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Preface

Dear Readers,

Welcome to the latest edition of Research Papers in Economics and Finance from the Poznan University of Economics and Business Press. This release features a selection of six papers, carefully chosen for their positive reviews, offering diverse and inspiring insights within the fields of economics and finance. The authors have provided impactful research that meets rigorous academic standards while offering fresh perspectives on contemporary issues. We extend our gratitude to both the authors and reviewers for their contributions, aiming to spark intellectual curiosity and serve as a source of inspiration for readers in academia and beyond. We invite you to explore the diverse array of articles in this edition.

The issue opens with an empirical paper entitled **The Consumption of Lifetime and consumption habits in the face of pandemic** written by **Joanna Staniszewska** from the Poznan University of Economics and Business, Poland. The author emphasises the importance of Lifetime Consumption and proves the influence of the digitalisation of society during the COVID-19 pandemic on consumption-related decisions. As the author shows, the process of digitalisation intensified as the pandemic and its restrictions subsided, with society adapting to remote work, extended periods in front of computer screens as well as the widespread use of remote communication devices. One of the conclusions of this work is that computers and smartphones have evolved into indispensable tools for remote work, education and communication within society.

The second paper entitled **Carbon footprint and economic growth in Nigeria and Ghana** has been written by **Joel Obayagbona** from the University of Benin, Nigeria. The author proves that greenhouse gas emissions and renewable energy consumption exhibit a significant negative impact on economic growth in both Nigeria and Ghana. Electricity consumption and trade openness display insignificant positive and negative relationships with economic growth, respectively. The author recommends implementing a carbon pricing law by governments. Imposing

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higher taxes would discourage practices such as indiscriminate bush burning, leading to reduced environmental pollution and degradation. In brief, this measure is anticipated to mitigate adverse greenhouse gas emissions and contribute positively to economic growth.

The third paper entitled **Digital public transport in New Economy – contemporary mobility trends** has been written by **Marcin Jurczak** from the Poznan University of Economics and Business, Poland. In this study, the author analyses current trends shaping urban mobility, particularly focusing on the development of public transportation. Key elements, including IT systems, big data, alternative energy, autonomous mobility and the sharing economy, are considered in the context of technological progress. The macroeconomic factors of the COVID-19 pandemic, inflation and migration trends are also examined for their impact on transportation services in cities. The primary goal is to explore the interplay between technology and the evolution of public transport systems, addressing two key research questions. The study provides valuable insights into the challenges and opportunities of urban transportation in the digital and post-pandemic era.

The fourth paper entitled **The role of rules and norms in conditional cash transfer programs – Latin American experience** has been written by **Marta Sordyl** from Krakow University of Economics, Poland. The author has undertaken a comprehensive analysis of conditional cash transfer (CCT) programs, emphasising the significance of conditioning social transfers based on predetermined requirements related to healthcare and education. This conditioning, termed co-responsibility, is grounded in the belief that enhancing human capital accumulation will lead to a sustainable upliftment of beneficiaries from poverty. While the existing literature predominantly focuses on the cost-effectiveness of CCTs and their impact on poverty rates and income inequalities, the author addresses a notable gap by exploring the often-overlooked rules and norms that play a crucial role from an institutional perspective.

The fifth paper entitled **Local housing strategies in Poland as a tool to develop social and affordable housing: Barriers for development** has been written by **Agnieszka Cieśla** from Warsaw University of Technology, Poland. The paper aims to identify barriers hindering the formulation of clear housing strategies at the local level in Poland. Drawing insights from existing housing strategies of certain Polish municipalities and experiences gained while working on a housing strategy for a medium-sized city in Poland, the author highlights key impediments including a lack of robust demographic data, insufficient housing inventories as well as demand for skilled experts and guidance to formulate structured strategies. The research underscores the growing importance of local strategies, particularly in crisis-affected cities, in the light of impending EU investments in housing. The anticipated financial aid for social housing further underscores the imperative for well-crafted housing strategies in Poland.

Last but not least, the final paper entitled **Job insecurity and job performance as the key research issues of the modern labour market** has been written by **Joanna Wyrwa** and **Anna Łoś-Tomiak** from the University of Zielona Góra, Poland. The author has undertaken an analysis of the contemporary labour market, emphasising the need for a comprehensive and multidimensional interpretation of the concept of "insecurity" concerning employment, job retention and evolving working conditions. The analysis highlights correlations between the notion of uncertainty and factors such as work efficiency and time. The study emphasises the dynamic nature of job insecurity over time, suggesting that employees achieve better professional results when they feel secure about their future in the workplace. The authors outline the mechanisms underlying job insecurity and labour productivity, proposing a thesis that posits a non-linear or "U-shaped" relationship between job insecurity and self-assessment of work performance. In brief, job insecurity is thought to negatively impact work productivity by diminishing occupational energy known as vigour or enthusiasm for work.

Yours faithfully,

Piotr Lis
Editor-in-Chief

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The Consumption of Lifetime and consumption habits in the face of pandemic

Joanna Staniszewska[1]

Abstract

The aim of this article is to present the concept of Consumption of Lifetime developed by the author and to show the impact of the phenomenon of digitalisation of society during the pandemic on decisions related to the consumption. The author conducts an analysis in the context of the Consumption of Lifetime to show the consumption habits of society. The process of digitalisation was particularly visible during the pandemic and the restrictions related to it, when education, work and interpersonal contacts were made possible with the use of devices connected to the Internet. These devices were also often used to make remote purchases. The work on this article has made it possible to formulate research questions and conclusions that confirm the importance of considering decisions related to consumption in the face of pandemic. Another interesting issue touched upon in this article is the post-pandemic period, in which it is possible to observe whether consumption has returned to the pre-pandemic state and previous purchasing behaviour. Currently, there is a noticeable tendency to return to the permanent consumption habits observed prior to the pandemic.

Article received 2 August 2023, accepted 15 November 2023.

Keywords

- Consumption of Lifetime
- consumption
- digitalisation
- pandemic
- consumer spending
- consumer behaviour
- society

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Introduction

This article discusses the issue of Consumption of Lifetime (CL) and the accelerated process of digitalisation of society during the pandemic which has influenced the consumption habits. Consumption of lifetime is an economic category of key theoretical and practical importance for the development of economics. In the analytical sense, the category of Consumption of Lifetime allows us to calculate and determine the fulfilment of consumers' life aspirations, taking into account boundary conditions such as income. It comes from the theory of consumption and concerns consumption over the course of a person's lifetime; it is calculated on the basis of current data, enabling consumption to be related to the current socio-economic conditions.

The marginal propensity to consume varies in social groups with different levels of income, with the poor having a higher marginal propensity to consume than the rich (Deaton, 2005). Consumption expenditure depends on income (Keynes, 1936) as well as the social environment in which a person lives (Duesenberry, 1949). In the long run, a person wants to maintain expenditure at a certain (constant) level, consistent with their standards of living (Friedman, 1957; Modigliani & Ando, 1963). When considering consumption, the extension of human life is a visible correlation (Deaton, 2018). Additionally, digitalisation is another important aspect in the current socio-economic situation. The ongoing digitalisation process, which was particularly visible during the COVID-19 pandemic, is still noticeable in society. Restrictions introduced at that time, aimed at avoiding the spread of the pandemic, caused many people to switch to remote work, forcing them at the same time to avoid interpersonal contacts and change their shopping habits. Thus, consumption decisions were revised. The phenomenon of digitalisation deepened when the pandemic and its restrictions ended, and society became accustomed to remote work, spending longer time in front of a computer screen and using remote communication devices. An interesting issue is also the current period after the pandemic, in which we may observe whether consumption is returning to the pre-pandemic state and previous purchasing behaviour. Therefore, the following research questions arise:

- How is society's consumption shaped during the pandemic?
- Is consumption returning to the pre-pandemic state and the previous structure of consumer spending?

The aim of this article is to present the concept of Consumption of Lifetime developed by the author and to show the impact of the phenomenon of digitalisation of society during the pandemic on decisions related to consumption. The significant cognitive and utilitarian usefulness of this economic category and the

impact of the phenomenon of digitalisation on society during the pandemic were among the most important reasons for taking up this topic. The considerations and analyses carried out in this work make it possible to address the above questions.

1. Consumption of Lifetime and society's consumption habits

During her scientific research, the author has introduced and used her own definition of Consumption of Lifetime: *Consumption of Lifetime is an economic category depicting the estimated value of consumption that a person does during their life and resulting from consumption in individual stages of life. On the one hand, it is conditioned by a person's needs, aspirations and choices, and on the other hand, it is limited by the consumer's income and savings*. This research approach allows for a practical analysis of Consumption of Lifetime, making it possible to omit unimportant consumption changes that took place several decades ago and which no longer affect current consumption. Consumption of Lifetime is estimated on the basis of current data from an analysis of household budgets based on the Central Statistical Office (Główny Urząd Statystyczny, GUS) data, enabling consumption to be related to the current socio-economic conditions (Staniszewska, 2022). Consumption accompanies a person at every stage of their life and is the basic fact on which their livelihood depends. It has a great impact on modern society, which is why it is treated as the highest value – it promotes the growth of the economy and achieves human life goals. Consumption in the economic sense refers to consumer spending on specific types of consumer goods.

The importance of cohort studies of consumption with sufficiently large samples was confirmed by Deaton (1985). By introducing cohort studies, he confirmed the validity of using aggregated data, which ensures reliable results. Furthermore, consumption is less variable throughout the year, more stable than revenues, which justifies analysing and predicting it in unknown conditions based on the knowledge of its mechanisms (Deaton & Zaidi, 2002). Transforming sectors and markets through digitalisation may lead to the production of higher quality goods at reduced costs. Digital technologies are also changing the way enterprises conduct business and relationships with customers and suppliers, creating new business models and opportunities to make and introduce innovations. Digitalisation can facilitate professional activity thanks to remote work and distance education (Grynia, 2022). An interesting issue within this topic is the development of society's Consumption of Lifetime in the period before and after the pandemic, in

which we may observe whether consumption has returned to the previous consumption habits, thus emphasising its stability over the years.

Based on data from the Central Statistical Office (GUS, 2020, 2021, 2022), consumer expenditure on food and non-alcoholic beverages had, as in previous years, the highest share in the structure of total expenditure of households, amounting to approximately 26%. The second most important item in household expenditure was expenditure for housing and energy commodities. The share of this type of expenditure in total expenditure was on average 19%, which is presented in Figure 1.

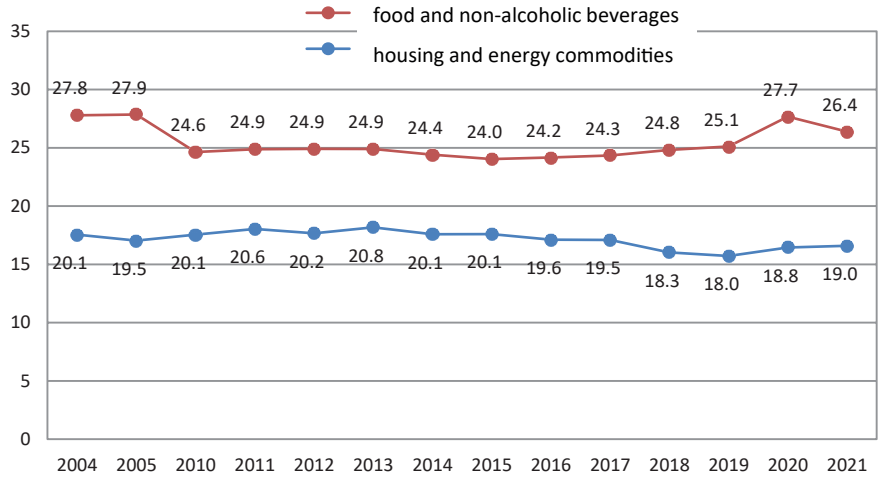

Figure 1. Share of average monthly expenditure per capita on food and non-alcoholic beverages as well as housing and energy commodities in the total expenditure of households, 2004–2021 (in %)

Source: own study based on (GUS 2020, 2021, 2022).

In the case of the main groups of consumer goods, the stability of the share in the entire structure of consumer spending over the years is visible; only in 2020, during the pandemic and the related restrictions, an increase in the share of food and non-alcoholic beverages was noticed, which was related to remote work and the society staying and eating in their homes. However, expenditure on consumer goods and services in 2020 amounted to PLN 1,165 and was actually lower by 6.2% (nominally by 3.0%) compared to 2019. At the same time, compared to 2019, expenditure on food and non-alcoholic beverages, as well as housing and energy (which have the highest share in the expenditure structure) increased. These changes were conditioned by the changing dynamics of the COVID-19 pandemic and the related restrictions. It is also worth noting that expenditure on consumer goods and services in 2021 amounted to PLN 1,269 and was realistically higher by

3.6% (nominally by 8.9%) compared to 2020 (GUS, 2020, 2021, 2022). The largest increases concerned expenditure on education, restaurants and hotels, transport, clothing and footwear, as well as health. Expenditure on these consumer goods recorded an increase in line with the changing pandemic situation and easing of restrictions, as well as a gradual return to the consumption habits and spending prior to the pandemic. These expenditures dropped significantly in 2020. All of the above presented relationships can be observed in Figure 2.

