 36 (1): 127-156.
Nelson, R.R. (ed.). (1993). *National innovation systems: a comparative analysis*, Oxford University Press.
OSLO Manual, OECD & Eurostat, Paris. (2005 & 2018).
Pansera, M., Fressoli, M. (2021). *Innovation without growth: Frameworks for understanding technological change in a post-growth era*, Organization, 28(3).:380-404.
Schot, J., Steinmuelle, W.E. (2018). *Three frames for innovation policy: R&D, systems of innovation and transformative change*, Research Policy, Vol. 47:9.
Shabanova, Y. (2019). *Conceptual Foundations of the Postmaterialist Paradigm of Science*, Philosophy and Cosmology, Vol.22.
Silva-Flores, M.L. (2019). *Social Innovation Policies: A Way Through Consolidating Emerging Innovation Infrastructures*, The Innovation Journal: The Public Sector Innovation Journal, Volume 24(3).
Sitek, B. (2013). The human right to respect the religious identity in the light of the media and political regulation. In: M. Sitek i inni (red.), *Europe of Founding Fathers: Investment in common future* (pp. 257–264). Olsztyn: Wydział Prawa i Administracji Uniwersytetu Warmińsko-Mazurskiego.
Skyttner, L. (2001). *General Systems Theory, Ideas and Applications*, World Scientific.
Stål, H.I., Babri, M. (2020). Educational interventions for sustainable innovation in small and medium sized enterprises, Journal of Cleaner Production, Vol.243:1.
Szymczak, W. (2010)., Podstawy statystyki dla psychologów [Fundamentals of statistics for psychologists], Difin, Warszawa.
Tatarczyk D. (2023). *Catholicism, Pluralism and American Democracy Politics and Religion*, 16, 393–398, doi:10.1017/S1755048323000019.
Tormos, R. (2012)., *Postmaterialist values and adult political learning. Changing Intracohort Values in Western Europe*, Revista Española de Investigaciones Sociológicas (REIS)., 140 (1), 201-228.
Wojnicka-Sycz, E., Sycz, P. (2023). *Innovative ecosystem based on a sixtuple helix on the example of the Podkarpackie Voivodeship,* Journal of Modern Science, 52(3), 172-189, https://doi.org/10.13166/jms/173122.