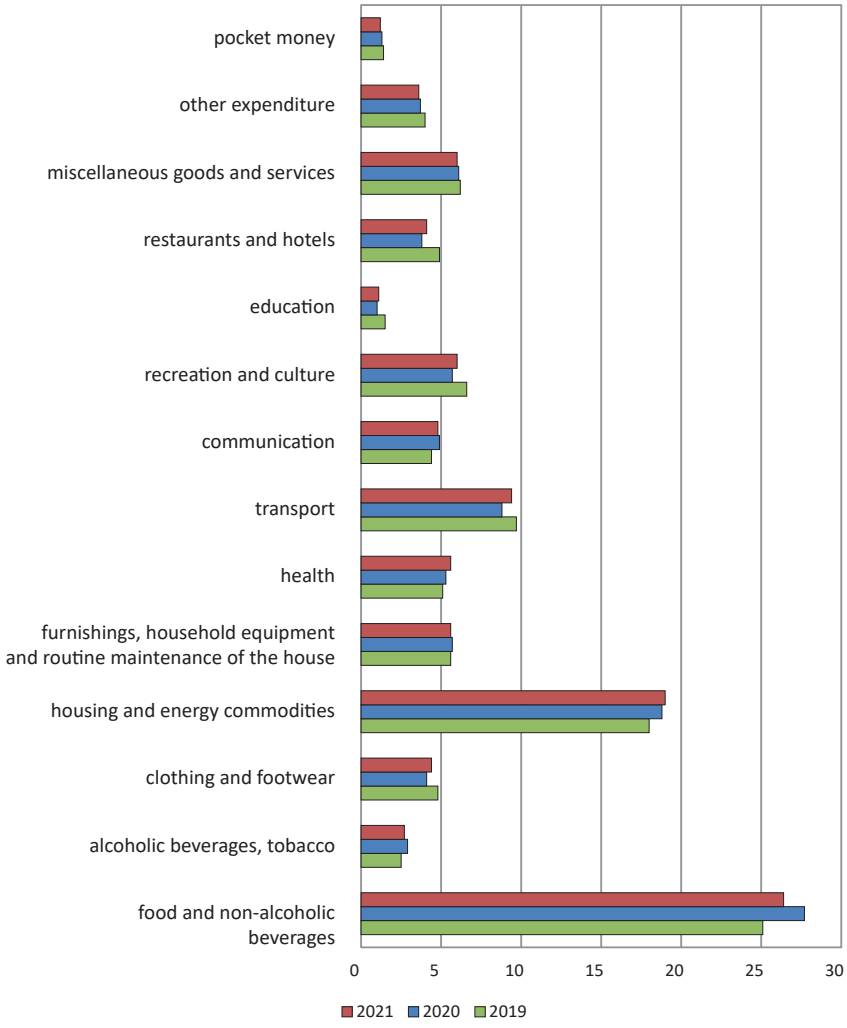

Figure 2. Structure of average monthly expenditure per capita in households (in % of total expenditure) in 2019-2021

Source: own study based on (GUS 2020, 2021, 2022).

The share of expenditure on food and non-alcoholic beverages increased moderately in the total expenditure structure, and in 2020 it increased considerably due to the COVID-19 pandemic, amounting to 27.7%. Additionally, it should be noted that in 2020, compared to 2019, there was a decrease in the share of goods such as restaurants and hotels (by 1.1 percentage points), recreation and culture, transport (by 0.9 percentage points) as well as clothing and footwear (by 0.7 percentage points), which is also connected with the COVID-19 pandemic and the related restrictions. The second significant item in consumer spending was expenditure on housing and energy commodities, the share of which was on average 18.8% in total expenditure, and in 2020 it increased by 0.8 percentage points. This type of expenditure was the lowest in the households of farmers (16.1%), and the highest in the households of pensioners (23.1%). In real terms, in 2020 there was a decrease in average monthly expenditure per person in households by 6.5% compared to 2019. However, in 2021, compared to 2020, there was an increase in average monthly expenditure per person in households by 3.5% in real terms. Furthermore, in all socio-economic groups of households there was a real increase in average monthly expenditure per person in relation to 2020 (from 0.3% in the group of the self-employed to 6.1% in the group of farmers) (GUS, 2020, 2021, 2022). In 2021, consumption expenditure on food and non-alcoholic beverages had, in line with the trend in previous years, the highest share in the structure of consumption expenditure of all households, i.e. 26.4%, amounting to 23.6% in the households of the self-employed and 32.3% in the households of farmers. From 2016, the share of expenditure on food and non-alcoholic beverages increased moderately in the total expenditure structure, increasing significantly in 2020 due to the COVID-19 pandemic, and decreasing in 2021 by 1.3 percentage points. The second significant item in consumer spending was expenditure on housing and energy commodities. The share of this type of consumer spending in total expenditure amounted to 19% on average and increased by 0.2 percentage points in 2021 compared to 2020. It was lowest in the households of the self-employed (16.4%) and highest in the households of pensioners (23.5%). In 2021, the share of the following groups of goods increased the most in the structure of consumer spending compared to the previous year: energy commodities (by 0.7 percentage points), transport (by 0.6 percentage points), clothing and footwear, health, restaurants and hotels, as well as recreation and culture (0.3 percentage points each) (GUS, 2020, 2021, 2022). This increase is related to the return to the level of consumer spending prior to the pandemic and the specific structure of consumer spending in 2020, i.e. the period of the pandemic and the resulting restrictions. Currently, there is a noticeable tendency to return to permanent consumption habits.

2. Consumption habits during the pandemic

Society's consumption is undoubtedly influenced by digitalisation, especially visible during the pandemic when the society was forced to use primarily tools for remote communication and work. According to *Słownik języka polskiego PWN* (PWN Dictionary of the Polish Language), the concept of digitalisation means: "the dissemination and popularisation of digital technology and the introduction of electronic infrastructure on a large scale" ("Cyfryzacja", b.d.). During the pandemic, due to restrictions which prevented interpersonal contacts in the real world, the majority of society had to move to the virtual world. Work and interpersonal contacts were made possible through devices connected to the Internet. Computers and smartphones became essential devices for remote work, education and communication. These devices were also often used to make remote purchases. This has undoubtedly accelerated the process of digitalisation of society. In this part of the work, it is worth looking at the categories of expenditure related to the requirements for living and working conditions caused by the pandemic. In 2020, due to the COVID-19 pandemic and the transition to remote work and education, there was an increase in the level of household equipment, including the following goods: printers and devices with access to the Internet (including personal computers and smartphones). In 2020, there was an increase in the level of household equipment including printers (17.1%), smartphones (9.6%),

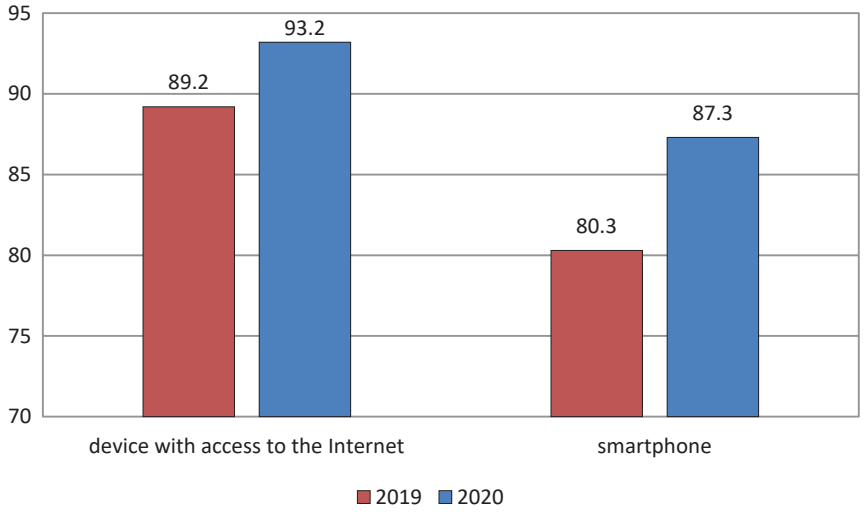

Figure 3. Households equipped with devices with access to the Internet and smartphones according to V quintile group in 2019 and 2020 (in %)

Source: own study based on (GUS 2020, 2021, 2022).

devices with access to the Internet (6.1%) and personal computers (5.2%) compared to 2019. For some goods, the direction of changes was reversed, resulting in a decrease in the level of such household equipment as motorcycles, scooters, mopeds (a decrease of 25.0% in the number of households owning such equipment). It is worth noting that in the case of devices with access to the Internet, the largest increase compared to 2019 was recorded in the group of retirees and pensioners – 18.8%, and of particular importance was the increase of 27.9% in smartphone equipment (GUS, 2021, 2022). Equipping households with durable goods depends to a large extent on the household's income situation. The level of household equipment regarding devices with access to the Internet and smartphones is presented in Figures 3 and 4.

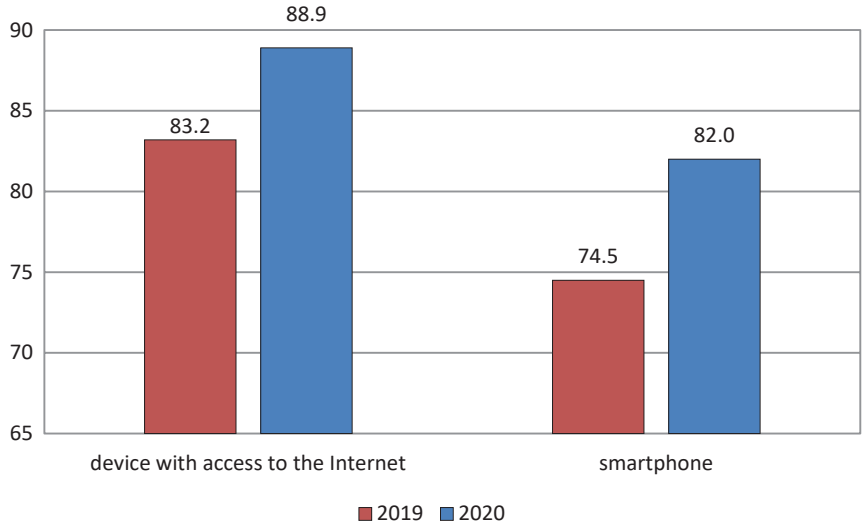

Figure 4. Households equipped with devices with access to the Internet and smartphones according to I quintile group in 2019 and 2020 (in %)

Source: own study based on (GUS 2020, 2021, 2022).

Households belonging to the richest income group (V quintile group) were much better equipped compared to households from the poorest income group (I quintile group). It should be noted, however, that the differences in the degree of equipment between the V and I quintile groups in 2020 decreased compared to 2019 by 5.7 percentage points in the case of a passenger car and 5.1 percentage points in the case of a dishwasher. For other goods, the changes were insignificant (GUS, 2021, 2022). There is a significant increase in household equipment regarding devices with access to the Internet and smartphones in 2020 compared to 2019, i.e. during the pandemic versus the period prior to the pandemic, both

in the richest income group (V quintile group) and in the poorest income group (I quintile group). In the case of devices with access to the Internet, the increase amounted to 4 percentage points in the richest income group (V quintile group) and almost 6 percentage points in the poorest income group (I quintile group). However, in the case of smartphones, there was an increase of 7 percentage points in the richest income group (V quintile group) and over 8 percentage points in the poorest income group (I quintile group). These changes were conditioned by the changing situation related to the COVID-19 pandemic and the related restrictions. The result was the introduction of remote education and work, which accelerated the process of digitalisation of society.

Conclusions

A broader look at the issue of consumption of lifestyle including the aspect of digitalisation during the pandemic allows us to explain society's consumption decisions more accurately. Economists are interested in total (aggregate) consumption because aggregate consumption determines aggregate saving, and saving, in turn, is defined as the portion of income that is not consumed. Aggregate consumption and saving behaviour have a strong impact on the long-term productive capacity of the economy (Carroll, 2016). The role played by a person's work in combination with personal motives and social integration has now been assigned to consumer activity, and the most important thing is the ability to truly consume (Bauman, 2006; 2009). Combining important assumptions about consumption is a good trend, enabling integrated and comprehensive research as well as better explanation of various phenomena of consumption economics. The level of per capita consumption is seen as the main measure of the productive success of an economy.

The obtained research results confirm that society's consumption is characterised by relative stability over the years. Only the period of the pandemic and the related restrictions had an impact on consumption, which was visible in 2020. People were forced to revise their purchasing habits at that time. The introduction of remote education and work as well as the limitation of stationary sales in stores during that period led, on the one hand, to a reduction in total consumer spending including consumer spending on restaurants and hotels, clothing and footwear, recreation and culture as well as transport, and on the other hand, to an increase in consumption expenditure on food and non-alcoholic beverages as well as housing and energy commodities. In 2021, when the pandemic was easing off, there were changes in the structure of consumer spending, which restored

consumption to the level from before the period of restrictions related to the pandemic. The share of consumer spending increased the most in terms of energy and transport and decreased the most in terms of food and non-alcoholic beverages. This is also confirmed by the fact that society's Consumption of Lifetime is characterised by relative stability, and after a sudden shock related to, for example, the introduction of restrictions, it returns to its base state. Currently, there is a noticeable tendency to return to permanent consumption habits observed prior to the pandemic.

Society's consumption has also been also influenced by the accelerated process of digitalisation that took place during the pandemic. Restrictions introduced during the pandemic, aimed at avoiding the spread of the pandemic, resulted in many people switching to remote education and work, forcing them at the same time to avoid interpersonal contacts. As a result, it accelerated the spread of digital competences and the process of digitalisation. In 2020, due to the pandemic and the transition to remote work and education, there was an increase (compared to 2019) in the level of household equipment enabling interpersonal contact and remote work through the following goods: printers (an increase of 17.1%), smartphones (9.6%), devices with access to the Internet (6.1%) and personal computers (5.2%). This significant increase in 2020, i.e. the period of the pandemic, compared to 2019, i.e. the period prior to the pandemic, was noticeable both in the richest income group (V quintile group) and in the poorest income group (I quintile group). The phenomenon of digitalisation deepened when the pandemic and its restrictions ended, and the society became accustomed to remote work, spending longer time in front of a computer screen and using remote communication devices. Computers and smartphones have become essential devices for remote work, education and communication in society.

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Carbon footprint and economic growth in Nigeria and Ghana

Joel Obayagbona[1]

Abstract

The study investigates the relationship between carbon footprint and economic growth in Nigeria and Ghana over the period between 1990 and 2020 (31 years). The carbon footprint related variables used in the study include greenhouse gas emissions, renewable energy consumption, electricity consumption and trade openness. These variables have been regressed against gross domestic product per capita (a proxy for economic growth). The fully modified least square and panel dynamic least square have been employed for the main analysis of the study. The findings have revealed that greenhouse gas emissions and renewable energy consumption have a significant negative effect on economic growth in Nigeria and Ghana, while electricity consumption and trade openness have insignificant positive and negative relationships with economic growth respectively. The study recommends, among others, that the governments should initiate a carbon pricing law which should be implemented through tax policy specifically on the emissions from burning of biomass which consist of methane (CH_4) and nitrous oxide (N_2O) from the combustion of biomass in forest areas as well as carbon dioxide gas from the combustion of organic soils. High taxes will deter indiscriminate bush burning among others, resulting in lower environmental pollution and degradation. This measure will help reduce adverse greenhouse gas emissions and positively impact economic growth.

Article received 2 September 2022, accepted 23 November 2023.

Keywords

- carbon footprint
- greenhouse gas
- renewable energy
- economic growth
- econometric and statistical methods

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Introduction

One of the most crucial issues posing serious threat to human existence which has also attracted serious attention from governments, academia and environmental experts over the past two decades across the globe is the issue of carbon footprint and its attendant effect on the ecosystem and growth process of nations. It is strongly believed that environmental quality, alongside carbon and other greenhouse gases (GHG) emissions, has a direct relationship with economic growth (Grossman & Krueger, 1991). In other words, the higher the growth is, the higher the emissions are. This is true because of the strong desire to increase foreign exchange earnings from crude oil export, which is a major driver of economic growth among African countries. Furthermore, this desire has pushed African countries to open-up their trading activities (trade openness) with other countries of the world. Increased trade increases carbon emissions through environmental goods consumption, which in turn increases the volume of global trade and specific country's output and thus affect economic growth (Mesagan, 2015). The carbon footprint represents the total amount of greenhouse gases (including carbon dioxide and methane) that are generated by human activities through the product life cycle (Gui et al., 2019). The concept derives its name from the ecological footprint traceable to Rees (1992), a Canadian ecologist who was a regional planner at the University of British Columbia. According to Finkbeiner (2009), the idea of ecological footprint is not new, it has even been in existence for the past three decades. Today, the concept is a hybrid serving as strong potential indicator for global warming.

The link between the carbon footprint and economic growth is clearly rooted in the famous Environmental Kuznets Curve Hypothesis advocated by Kuznets (1955) who stated that energy (whether fossil fuels or renewable sources), though very fundamental to economic growth by way of increased production of goods and services, and state of the art technology could have both positive and negative adverse externality effects on aggregate productivity in the long run (Kılavuz & Doğan, 2021). Thus, as countries desire to increase their foreign exchange earnings through imports and exports mechanisms, trading activities across national borders will increase, and for this to happen, the level of production will shoot up leading to high level of carbon emissions because industrial machineries will consume more fuel that will be emitted into the environment as CO_2 (Mesagan, 2015; Olubusoye & Dasauki, 2018). Hence, increases in economic activities mean high rates of carbon emissions. In order to effectively moderate and checkmate the negative effect of the carbon footprint on economic growth, various financing mechanism have been introduced, such that companies are made to compensate

for their carbon emissions by either adhering to emission allowances or contributing to sustainable projects (UNHCR, 2012).

Nigeria annual greenhouse gas emissions/carbon (CO_2) emissions for 2019 was 115,280.00, while that of 2018 was 109,890.00, with an increase of 4.9% (Macrotrends, 2022). The CO_2 emissions per capita in Nigeria are equivalent to 0.44 tonnes per person (based on a population of two hundred million), and Ghana is 0.51 tonne per person. While those of the US is about 16 tonnes per person, representing the highest rates in the world; but the global average carbon footprint is approximately 4 tonnes (Worldometer, b.d.). Nigeria is also a signatory to the Paris Agreement, the international deal aimed at tackling climate change, a position it ratified in 2017, and by implication, the country has pledged to reduce its greenhouse gas emissions by 20% by 2030; this percentage has since increased to 45% as a result of the amount of international support it has received in this direction (Macrotrends, 2022).

Several carbon footprint and economic growth nexus studies have been conducted across the globe (Bimanatya & Widodo, 2018; Magazzino, 2016; Li et al., 2019; Sabbaghi et al., 2018). However, apart from those of Amuakwa-Mensah and Adom (2017) in Ghana as well as Aye and Edoja (2017) and Olubusoye and Dasuki (2018, 2020) in Nigeria, to the best of our knowledge, not much has been done in this area in Nigeria and Ghana, hence the need to conduct this study.

Furthermore, given the danger and increasing risk that carbon footprint emissions pose to the world spectrum in terms of environmental degradation, destructive climate change and atmospheric concentration of GHG, Nigeria and Ghana should be more proactive in handling climate change issue. The two countries should not only refrain from high-emission economic growth models but also develop, adopt and implement alternative environmental friendly models that are capable of increasing total economic activities and at the same time reduce total carbon footprint emissions. This is what this study seeks to provide.

Significance of the study

The Nigerian and Ghanaian economies are heavily dependent on fossil fuel energy consumption based on the current level of technological development in their industrial sector, and a shift to renewable energy has serious implications for the two countries both in the short and long run. Thus, the study is significant in that its outcome will enable us to assess and evaluate the impact of these two energy sources as well as the shift from fossil energy to renewables and their attendant impact on economic growth in Nigeria and Ghana over time. Additionally, the outcome of this study will assist foreign investors to carefully identify and take cog-

nisance of carbon sensitive assets in order to effectively minimise the associated investment portfolio risk within the region. It will also be of immense benefit to non-governmental agencies and the UN agencies which are interested in supporting carbon footprint reduction in African countries. Hence, it will enable them to identify the short fall between carbon financing needs and actual invested funds in the region in order to assist countries to improve their environment and achieve the goal of carbon footprint reduction. Finally, it will provide a veritable platform that will serve as a guide to the management of oil firms in oil producing countries (Nigeria and Ghana) on how to effectively mitigate carbon emission issues.

Research questions

The study seeks to provide answers to the following research questions:

1. What is the relationship between greenhouse gas emissions and economic growth (measured by gross domestic product [GDP] per capita) in Nigeria and Ghana?
2. What is the impact of renewable energy consumption on economic growth in Nigeria and Ghana?
3. To what extent does electricity consumption affect economic growth in Nigeria and Ghana?
4. What is the relationship between trade openness and economic growth in Nigeria and Ghana?

Aim of the study

The main aim of the study is to examine the relationship between the carbon footprint and economic growth in Nigeria and Ghana. However, the specific objectives are to:

1. Examine the relationship between greenhouse gas emissions and economic growth (measured by GDP per capita) in Nigeria and Ghana.
2. Investigate the impact of renewable energy consumption on economic growth in Nigeria and Ghana.
3. Determine the extent to which electricity consumption affects economic growth in Nigeria and Ghana.
4. Ascertain the relationship between trade openness and economic growth in Nigeria and Ghana.

Contribution to knowledge

First of all, this study is one of the fewest and most recent studies in this area in the oil producing countries of the West African subregion. Apart from the studies of Amuakwa-Mensah and Adom (2017) in Ghana as well as Aye and Edoja (2017), Olubusoye and Dasuki (2018, 2020) in Nigeria, to the best of our knowledge, not much has been done in this area in Nigeria and Ghana. Secondly, the study highlights the fact that greenhouse gas emissions and renewable energy consumption are critical to growth, and failure to manage them timely and effectively will have serious adverse consequences on the nation's economic growth.

The remaining part of the paper has the following format: section two presents the literature review, section three discusses the methodology adopted for the study, section four shows data analysis and interpretation of results and section five offers conclusions and recommendations.

1. Literature review

1.1. Economic growth

Economic growth is a steady rise in real output in a given country. According to Ivic (2015), economic growth is the overall increase in the productive capacity of a country over a given period of time, usually measured by the monetary value of the total goods and services produced within a specific year. However, the International Monetary Fund (2013) sees economic growth as improvement in the market value of the goods and services produced and adjusted for inflation. Stone (2017) identified two diamensions of growth, the one that relates to size of labour and that of productivitythere are two main sources of economic growth: growth in the size of the workforce and growth in the productivity. Both factors can stimulate economic growth while productivity is attributable to per capita GDP (Stone, 2017, p. 4).

1.2. Carbon footprint

The concept of carbon footprint is strongly connoted with the earlier concept of ecological footprint advocated by Rees (1992), which has gained considerable

attention and publicity over the past two decades due to its strong focus on the impact of human activities in terms of carbon emissions (GHG) on global environmental and climate conditions (Ercin & Hoekstra, 2012). According to Rees (1992), later corroborated by Selin (2022), "ecological footprint is the total area of land required to sustain an activity or population which includes environmental impacts, such as water use and the amount of land used for food production; in contrast, a carbon footprint is often expressed as a measure of weight, as in tons of CO_2 or CO_2 equivalent per year" (p. 1). Gui et al. (2019) and Syafrudin et al. (2020) also see the carbon footprint as an estimation of the aggregate CO_2 emissions directly or indirectly caused by an activity or accumulated through the product life cycle, where carbon dioxide is not only one of the greenhouse gases (GHG) but its most vital component (about 30%), followed by CH_4 and N_2O (Chen et al., 2019; Liu, et al., 2019). Muthu (2015) had earlier argued that "the amount of GHG is denoted by carbon dioxide equivalent (CO_2-eq) or Global Warming Potential (GWP), which is a combination of a large GHG impact based on radiation power and the length of GHG time in the atmosphere" (p. 2).

According to Gao, Liu and Wang (2013), "carbon footprints is a standard measure of human demands for natural resources, which causes serious depletion of the natural resources by generating wastes for the earth to absorb in the form of GHG emissions in waters, air and on land" (p. 3). It could also be generated from agricultural activities, energy consumption, transportation, use of water and foods among others.

1.3. Renewable energy consumption (RENGC) and economic growth

Renewable energy is usually generated from natural processes continuously, and it includes sunlight, geothermal heat, wind, tides, water, and various forms of biomass. This type of energy does not produce greenhouse gas emissions like those of fossil fuels and it is constantly renewed. Therefore, diversifying energy supply and reducing dependence on imported fuels increases the level of economic growth by creating more jobs in the manufacturing and installation sectors among others.

According to Timmons et al. (2014), as economies grow, demand for energy. Also increases. For instance, history has it that at a certain point, supplies of firewood and other biomass energy proved insufficient to support growing economies in Europe and the US, which necessitated a shift to hydropower, followed by coal during the nineteenth century, and then to oil and natural gas during the twentieth century. In the 1950s, nuclear power became part of the energy mix such that

the different phases of economic development over time were associated by series of energy transitions from one major source to another. Nowadays, fossil fuels – coal, oil and natural gas – are dominant energy sources globally. However, "the twenty-first century is already witnessing the start of the next drastic transition in energy sources – away from fossil fuels towards renewable energy sources. This transition is motivated by many factors, including concerns about environmental impacts (particularly climate change), limits on fossil fuel supplies, prices and technological change. Thus, countries will eventually adopt renewable energy, since they are seen to be cheaper and growth-friendly compared to fossil fuels that are limited in supply and only created over geologic time" (Timmons et al., 2014, p. 3).

1.4. Electricity consumption (ELCON) and economic growth

Regular and stable supply of electricity is indispensable for the economic growth as it affects significantly all sectors of the economy, including households. It was corroborated by Satpathy (2015) that it enhances the quality of education, health services and access to information among others; hence, a strong positive relationship exists between ELCON and growth (Stern et al., 2019). According to Xiao et at. (2012, p. 5), "electricity consumption can promote economic growth by way of enhancing the production of capital, labour and technology, and in turn economic growth can also promote the demand for electricity consumption; and this demonstrates the inherent relationship between them". This clearly aligns with the submission of Paresh and Narayan (2007) that if ELCON can stimulate economic activities, and economic activities are energy dependent, then shortages in electricity supply will have an adverse effect on economic growth. Therefore, the causal link between electricity consumption and economic growth is traceable to the seminar work of Kraft and Kraft (1978), who concluded causality running from GNP to energy consumption in the US; however, subsequent works by Akarca and Long (1980), Yu and Hwang (1984) as well as Xiao et al. (2012) found unidirectional causality running from ELCON to economic growth.

1.5. Environmental Kuznets curve hypothesis

The environmental Kuznets curve hypothesis is predicated on the fact that during the early stages of economic development, a country experiences increased

environmental pollution and degradation until a certain level of income growth, otherwise known as the "turning point", where improvement in the environment also occurred. This implies that, in the early stage of the growth process, when agriculture and allied activities dominate the entire economy, the level of environmental pollution and degradation will be generally low; yet, when economic activities begin to tint towards industrialisation, the rate of pollution tends to increase. However, as the economy continues to experience a steady shift to high level of technological advancement and services, the level of observable pollution continues to decline, thus leading to a state of the U-shaped curve (Grossman & Krueger, 1991; Omoto, 2019), a situation that strongly corroborated Kuznets (1955) hypothesis of the relationship between income inequality and average national income (economic growth).

More specifically, the basic tenet of Kuznets (1955) curve hypothesis is the existence of an inverted U-shaped nexus between environmental degradation/pollution (occasioned by carbon footprints/emissions as a result of intermediate stage of industrialisation) and economic growth (see Figure 1). It added that at the early economic growth stages of an economy, improvement in environmental quality occurs until it reaches a peak, and thereafter begins to decline due to an aggregate increase in per capita income of the population. Subsequently, economic development would eventually lead to improvement in the environment such that the U-shaped nexus between the environmental pollution and growth is attained. By implication, the rising rate of aggregate economic activities where less input is required for efficient production, will bring about general reduction in the rate of pollution and environmental degradation, thereby resulting in the U-shaped pattern.

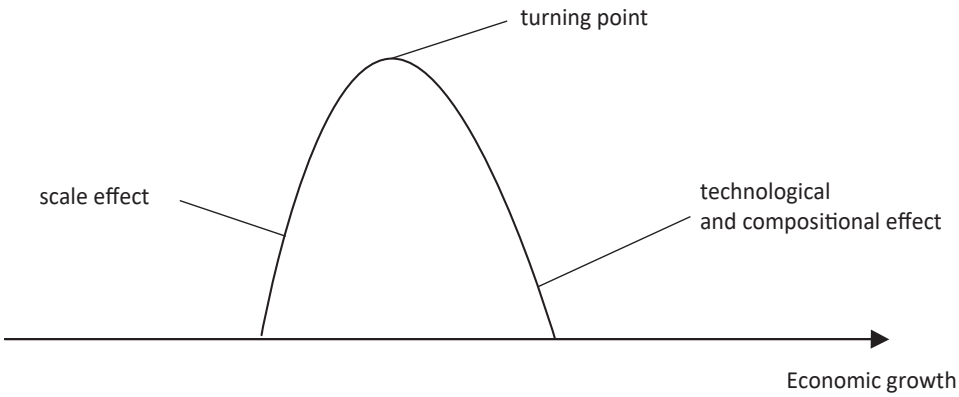

Figure 1. The N-shaped environmental Kuznets curve

Source: based on Stern (2004).

1.6. Theoretical review

1.6.1. Neo-classical theory of economic growth

The neo-classical theory and Harrod-Domar theory best explain modern economic growth behaviour by analyzing different economic aspects. The neo-classical theory of economic growth is based on the collective works of Tobin, Swan, Solow, Meade, Phelps and Johnson. According to the theory, economic growth is determined with the help of certain factors, such as the stock of capital, supply of labour and technological development over time (Solow, 1956). It is usually expressed in the following production function:

$$Y = F(K, L, T) \tag{1}$$

where: Y is the national output, K is capital stock; L is labour supply and T is the scale of technological development. According to the assumption of constant return to scale, increase in the national output (ΔY) would be equal to the marginal productivity (MP) times ΔK and ΔL, therefore:

$$\Delta Y = \Delta K \times MP_k + \Delta L \times MP_l \tag{2}$$

where: MP_k is the marginal physical product of capital, MP_l is the marginal physical product of capital. Thus, dividing the national output by Y, we arrive at $\Delta Y/Y = = \Delta K(MP_k/Y) + \Delta L(MP_l/Y)$; the $K \times MP_k$ and $L \times MP$ represent the total stake of capital and labour in the national output, whereas $K/Y \times MP_k$ and $L/Y \times MP_l$ represent the relative stake of capital and labour in the national output; thus:

$$(K \times MP_k/Y) + (L \times MP_l/Y) = 1 \tag{3}$$

The theory further argues that economic growth (at a given level of technology) = elasticity of output with respect to the increase in capital stock + elasticity of output with respect to the increase in labour. However, with respect to technological change, the change in national output is given by:

$$\Delta Y/Y = b\ \Delta K/K + (1 - b)\ \Delta T \tag{4}$$

where b is elasticity of output.

Deducing from the above, it is obvious that a strong positive relationship exists between economic growth and energy consumption as represented by the stock of capital and technological changes in the above model. Thus, as the process of energy consumption (EC) rises, the total output and growth also rise leading to what

is called the growth hypothesis. However, the conservative view has it that the quantity of EC in a country depends on the economic growth level. Hence, when energy consumption is embraced, it will not have an adverse effect on growth; yet, from the view of the feedback hypothesis, a bidirectional relationship does exist between economic growth (EG) and the level of energy consumption in a country (Bimanatya & Widodo, 2018).

1.7. Empirical literature

Cole et al. (2011), testing the validity of the U-EKC curve, examine how FDI affects economic growth and carbon footprint emissions in 112 major PRC cities in the period of 2001–2004. The finding indicated an inverted-U EKC-type curve with a turning point between RMB32,4557 and RMB35,098 for wastewater and a turning point between RMB17,233 and RMB23,866 for petroleum-like matter. In a similar study by He and Wang (2012) on how economic growth strategy and environmental laws impact the quality of the environment, the authors, employing the panel data analysis, established a significant positive relationship between environmental quality and economic development, which could vary at different stages of development.

In a related study by Olarinde et al. (2014) on the effect of CO_2 emissions on economic growth in selected West African countries, the authors employed the panel data analysis and found that the N-shaped hypothesis holds between economic growth and CO_2 emissions. Tubiello et al. (2014), employing the panel data methodology, studied greenhouse gas (GHG) emissions and other agricultural and forestry pollutants. The authors found that increases in agricultural emissions reduce deforestation rates and forest sinks. They also observed GHG intensity of products between 1990 and 2010, concluding that if not properly mitigated, future emissions may further rise by 30% by 2050.

The study of Kasman and Duman (2015) on the causality relationship between CO_2 emissions, trade openness, energy consumption, urbanisation and economic growth in new EU members over the period between 1992 and 2010, revealed that energy consumption, CO_2 emissions, GDP and lagged trade openness have a significant positive effect on CO_2 emission.

Halicioglu and Ketenci (2016), in their study on environmental quality and international trade in 15 transition countries, employed the autoregressive distributed lags (ARDL) and generalize method of moment (GMM). The authors found that the EKC hypothesis holds in only Uzbekistan, Turkmenistan and Estonia, while the displacement hypothesis was confirmed in Latvia, Armenia, Kyrgyzstan, Estonia and Russia.

In another related study, Olubusoye and Dasauki (2018) empirically examined the validity of the EKC hypothesis in 20 African countries. The authors employed the income elasticity analysis based on the long and short run and found that an inverted U-shaped curve in the long run income elasticity, which is an indication that as carbon emissions , aggregate income rises considerably. Additionally, Fang et al. (2018) examine the impact of industrial wastewater and sulfur dioxide pollution as well as openness on economic growth in China for the period of 2004–2013. Employing the fully modified least square (OLS), the result showed that the environmental Kuznets curve hypothesis does not hold, and that greater openness tends to favour lower industrial waterways emissions and higher sulfur dioxide emissions.

Iskandar's (2019) empirical investigation of the EKC hypothesis with respect to CO_2 emissions and economic growth (EG) in Indonesia for the period between 1981 and 2016, used the ARDL analysis and found that the EKC hypothesis does not hold in the country. Balcilar et al., (2019) study on the nexus between CO_2 emissions and EG in G-7 countries used the historical decomposition technique and observed a trade off on EC in order to minimize CO_2 emissions in the US, Canada and Italy; while the EKC does not hold in the case of the UK and Germany, EC has a positive effect on the environmental quality.

In an attempt to minimise the impact of the carbon footprint at Diponegoro University, Syafrudin et al. (2020) employed the panel method to analyze the carbon footprint under three stages of the Greenhouse Gas Protocol, such as clean water treatment activities, electricity usage activities as well as transportation, wastewater and solid waste treatment activities. The results showed that the largest contributor to carbon footprints came from the electricity and transportation activities.

Khan et al. (2020) investigated the impact of CO_2 emissions and energy consumption on economic growth in Pakistan for the period of 1965–2015. Using the ARDL econometric technique, the authors found that EC and growth significantly impact CO_2 emissions both in the short and long run. Kılavuz and Doğan (2021) examined the EKC hypothesis in Turkey in the period of 1961–2018. Using the ARDL, the authors' findings confirmed its existence, with CO_2 playing the dominant role, while trade openness had no significant impact.

1.8. Knowledge gap

From the above reviewed empirical literature, it was observed that most of the studies were carried out in other countries, and to the best of the authors' knowledge, not much has been done in this area in Nigeria and Ghana. This created a gap in the literature that needed to be filled, hence the need to conduct

this study using the above two countries as they are the leading economies in the West African subregion.

In terms of the methods of analysis, it was also found that, unlike this study, no studies employed the fully modified ordinary least squares and the panel dynamic least squares (PDLS) in their empirical analysis of data. The methods are deemed to be more suitable and appropriate for a work of this nature due to the fact that these two methods are non-parametric analysis that possessed the ability to address small sample bias and endogeneity bias by taking the leads and lags of the first-differenced regressors.

Furthermore, the major energy mix and energy intensity trends in Nigeria and Ghana (coal, petroleum reserves, natural gas, peat, hydroelectricity, solar and wind) have been observed to be on a downward trend for some time now (Knoema, 2020a). For instance, in Nigeria, there is a marked fall from 10 MJ per dollar of GDP in 2000 to 6 MJ per dollar of GDP in 2019; while in Ghana, it fell gradually from 5 MJ per dollar of GDP in 2000 to 3 MJ per dollar of GDP in 2019 (Knoema, 2020b). Given this worrisome scenario, one cannot vividly ascertain what could have been responsible. It is therefore necessary to carry empirical investigation in this direction in order to see the extent to which these downward trends have impacted the two countries' economic growth over time.

2. Methodology

The research design employed for this study is the longitudinal (ex post facto) research design because the data involved have already occurred, and so the researchers cannot alter them. Moreover, in order to effectively analyse the impact of the carbon footprint on economic growth in Nigeria and Ghana, the study employed an augmented Decay-Fuller unit root test, correlation coefficient, fully modified ordinary least squares (FMOLS) and the panel dynamic least squares (PDLS). The augmented Decay-Fuller unit root test is used to ascertain the stationarity property of the data set for the purpose of avoiding spurious regression results, the correlation coefficient is used to assess the background characteristics and the nature of the relationships among the data, while the FMOLS and PDLS have been employed for the main estimation of the study. Both methods are non-parametric and are often preferred to the OLS estimator because they are able to address small sample bias and endogeneity bias by taking the leads and lags of the first-differenced regressors; the methods also impose additional requirements that all variables should be integrated of the same order [i.e. order one of one I(1)] and that the regressors themselves should not be cointegrated (Philips, 1993).

2.1. Model specification

The model for this study hinges on the neo-classical theory and the Harrod-Domar theory of modern economic growth that is determined by the help of certain factors, such as stock of capital, supply of labor, and technological development over time (Solow, 1956).

Thus, Equation 1 above is slightly modified to incorporate carbon footprints and trade openness factors, such that (*Y*) national output (economic growth) is a function of carbon footprint variables which is presented in its functional form as follows:

$$EGRWTH = f(GHG, RENGC, ELCON, TOPN) \tag{5}$$

The econometric form of the model is stated in the following order:

$$GDPPC = \alpha_0 + \alpha_1 GHGe_t + \alpha_2 RENGC_t + \alpha_3 ELCON_t + \alpha_4 TOPN_t + u_t \tag{6}$$

where:

$GDPPC$ – GDP per capita income (a proxy for economic growth),
$GHGe$ – greenhouse gas emissions,
$RENGC$ – renewable energy consumption,
$ELCON$ – electricity consumption,
$TOPN$ – trade openness,
u_t – the error term.
The a ppriori expectations are $\alpha_1, \alpha_2, \alpha_3, \alpha_4 > 0$.

2.2. Measurement of variables

The respective measurements of various variables employed in the study are specifically defined in Table 1.

Table 1. Definition of variables

Acronym	Variable	Measurement	Source
GDPPC	gross domestic product per capita	GDP/midyear population	World Bank Development Indicators (n.d.)
GHG	greenhouse gas emissions	Aggregate GHG emissions (inclusive of forest, land use, kilotonne of CO_2 equivalent), etc.	Hu et al. (2019); World Bank Development Indicators (n.d.)

Table 1 continued

Acronym	Variable	Measurement	Source
RENGC	renewable energy consumption	Renewable energy consumption as % of aggregate final energy consumption	Hu et al. (2019); World Bank Development Indicators (n.d.)
ELCON	electricity consumption	Electric power consumption measures the production of power plants and combined heat and power plants less transmission, distribution, and transformation losses and own use by heat and power plants	World Bank Development Indicators (n.d.)
TOPN	trade openness	ratio of trade (imports and exports) to GDP	Navaretti and Venables (2004); Rambeli et al. (2020)

Source: own study.

3. Data analysis and interpretation of results

In this section, we present different analyses of data based on the methodology presented in the previous section. First, we analyse the correlation coefficients for each country (Nigeria and Ghana) as well as their fully modified least square (OLS) results. Next, we proceed to the combined analysis of the results for the two countries with respect to the unit root test, correlation coefficient and panel dynamic least square (PDLS).

3.1. Correlation analysis (for Nigeria and Ghana)

The results of the correlation matrix for the relationship between the carbon footprint and economic growth in Nigeria and Ghana are presented in Table 2. It may be noted that GDP per capita income generally has a weak negative correlation value of –0.35033 and –0.01705 with greenhouse gas emissions (GHG) and electricity consumption (ELCON), and weak positive correlation values of 0.11437 and 0.29583 with renewable energy consumption (RENGC) and trade openness (TOPN). The corresponding result from Ghana shows GDP per capita income with

Table 2. Pairwise correlation matrix

	Nigeria				
	GDPPC	GHG	RENGC	ELCON	TOPN
GDPPC	1				
GHG	–0.35033	1			
RENGC	0.11437	–0.81054	1		
ELCON	–0.01705	0.83055	–0.60036	1	
TOPN	0.29583	–0.19698	–0.09402	–0.01751	1
	Ghana				
	GDPPC	GHG	RENGC	ELCON	TOPN
GDPPC	1				
GHG	0.24425	1			
RENGC	–0.35162	–0.95533	1		
ELCON	–0.17009	0.25351	–0.01787	1	
TOPN	0.09991	–0.00536	–0.03976	–0.20533	1

Source: own study.

the same variables are also very weak; while a weak positive correlation values of 0.24425 and 0.09991 was observed between GDPPC, GHG and TOPN, a weak negative correlation values of –0.35162 and –0.17009 was noticed between GDPPC RENGC and ELCON. In Nigeria, GHG has a strong positive and negative values of 0.83055 and –0.81054 ELCON and RENGC; but those of RENGC and ELCON were strongly and inversely correlated. On the other hands, those of Ghana indicate a strong inverse correlation value of –95533 between GHG and RENGC. In a nutshell, the correlation results simply suggest the absence of multicolinearity among the data set used in the empirical analysis.

3.2. Panel fully modified ordinary least squares (FMOLS) estimates (for each country)

3.2.1. Nigeria's case

The results for each country (Nigeria and Ghana) are presented in Table 3. In the case of Nigeria, the diagnostic indicators are impressive, the *R*-squared value of 0.62 is high and shows that over 62% of the systematic variations in economic growth are captured by changes in the explanatory variables; even the adjusted

Table 3. Carbon footprint and economic growth

Variables	Nigeria			Ghana		
	Coefficient	***T*-Ratio**	**Probability**	**Coefficient**	***T*-Ratio**	**Probability**
GHG	–0.000241	–6.794486	0.0000**	–0.000533	–2.673745	0.0133*
RENGC	–1.566044	–5.894024	0.0000**	–0.339228	–2.807638	0.0098**
ELCON	0.183150	6.972458	0.0000**	0.014001	1.264911	0.2180
TOPN	–0.101688	–1.543273	0.1358	0.023664	0.980502	0.3366
Constant	179.5210	5.833728	0.0000	28.59312	2.882490	0.0082
$R^2 = 0.62$	$\bar{R}^2 = 0.55$	–	–	$R^2 = 0.23$	$\bar{R}^2 = 0.06$	–

Note: * significant at 5% level; ** significant at 1% level.

Source: own study.

R-squared value of 0.55% is equally good, which it implies that the models have good predictive abilities. With respect to the individual coefficients of the variables in terms of significance and signs, it is seen that GHG emissions, RENGC and ELCON have a significant positive and negative relationship with economic growth in Nigeria; they are significant at the 1% significance level. This means that the growth of the Nigerian economy is highly dependent on GHG, RENGC and electricity consumption. However, the negative signs for greenhouse gas emissions and renewable energy consumption suggest that a unit increase in these variables reduces economic growth in Nigeria by –0.000241% and –1.566044% respectively. The other variable TOPN does not play a significant role in economic growth in Nigeria within the period of analysis.

3.2.2. Ghana's case

On the other hand, the results from Ghana show a weak diagnostic indicator because the *R*-squared value of 0.23 is low, indicating that over about 23% variations in economic growth are captured by changes in the dependent variables; even the low adjusted *R*-squared value of 0.06 indicates a weak predictive ability of Ghana's economic growth-carbon footprint model. However, turning to the results of individual variables, we observe similar results to those of Nigeria, i.e. GHG emissions and RENGC have a significant negative impact on economic growth in Ghana, passing the 5% and 1% levels of significance. It therefore follows that these two variables play a significant role in determining the growth of Ghana's economy over time. However, the variables of ELCON and TOPN failed the 5% significance level, suggesting that they do not play a significant role in Ghana's economic growth.

3.3. Combined analysis of carbon footprint in Nigeria and Ghana

3.3.1. Correlation analysis

In this section, the analysis of the correlation matrix for the relationship between the carbon footprint and economic growth in Nigeria and Ghana (taken together) is presented in Table 4. Generally, the correlation between GDP per capita income,

Table 4. Pairwise correlation matrix (Nigeria and Ghana)

	GDPPC	GHG	RENGC	ELCON	TOPN
GDPPC	1				
GHG	–0.20925	1			
RENGC	–0.22703	0.66642	1		
ELCON	0.11577	–0.87027	–0.71837	1	
TOPN	0.03798	0.46733	0.34760	–0.51552	1

Source: own study.

greenhouse gas (GHG) emissions, renewable energy consumption (RENGC), electricity consumption (ELCON) and trade openness (TOPN) is very weak. However, GHG have strong positive and negative correlation values of 0.66642 and –0.87027 with RENGC and ELCON, and a moderate positive correlation value of 0.46733 with TOPN. Furthermore, while RENGC is inversely correlated with ELCON (–0.71837), ELCON and TOPN are inversely correlated (–0.51552). The conclusion is that the outcome of this result is an indication of the absence of multicolinearity among the data used for the analysis in this study.

3.3.2. Panel unit root tests

The panel unit root tests analysis involving Levin, Lin & Chu (LLC), Fisher Chi--square-ADF and PP-Fisher Chi-square has been performed. Table 5 presents the results for the unit root test at levels and the first difference. It has been observed that at levels the variables were non-stationary but after the first difference they became stationary. Hence, we have technically avoided spurious regression results.

Table 5. Unit root test (Nigeria and Ghana)

Variable	At levels				At first difference			
	LLC	Fisher-ADF	PP-Fisher	Remark	LLC	Fisher-ADF	PP-Fisher	Remark
GDPPC	–0.38865 (0.3488)	6.15101 (0.1882)	14.9717 (0.0048)	stationary	0.29902 (0.6175)	18.9900 (0.0008)	61.1651 (0.0000)	stationary
GHG	1.60876 (1.9462)	0.05794 (0.9996)	0.06416 (0.9995)	non-stationary	–1.56507 (0.0588)	13.1126 (0.0107)	36.3898 (0.0000)	stationary
RENGC	–0.31577 (0.3761)	0.95382 (0.9167)	1.23693 (0.8720)	non-stationary	–3.54038 (0.0002)	28.0943 (0.0000)	56.3945 (0.0000)	stationary
ELCON	0.15126 (1.5601)	1.79691 (0.7730)	3.59326 (0.4638)	non-stationary	–3.47265 (1.0003)	22.9493 (0.0001)	51.7900 (0.0000)	stationary
TOPN	–1.29926 (0.0969)	9.17270 (0.0569)	8.59038 (0.0722)	non-stationary	–5.13273 (0.0000)	23.9275 (0.0001)	36.8992 (0.0000)	stationary

Note: the numbers in parenthesis are *p*-values.

Source: own study.

3.3.3. Cointegration test

The Pedroni Residual Panel Cointegration Test (PRPCT) was employed to test for cointegration. The result in Table 6 shows that there are more than one (1) significant cointegrating vectors among the variable. This implies the existence of a long run relationship among the variables.

Table 6. Pedroni Residual Cointegration Test Results (Nigeria and Ghana)

Variable	Statistic	Probability	Weighted statistic	Probability
Panel *v*-Statistic	0.300825	0.3818	–0.101824	0.5406
Panel rho-Statistic	–1.017157	0.1545	–1.361830	0.0866
Panel PP-Statistic	–6.791202	0.0000**	–7.413860	0.0000**
Panel ADF-Statistic	–1.951504	0.0255*	–2.036511	0.0208*

Note: * significant at 5% level; ** significant at 1% level.

Source: own study.

3.4. The panel dynamic least squares (PDLS) estimates for Nigeria and Ghana (combined)

The relationship between the carbon footprint and economic growth in Nigeria and Ghana has been analysed using the PDLS (see Table 7). The goodness of fit is very high, with the *R*-squared value of 0.84, suggesting that over 84% changes in economic growth in both countries are captured by changes in the dependent variables. However, the adjusted *R*-squared value of 0.21% suggests a weak predictive ability of the model.

Table 7. Carbon footprint and economic growth in Nigeria and Ghana (PDLS)

Variables	Dependent variable = GDPPC		
	Coefficient	*T*-Ratio	Probability
GHG	–0.000143	–2.863323	0.0187*
RENGC	–0.257296	–2.213801	0.0541*
ELCON	0.015043	0.445232	0.6667
TOPN	–0.046706	–0.501861	0.6278
GDPPC(–5)	–0.051284	–0.120824	0.9065
R^2 = 0.84	$\bar{R}^2$ = 0.21	–	–

Note: * sig at 5% level.

Source: own study.

On the basis of the individual relationship between the explanatory variables and the dependent variable, it is seen that greenhouse gas emissions (GHG) have a significant negative relationship with economic growth (proxied by GDP per capita income (GDPPC)) in Nigeria and Ghana. The variable passes the 5% significance level, which may suggest that it plays a significant role in the growth of Nigeria's and Ghana's economies over time. However, the negative sign suggests that as the level of greenhouse gas emissions increases, economic growth in these two countries decreases by approximately –0.000143%. This further suggests that, besides policy initiatives towards reducing GHG, the governments of these two countries need to be very proactive by taking decisive actions towards effectively tackling and reducing the menace of GHG so that the space of economic growth will not only improve but also become equally sustained over the long term. Indeed, this result is corroborated by Cole et al. (2011), Kasman and Duman (2015), Tubiello et al. (2014), as well as Olubusoye and Dasauki (2018) all of whom found a significant inverse relationship between GHG emissions on EG. However, the above research disagrees with that of Fang et al. (2018), He and Wang (2012), Iskandar (2019), Syafrudin et al. (2020), as well as Khan et al. (2020) who observed in their respective studies that GHG emissions significantly and positively impact EG.

The coefficient of renewable energy consumption (RENGC) also has a significant inverse relationship with economic growth, being significant at the 5% level. This simply implies that a unit increase in the level of RENGC reduces EG in Nigeria and Ghana by –0.257296%. Therefore, proper combination, deployment, application and management of all forms of renewable energy alongside other sources of energy is imminent in these two countries in order to positively boost their economic growth. This is true because, given the low level of technological know-how as well as weak infrastructure to effectively engage renewable energy, it will continue to have a negative impact on their economic activities compared to their American, Europen and Asian counterparts. In fact, this result does not corroborate the research of Fang et al. (2018), Iskandar (2019), Kasman and Duman (2015), Syafrudin et al. (2020), as well as Khan et al. (2020) who unanimously confirmed a significant positive relationship between the renewable energy consumption and EG.

On the other hand, the coefficients of ELCON and TOPN failed the 5% significance level, which is an indication that these two variables do not play a significant role in the determination of economic growth in Nigeria and Ghana over the period of analysis. This result is a clear confirmation of the poor, epileptic and disappointing level of electricity supply in these two countries, including a total blackout in major cities and towns lasting for several months and years. The ineffective and corrupt nature of electricity companies in these two countries accounts for the inability of electricity energy to impact positively their economic growth. This result is seen to agree with the findings of Kılavuz and Doğan (2021) who found an insignificant impact of TOPN on EG; however, it contradicts the findings of Iskandar (2019), Syafrudin et al. (2020), as well as Khan et al. (2020) who found that ELCON significantly impacts growth and those of Kasman and Duman (2015) who also found that TOPN significantly impacts economic growth.

3.5. Discussion of results

Within the analysed period (1990–2020), some observed trends/changes in Nigeria and Ghana GDP per capita showed that in 1990, Nigeria's GDP per capital stood at $568, with a growth rate of 11.78%, while that of Ghana was $399 with a growth rate of 3.33%. Between 1993 and 1995, a negative growth rate was observed in Nigeria, and from that period to 2020, the growth rate was not stable; the rate was even decreasing. The average growth rate between 1990 and 2020 stood at about –13.57%. In Ghana, the growth rate was generally positive and seemed to be more stable compared to that of Nigeria; however, the average growth rate between 1990 and 2020 for Ghana was –2.82%. This is a clear confirmation of the results of this study, with greenhouse gas (GHG) emissions and renewable energy

consumption (RENGC) having a significant negative impact on economic growth of the two countries. This suggests that the slow pace of economic growth in Nigeria and Ghana over time was influenced primarily by greenhouse gas emissions and renewable energy consumption.

The result from the empirical analysis has shown that trade openness (TOPN) (measured as the ratio of trade (imports and exports) to GDP) has had a weak inverse relationship with economic growth in Nigeria and Ghana. This suggests that over time TOPN has not really impacted positively the countries' economies; in fact, it has rather had the tendency to reduce them. There is further confirmation of the current trends in international trade of the two countries within the period of analysis. For instance, Nigeria's total export was about $34,900,471.09 (in thousands) and its imports $55,455,401.89 (thousands) resulting in an inverse trade balance of $20,554,930.80. The trade growth is –19.12% compared to the global growth of –3.91%. Nigeria's GDP is about $432,293,776,262.40 and its services export is $3,993,012,590.25 while the services import stand at $19,832,514,705.25. However, for the case of Ghana, aggregate export is $16,768,275.19 (thousands), total import is about $10,439,795.45 (thousands), leading to a positive trade balance of $6,328,479.74. Its overall trade growth is –1.94% compared to the global growth of –1.78%. The above scenario was strongly corroborated by Kılavuz and Doğan (2021), who observed that TOPN does not significantly affect economic growth. However, studies by Iskandar (2019), Syafrudin et al. (2020), Khan et al. (2020) concluded otherwise.

Finally, the major energy mix and energy intensity trends in Nigeria include coal, petroleum reserves, natural gas, peat, hydroelectricity, solar and wind. The country remains a top producer of crude oil and natural gas in Africa. According to Knoema (2020b), in 2019, energy intensity for Nigeria was 6 MJ per dollar of GDP. Energy intensity of Nigeria fell gradually from 10 MJ per dollar of GDP in 2000 to 6 MJ per dollar of GDP in 2019. On the other hand, Ghana's major energy mix includes hydropower generation as well as thermal generation fueled by crude oil, natural gas and diesel. Energy intensity for Ghana in 2019 was 3 MJ per dollar of GDP, which fell gradually from 5 MJ per dollar of GDP in 2000 to 3 MJ per dollar of GDP in 2019 (Knoema, 2020a).

4. Conclusions

The main aim of the study was to empirically investigate the relationship between carbon footprint and economic growth in Nigeria and Ghana over the period of 1990–2020 (31 years). The study was to provide answers to 4 specific re-

search questions such as: what is the relationship between greenhouse gas emissions, renewable energy consumption, electricity consumption, trade openness and economic growth (measured by GDP per capita income) in Nigeria and Ghana? The carbon footprint related variables used in the study include greenhouse gas emissions (GHG), renewable energy consumption (RENGC), electricity consumption (ELCON) and trade openness (TOPN), which were regressed against GDP per capita (GDPPC) (a proxy for EG). Preliminary tests such as unit root tests, correlation coefficient and panel cointegration tests were carried out, while the fully modified ordinary least square (FMOLS) and panel dynamic least square (PDLS) were employed for the main analysis of the study. Generally, the results obtained from the analysis of data indicate that greenhouse gas emissions (GHG) and RENGC have a significant negative effect on GDPPC, and thus they were the major factors affecting economic growth in Nigeria and Ghana. ELCON and TOPN have an insignificant positive and negative relationship with economic growth. The conclusion is that in the determination of economic growth in Nigeria and Ghana, GHG and RENGC are the potent factors that must not be undermined by the governments and relevant policy makers in these two countries. Any attempt to ignore or downplay them will spell doom for the two economies.

Recommendations

In view of the findings of this study, the following recommendations for policy action are brought forward:

First, since GHG emissions have a significant inverse impact on economic growth, appropriate mitigation strategy aimed at reducing the adverse effect of all forms of greenhouse emissions should be put in place. For example, the governments of Nigeria and Ghana and their respective environmental policy makers can initiate a carbon pricing law which should be implemented through tax policy specifically on the emissions from burning of biomass which consist of methane (CH_4) and nitrous oxide (N_2O) from the combustion of biomass in forest areas and carbon dioxide gas from the combustion of organic soils. High taxes will deter indiscriminate bush burning among others, resulting in lower environmental pollution and degradation. This measure will not only reduce adverse GHG emissions but will also have the much needed positive effect on economic growth.

Secondly, the current thought towards the near future that should preoccupy the minds of Nigerian and Ghanaian governments is diversifying energy supply to renewable energy and reducing dependence on imported fuels. This will increase the level of economic growth by creating more jobs in the manufacturing and in-

stallation sectors among others. The reason being that this form of energy does not generate greenhouse gas emissions and is constantly renewed.

Finally, the poor, epileptic and disappointing level of electricity supply in these two countries, and especially total blackouts in major cities and towns for several months and years, should be properly and effectively tackled. The ineffective and corrupt nature of electricity companies also accounted for the inability of electricity energy to positively impact the economic growth. If the governments are sincere in this direction and vigorously pursue and implement the right policy, electricity energy will have a significant positive impact on economic growth while overall aggregate emissions will be reduced.

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Digital public transport in New Economy – contemporary mobility trends

Marcin Jurczak[1]

Abstract

Public transport is very often treated as a nerve of all city systems. Changing cities need proper organisation of transport. In particular, the development of public transport is associated these days with such concepts as IT systems, big data, alternative energy sources, autonomous mobility, transport effectiveness, sharing economy and personal mobility (micromobility). In this work, the author presents contemporary trends that affect city mobility. The author also takes into account the macroeconomic context – the COVID-19 pandemic, inflation, migration trends, because changes in the demand and supply of transport services have become one of the challenges for cities. The main purpose of this article is to review current trends in public transport development and mobility changes in the new, digital, post-pandemic perspective. The research gap found by the author is connected with the interrelationship between technology and the development of public transport systems. The article is an attempt to answer two main research questions: 1) What is the influence of digitisation and technology development on the development of public transport? 2) How are contemporary social, economic and political problems changing public transport? The article is based on critical analysis of literature and selected case studies. The result of the research work is the indication of the most important directions for the development of public transport and related risks and opportunities.

Keywords

- public transport
- alternative energy sources
- digitalisation
- autonomous driving
- sharing economy

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Introduction

Public transport is full of stereotypes. One of them assumes that public transport should be a worse alternative to individual motorisation. Meanwhile, as in many western cities, public transport can be a daily, fully functional alternative to individual transport. Public transport in Central and East European countries is undergoing intense transformation – and the New Economy brings many new challenges but also many new opportunities for both local governments and inhabitants, who are final users of public transport and urban space.

1. Methodology

Public transport remains an interesting field of research. It is an area of many changes – technological, organisational as well as economical. This study takes into consideration cities and their trends in public transport development, with the purpose being the analysis of selected case studies – in different areas of technology implementation (drives, IT, etc.). The review of the case studies is preceded by a literature review, including both domestic and foreign literature, the purpose of which is identifying directions of development of public transport and current trends related to it. The aim of the author is to create a list of trends and applied technical solutions. The subject of the study is Polish cities, and the object is public transport solutions. The whole study includes an analysis of literature sources and selected case studies.

2. Public transport as the basis of the functioning of cities in the New Economy

Transport is widely regarded as the nerve of the urban system. It plays an important, often underestimated role in shaping the mobility of urban areas (Komsta et al., 2019). Consistent development of a city's transport system is an effective tool for creating a specific functional and spatial structure of the city (Suchorzewski, 2010). What is more, the efficiency of urban transport systems affects the efficiency of the country's transport system (Krysiuk & Nowacki, 2016). Making cities more sustainable is also a part of the United Nations Sustainable Goals. On this

list of 17 goals, we can find Goal 11 – sustainable cities and communities (United Nations, n.d. a). The main aim of this goal is to "make cities and human settlements inclusive, safe, resilient and sustainable" (United Nations, n.d. b).

Modern cities are areas of many contemporary challenges – cities struggle with a global environmental crisis, climate change concerns as well as unsustainable urbanisation habits (Rode, 2013). Development of sustainable urban mobility is seen as critical to ensuring sustainable development of the whole city (Rezende Amaral et al., 2018). Especially since in the last decade digital innovations have radically changed traditional concepts of urban transport and introduced new opportunities (Dia et al., 2020). Additionally, we must remember that public transport has been affected by the COVID-19 pandemic (Abu-Rayash & Dincer, 2020).

The functioning of cities in the new economic reality remains an additional issue. The concept of the New Economy is understood as a fast-moving technological revolution, a global revolution related to the networking of the economy, information management, relationships and security (Kelly, 1999). The New Economy stands for a wide use of information and communication technologies (ICT), which has had a major impact on economic development, among others in the US economy (Pohjola, 2002). It has also had a strong impact in Europe since the 1990s; strong development connected with a wide use of ICT technologies has been observed in many countries, especially the UK, Denmark, Finland, Sweden, Ireland and Greece (Daveri, 2002). In smart cities, public must provide real-time response services, convenience and high quality (Kuo et al., 2023). Another idea of developing public transport is connected with the concept of smart mobility (Paiva et al., 2021).

Organisation of public transport is also a challenge in the perspective of the new institutional economy, which strongly changes the perception of economic aspects of transport, introducing new concepts and theories such as transaction cost economics, agency theory, contract theory and property rights economics (Canitez, 2019).

The New Economy raises many questions, e.g. how far will service sectors develop instead of traditional production-based systems? Is it possible to continuously increase productivity and efficiency? How will the network economy also change entire organisations? (Herzenberg et al., 2018). The New Economy is an economy based on knowledge and learning (Lundvall, 2004). Practically from the very beginning of the New Economy concept, researchers have wondered to what extent the idea changes the perception of reality, and to what extent the "old economy" still allows us to explain economic events (Stiroh, 1999). Digitalisation in many sectors of the economy is an undeniable trend, visible today more than ever.

A separate area of interest for researchers is connected with the factors determining the choice of public transport instead of private cars. The final decision is made by the consumer, who makes the decision based on his or her individual

preferences. The use of public transport in Poland is motivated primarily by economic factors such as rising fuel prices – indicated by 57% of respondents, time savings and the ability to move around the city faster –54% of respondents, and environmental aspects – 52% of respondents (Nationale Nederlanden, 2022).

3. Contemporary trends in public transport development

In a rapidly changing world, mobility and accessibility play an increasingly important role, especially in cities and urban areas. The problem of mobility is solved, among others, through the use of modern technologies or improving public transport management (Gakenheimer, 1999). This means, among others, technologies in the field of autonomous and electric vehicles or the integration of shared mobility services (Schuckmann et al., 2012, Burns, 2013; Nijkamp & Kourtit, 2013; Dia, 2019, as cited in: Miskolczi et al., 2021).

The above trends seem to be complemented by the development of micromobility – a response to the last mile problem, different transport needs and spatial conditions (McKenzie, 2020). Researchers discuss, among other things, the possibility of a wider use of technology and information management for urban mobility (Guirao & Orellana, 2021). This means, at the technological level, e.g. access to open data or the use of Bluetooth technology – in order to minimise a waste of time and energy as well as to improve user satisfaction (Soriano et al., 2018).

The above-mentioned examples from the literature do not end the list of trends observed in the development of technology-based public transport and the digitisation of processes. The following subsections discuss a few key trends in this field as well as some case studies.

3.1. Development of IT systems

Traffic management systems remain one of the widely used groups of IT tools in public transport. This means all the tools that can ensure the efficient movement of public transport vehicles – both in terms of traffic management and the management of the vehicles themselves (for example, their activities).

An intelligent transportation system (ITS) may consist of four basic components: Advanced Traveler Information System (ATIS), Advanced Traffic Management System (ATMS), Advanced Public Transportation System (APTS) and Emergency Management System (EMS) (Singh & Gupta, 2015). Many trends in the develop-

ment of this type of IT tools can be seen today. They include, for example, short-term real-time forecasting, dynamic routing and traffic modelling, as well as real-time demand and supply support – using big data and bidirectional data transmission (Nuzzolo & Comi, 2016).

Today, every Polish city has an ITS system or its selected components. A lot of such projects were implemented between 2010 and 2012, when the EURO 2012 football tournament was organised in Poland. It was one of initiation factors for cities to invest in such technical solutions (EURO 2012 provided some opportunities for financing such investments).

Among the biggest systems implemented during that period we shall mention the Tristar system – traffic management in Gdańsk, Gdynia and Sopot (together with an intelligent transport management system in the whole agglomeration), the project of the Integrated Public Transport System implemented in Poznań (which has dedicated subsystems for public transport, parking lots, information exchange for drivers and passengers) or the project of modernisation of infrastructure and construction of passenger information system in Lublin (with vehicle monitoring, transfer hubs, dynamic passenger information system) (Zysińska, 2013, pp. 869–870). Dynamic information systems are also very popular – an example of a display with data from such a system is shown in Figure 1.

Figure 1. Information display from a dynamic passenger information system in Łódź

Source: author's own archive.

Of course, these are not the only IT tools used in public transport. Transport operators use enterprise resource planning (ERP) systems and dedicated business-class systems for managing resources and infrastructure, planning systems (for timetables, job scheduling), systems for managing passenger information and communication with passengers (web tools, mobile applications). Furthermore,

a separate group consists of IT solutions widely used in simple vehicles, e.g. related to the vehicle, its passenger information or more and more often – management of refuelling and charging infrastructure.

3.2. Alternative energy sources

The global search for alternative sources of energy to drive vehicles has become one of the fundamental trends in the development of the automotive industry. The first group of the solutions used today are electric vehicles – usually battery-powered vehicles. Such a vehicle is equipped with a set of batteries storing the electrical energy necessary to power both the engine and auxiliary, external systems (like heating, air conditioning, etc.). The batteries are charged periodically from external sources, usually via a wired connection and less frequently, as in the case of some buses, using a dedicated pantograph or an inductive charger.

The environmental performance of electric vehicles depends largely on the source of the energy they generate. In Poland, coal-fired power plants dominate, so the development of renewable energy sources becomes even more important (Koch-Kopyszko, 2018). In addition, it increases the discussion in Poland about other possible sources of energy to ensure a real reduced impact on the environment.

Several leading trends related to alternative vehicle drive solutions can be identified these days, including internal combustion engine vehicles (ICEVs), hybrid electric vehicles (HEVs), electric vehicles (EVs) and fuel cell vehicles (FCVs). Several types of fuel can be used in alternative-fuel modes, i.e. EVs, HEVs, fuel cell (hydrogen), methanol and natural gas (Morita, 2003; McNicol et al., 2001; Sperling, 1995, as cited in: Tzeng, 2005). It is pointed out that buses based on batteries (electric, especially with overnight charging) and fuel cells (e.g. hydrogen) are those directions that at the current level of technological development allow us to meet operational requirements (Mahmoud et al., 2016). Unfortunately, in Polish reality, a poorly planned revolution related to electromobility leads to numerous problems and a partial loss of profits (Połom & Wiśniewski, 2021). Regardless, it is worth pointing out that sales of Solaris buses with alternative drives on the Polish market in 2022 were, for the first time in history, higher than sales of conventional vehicles (Solaris Bus & Coach, 2023). The Polish bus market has so far gathered a lot of experience related to the operation of alternative vehicles. There are hybrid buses, powered by natural gas (both CNG and LNG), as well as numerous electric buses. Additionally, intensive efforts have been underway to bring hydrogen buses into service. An example of such buses (hybrid and electric) is shown in Figure 2.

In October 2022, a contract for the delivery for 25 hydrogen buses for MPK Poznań Sp. z o.o. (public transport municipal company) was signed. The 12-meter

Figure 2. Hybrid bus and electric bus on the streets of Kraków

Source: author's own archive.

low-floor buses are supplied by Solaris Bus & Coach. They are electric vehicles powered by electricity from hydrogen, converted into electricity in the vehicle's fuel cell. Advantages of this type of buses over battery buses are their long range and short charging time. The range is expected to be around 350 km, and the refuelling time is about 10 minutes. After the delivery of these buses, zero-emission buses will make up 25% of the company's fleet, which will bring MPK closer to meeting the statutory requirements (by 2028, 30% of the fleet should consist of zero-emission buses) (Urząd Miasta Poznania, 2022). First hydrogen buses in Poznań started operating in September 2023. Further deliveries of hydrogen buses are currently underway[2].

The purchase of vehicles is complemented by the choice of fuel supplier. The tender organised by MPK has been the largest tender of its kind on the Polish market so far. As the number of vehicles ordered is lower than originally planned (25 instead of 84), MPK decided to outsource fuel supplies instead of building its own refuelling infrastructure. The only bid in the tender was submitted by PKN Orlen, a national company. Unfortunately more than twice the estimated budget of MPK for this purpose (101.6 million PLN compared to 48.7 million PLN in the budget). Due to the limited offer of suppliers in this market, MPK decided to increase the budget and choose the offer. This means that in the tender for the supply of 1 800 000 kg of hydrogen over a period of 15 years, instead of the estimated price of 27.06 PLN/kg gross, the final price will be 56.46 PLN gross per kg of hydrogen (Transinfo, 2022).

[2] Based on the industry portal of transport enthusiasts www.phototrans.eu, a total number of 15 (out of 25) of these vehicles were delivered to the company (up to 29 November 2023).

In 2019, buses with alternative drives (zero- and low-emission) accounted for 12.42% of the structure of the bus fleet in Poland, including: buses powered by CNG – 6.12%, hybrid – 3.67%, electric – 2.01%, LNG and LPG – 0.40% and biofuels – 0.22% (Izba Gospodarcza Komunikacji Miejskiej, n.d.). The number of electric buses increased rapidly. At the end of the first half of 2022, the number of electric buses in Poland reached 734 units, with the majority operated at MZA Warszawa (162 units, 11% of the whole MZA fleet), MPK Kraków (78 units, 13.7% of the fleet), MPK Poznań (59 units, 18.3% of the fleet), PKM Jaworzno (44 units, 62.9% of the fleet) and MZK Zielona Góra (43 units, 48.3% of the fleet). Taking into account the ongoing contracts for the supply of new vehicles and planned deliveries, this number will increase by 654 vehicles between 2022 and 2024, bringing the number of electric buses operating in cities to 1388 (Stowarzyszenie Polska Izba Rozwoju Elektromobiności, 2022). At the end of 2022, the number of electric buses in Poland reached the level of 821 units (Polish Automotive Industry Association, 2023), and at the end of June 2023 – 856 units (Polska Izba Rozwoju Elektromobilności, 2023). In 2023, it is clear (analysing new vehicle registrations) that vehicles with alternative powertrains are predominant. In the first 10 months of this year, 232 diesel buses, 253 electric buses, 85 hybrid buses, 57 gas buses and 17 hydrogen buses were registered (Transinfo, 2023). The sharp increase in the number of new zero-emission vehicles is, among other things, the effect of new financial support government programmes, such as "Green Public Transport".

The number of other alternative drive vehicles registered in Poland is also growing. According to the statistics of the Polish Alternative Fuels Association, in 2021 there were about 17 000 electric cars (battery-powered – BEV) and 21 000 hybrid cars (plug-in hybrids – PHEV) in Poland. These numbers are forecast to increase to 34 000 / 33 000 in 2022, 75 000 / 75 000 in 2023, 150 000 / 120 000 in 2024 and 246 900 / 183 700 vehicles in 2025. This means that in 2025 more than 430 000 BEV and PHEV electric cars should be present on Polish roads (Polskie Stowarzyszenie Paliw Alternatywnych, 2022). The number is growing quite quickly, with the latest Polskie Stowarzyszenie Paliw Alternatywnych data indicating more than 29 000 new registrations of electric passenger cars in 2023, as well as 2300 vans and trucks, 263 buses, 3200 motorcycles and scooters, 229 microvehicles and 86 hydrogen-powered cars. A total of 90.9 thousand electric cars and 1083 buses were registered in Poland at the end of October 2023 (Polskie Stowarzyszenie Paliw Alternatywnych, 2023). On the other hand, data from the whole European market show that the number of PHEV registrations in the period from Q4 2020 to Q2 2022 remains at a nearly similar level, around 200–220 thousand vehicles per quarter (ACEA, 2022). It should also be noted that the number of hydrogen-powered passenger cars on the Polish market is increasing – the first 74 vehicles of this type were registered in 2021, followed by 115 units in 2022 (EAFO, 2023).

3.3. Autonomous mobility

Autonomous mobility is now being analysed primarily in the context of the possibility of providing a new type of service to customers and social change (Fayyaz et al., 2022; Zardini et al., 2022). They are also widely recognised as one of the most important areas for the introduction of AI in public transport (Zhang et al., 2017).

In practice, more and more cities are now looking for ways to introduce autonomous vehicles both in areas deprived of typical public transport (fairgrounds, cemeteries, harbour areas) and as an extension. In addition, small autonomous vehicles have great potential for use also in areas of dispersed or low-density buildings (especially residential), for example, wherever typical public transport vehicles are economically inefficient or impossible to implement due to their size. Autonomous vehicles can be used here, for example, as "tele-buses", running on routes and courses offered "on demand". Today, technology provides more and more opportunities for vehicles to move independently on the road, and with each generation of vehicles these opportunities are increasing.

In Poland, such vehicles have not been permanently implemented to date. Gdańsk has some experience with pilot operations of autonomous vehicles. The experiment for the commissioning of a line operated by an autonomous vehicle was carried out here for the first time in 2019, as part of the "Sohjoa Baltic" project. The vehicle was scheduled twice an hour, bringing passengers to the zoo (free of charge), seven days a week. The line was marked with number 322, and the bus carried a maximum of 12 passengers. The trips were carried out with the hu-

Figure 3. Autonomous vehicle tested in Gdańsk

Source: (Urząd Miejski w Gdańsku, 2021).

man operator, who was a supervisor in case of a crisis situation. The project was carried out by Easymile using EZ10 vehicles on behalf of the City Hall in Gdańsk (Urząd Miejski w Gdańsku, 2019).

As part of the next pilot programme, an autonomous vehicle appeared on the streets of Gdańsk in autumn 2021. The vehicle running without an operator on board completed 450 courses within 30 days and carried 2017 passengers – completing the courses on the planned route at the Łostowice Cemetery. The eight-seater Iseauto vehicle (4th autonomy level according to SAE) was supplied by Roboride, and the project was carried out in cooperation with Auve Tech (bus delivery and programming) and Trapeze (IT solutions). There were four stops on the 2,2 km long route (Urząd Miejski w Gdańsku, 2022). The autonomous vehicle from Gdańsk project is shown in Figure 3.

It is worth mentioning that in November 2023 the first tests of an autonomous vehicle started in Gliwice – the Blees BB-1 vehicle started tests at the Silesian University of Technology (Gliwice.eu, 2023).

3.4. Sharing economy

The use of shared vehicles remains an important trend in modern mobility. Several basic groups of this type of vehicles have developed in Polish cities, with the first being passenger cars. According to the data from the association Stowarzyszenie Mobilne Miasto, the largest fleets of shared cars in 2022 were in Warsaw (1656 cars), Gdańsk (738 cars) and Kraków (673 cars) (Stowarzyszenie Mobilne Miasto, 2022). Of course, these data are constantly changing – most of the fleets are operated by a few major car-sharing operators, who, because of their operations in many cities, relocate the fleets (they also allow journeys between cities). The second group of powered vehicles that appeared in large numbers on the streets of cities are scooters – first diesel and then electric ones.

A separate group of solutions, usually in the form of organised systems managed at the city level, are urban bicycle systems. Practically in every city there are (or used to be) such systems. In a typical model, an operator selected in a tender by the local government installs bicycle docking/receiving stations and supplies appropriate vehicles, and the tariff of charges operates independently or in conjunction with, for example, public transport charges. In the new systems, there are also dockless bicycles (which do not need to be pinned to the docking station) and electric bicycles. Such systems have played a very important role in building cycling culture in Polish cities and even if they are terminated for cost-related reasons (e.g. Poznań City Bike stopped functioning at the end of the 2022 season), their role in the development of bicycle transport shall not be underestimated.

Figure 4. Public city bike station in Warsaw

Source: author's own archive.

The number of users of vehicle-sharing systems in Poland is currently about 3.5 million. This level was reached in 2019 and now, after a slight correction due to the COVID-19 pandemic (and a drop below 3 million), the market has actually rebuilt the number of users. Forecasts indicate that the number of users of vehicle-sharing systems in Poland will reach around 4 million between 2025 and 2026 (Statista, 2021). Statistics show that Poland is the leader in terms of the number of users of shared transport in the countries of Central and Eastern Europe (Kuźma et al., 2022). An example of a typical bike-sharing station (the whole Warsaw system is called Veturilo) is shown in Figure 4.

3.5. Personal mobility (micromobility)

Shared vehicles allowed us to rediscover the role of the bicycle, among others, as a means of getting around the city. They are increasingly complemented by individual vehicles for the so-called "personal mobility" (or micromobility). Technological developments (especially in the field of batteries and electric drives) have resulted in the creation of a relatively small group of light electric vehicles used to transport one person. These are scooters and skateboards used for moving over short distances with limited speeds. Some researchers also place the above-

mentioned bikes in this group. And although scooters and skateboards were of course already present in the past, it was only with the widespread use of electric drives that their role in meeting the needs of urban mobility increased. These vehicles may also be shared (for example, electric scooters are available from private operators in Polish cities).

4. Changes in urban mobility

All the concepts and trends mentioned above also strongly emphasise transport effectiveness. Economic efficiency is often the basis for decision-making in the sector of public services. Many of the above-mentioned groups of solutions have been developed on the basis of modern technologies – for example, through widely used information tools. However, these are not the only factors that change urban mobility.

Transport has to face challenges in many fields. What are contemporary social, economic and political problems and are they strongly changing public transport? Key to the current changes in urban mobility is the concept of "sustainable mobility", which is understood today, among others (Banister, 2008, pp. 73–80, as cited in: Wyszomirski, 2017, p. 29) as:

- choosing rationally minimum travel time,
- journey as an independent activity,
- reducing travel needs, e.g. by reducing the travel distance, choosing remote computer connections for work,
- increasing the amount of time for walking, cycling and using public transport in relation to travelling by a passenger car,
- reducing air pollution and traffic noise and at the same time improving the energy efficiency of transport,
- increasing the capacity utilisation by making better use of vehicles,
- increasing the infrastructure capacity by introducing the rules on remuneration for use,
- improving the quality of urban space, e.g. by the introduction of Tempo30 traffic zones.

In general, technology today has a major impact on changes in public transport. We can use technology in order to:

- improve the quality of services,
- make public transport more available (better accessible),

- make public transport more sustainable,
- make public transport more effective.

Changes in urban mobility are also influenced by the current macroeconomic situation. Such factors as the COVID-19 pandemic, high inflation and migrations are all changing the demand for transport services. Cities are forced to react dynamically by adjusting supply, based on current social, economic or political factors. On the other hand, the involvement of certain groups of resources (vehicles, qualified staff) in public transport services results in relatively high fixed costs for public transport services. A strong change in supply over a short period of time may therefore be difficult to carry out.

Financial perspectives for local governments also remain an important factor influencing public transport. Changes to the law related primarily to personal income tax (PIT) generate large losses in local government budgets. Experts from the Union of Polish Cities have calculated that the biggest Polish cities will lose the most from these changes, and this loss will amount to 5.9 billion PLN for Warsaw, 1.6 billion PLN for Krakow, 1.4 billion PLN for Wrocław, 1.1 billion PLN for Poznań and over 1 billion PLN for Łódź (Związek Miast Polskich, 2022). This analysis takes into account both losses associated with lower tax revenues and additional equalisation funds, which are, however, significantly lower than the revenue foregone.

The high level of inflation is a separate problem, which also poses a threat to public transport services. Exceeding the inflation target (2.5%) in March 2021 ushered in many months of almost continuous inflation growth, reaching 17.9% on an annual basis in October 2022 (GUS, 2022). High inflation naturally forces upward pressure on wages, rising labour costs as well as external service costs and rolling stock maintenance costs. And in the longer term, there is a real risk that adequate funding will not be provided for the whole service sector.

5. Directions of transport development – opportunities and threats

Research made by Autopay shows that the longer the travel distance is, the more willingly public transport is used. For trips up to 2 km – 7% of the trips are made with the use of public transport, for 3–5 km – 19%, for 6–10 km – 24% and for 11–20 km – 25%. It is noteworthy that in all four distance ranges the number of journeys made by public transport (the survey concerned the Polish market) is lower than the number of journeys made by car (Autopay, 2023). A large share of road transport means great prospects for the development of public transport. On the other hand, for traveling to work, commuters most often use public

transport (42%), own transportation (car/motorcycle – 22%) and a bicycle (13%) (Colliers International, 2023).

Financial constraints remain one of the most serious threats to sustainable mobility in public transport. Investing in alternative fuels means high costs. The cost of operating a diesel-engine bus (from the perspective of purchase and fuel consumption for a period of 10 years) is about 2.65 PLN/km. This is at least more than for an analogous bus powered by gas (2.60 PLN/km) and at the same time more than the operating cost of an electric bus (2.38 PLN). The latter, however, takes into account an 80% stake in the purchase of the vehicle. For a hydrogen bus, the cost (even if 90% of the vehicle purchase is financed from external sources) is 3.10 PLN/km (Izba Gospodarcza Komunikacji Miejskiej, 2021, p. 6).

The operation of hydrogen vehicles will therefore be noticeably more expensive than vehicles with other propulsion sources. It shall be noted that the analysis is contained in a document from 2021, i.e. before the sharp rise in the prices of certain fuels (e.g. electricity). At the beginning of 2021, a barrel of crude oil cost approximately $50, surpassed $120 in the first half of 2022 and reached $80 by the end of November 2023 (Oil Price, n.d.). The average quarterly price of electricity sold on the competitive market in Poland increased from 256 PLN/MWh in the second quarter of 2021, reaching 890 PLN/MWh in the first quarter of 2023, and the following quarter (Q2/2023) brought the first decrease in two years – to 751 PLN/MWh (Urząd Rozwoju Energetyki, 2023).

With such an unstable fuel situation, both an electric bus and a hydrogen bus can only be considered economically meaningful if the vast majority of its purchase is financed externally. Even then, the operating costs remain higher compared to a conventional vehicle. The development and deployment of hydrogen vehicles is therefore primarily a matter of operating costs and not of technology itself.

The COVID-19 pandemic turned out to be a threat to the development of public transport. The sharp drop in the number of passengers using public transport has resulted in a decrease in revenue (through a significant decrease in revenue from tickets). Cities paid compensation, giving passengers money back for unused season tickets. In addition, changes in mobility trends were visible for months, so a relatively long period of time. In this period, public transport services were of course still in operation, which means a high level of costs. In addition, changes in urban mobility are permanent – after the pandemic, some workers and employees (in various industries) returned to work in a hybrid work model, i.e. partly remotely. This has affected, for example, preferences in terms of purchasing public transport tickets. Passengers today expect the flexibility of fare systems, adapted to different forms and working systems. On the other hand, public transport can act as a stimulus, and attractive fares can encourage other activities and drive the development of transport. This was the case, for example, with the 9-EURO-Ticket introduced on the German market, a ticket that reached very high popularity.

Conclusions

What is the role of digitisation and technology development on the development of public transport? Public transport is currently struggling with many challenges – the need to meet new technological challenges (e.g. implementing new propulsion sources), economic difficulties (due to changes in fuel prices) and fluctuations in the demand for services (as a result of the COVID-19 pandemic or the war in Ukraine). Technology can help overcome some of the challenges – for example, by improving the quality of services and reducing the environmental impact of transport. In general, the impact of technology will be positive as technology offers many opportunities to develop transport and adapt it to the current needs. The use of modern technologies also allows for increasing efficiency (e.g. vehicle use), which is also a key issue in sustainable mobility.

Current trends in public transport development and mobility changes have a strong connection with digitisation and technology development of public transport. Contemporary social, economic and political trends are changing public transport – technology and customer needs. A factor in assessing this change may be passenger statistics or mobility trends in a wider context. On the other hand, urban transport has always accompanied cities and followed their transformations – adapting to their development or following their degradation. It still remains (and will remain) an important element contributing to an adequate quality of life in all cities.

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The role of rules and norms in conditional cash transfer programs – Latin American experience

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Abstract

The most important element of conditional cash transfer (CCT) programs is conditioning the social transfer on some pre-defined requirements concerning healthcare and education. The conditioning (co-responsibility) is justified by the belief that higher accumulation of human capital will allow the beneficiaries to be permanently lifted out of poverty. The literature on the subject is ample, focused mostly on the cost effectiveness of CCTs and their impact on poverty rates and income inequalities. However, what is usually ignored are the rules and norms – important from the institutional perspective – that affect the behaviour of participants as well as non-participants and influence their attitudes towards work, childcare, social responsibility, etc. The aim of the paper is twofold. First, to identify rules and norms that matter for the effects and efficiency of CCTs. Second, to define the channels through which they impact the behaviour of economic agents. The research hypothesis assumes that conditionality of transfers increases the efficiency of public social spending. To verify the hypothesis, extensive literature research was performed. The initial conclusions suggest that CCTs could be successfully used both in developed countries as well as in poorer regions.

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Keywords

- conditional cash transfers poverty
- poverty Latin America
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Introduction

Since their introduction in the 1990s in Latin America, conditional cash transfer (CCT) programs have gained popularity, especially in developing countries. They are used as substitutes for or complements to traditional social support. Their most important element is conditioning the transfer on fulfilling some pre-defined requirements, usually concerning healthcare and education. The conditioning (co-responsibility) is justified by the belief that higher accumulation of human capital will allow the beneficiaries to be permanently lifted out of poverty.

The effects of the CCT programs are well studied and the literature is ample, yet sometimes inconclusive[2]. Most studies and meta-studies assess the cost-effectiveness of CCT programs (Caldés et al., 2010; Cecchini & Atuesta, 2017; Dávila Lárraga, 2016; Izquierdo et al., 2018), their direct impact on poverty reduction, the indirect impact on poverty prevention (Amarante & Brun, 2016; Araújo et al., 2017; Molina-Milan et al., 2016; Yaschine & Orozco, 2010), and the labour market prospects of beneficiaries (de Brauw et al., 2015; Del Boca et al., 2021; Gerard et al., 2021; López Mourelo & Escudero, 2016; Nazareno & de Castro Galvao, 2023). What they usually ignore are the rules and norms – important from the institutional perspective[3] – that affect the behaviour of participants as well as non-participants and influence their attitudes towards work, childcare, social responsibility, etc. Two aspects seem of importance for the programs' effects: formal rules (regulations) that create the CCT and their interaction with individual and social norms among beneficiaries and non-beneficiaries.

The aim of the paper is twofold. First, to identify rules and norms that matter for the effects and efficiency of CCTs. Second, to define the channels through which they impact the behaviour of economic agents. The paper contributes to the literature by studying the formal and informal institutional aspects of the programs and their consequences for the beneficiaries and communities. It finds that the proper set of formal rules makes it possible to achieve the program's goals, but informal (social, communal and individual) norms of conduct are very

[2] In Polish literature, however, the CCTs are not well researched. Any mentions were rare until recently – an increase in interest was inspired mostly by the unconditional programs for families with children introduced in Poland in recent years. A few papers on the subject include an analysis of the *Bolsa Familia* program by Duranowski (2013); Gocłowska-Bolek (2017) looks for general conclusions from previous studies and tries to evaluate the impact of CCTs on poverty and disposable income, as well as their role among other tools of social policy in Latin America. Szarfenberg's (2014) main focus is the role of conditionality in social assistance and social security.

[3] Institutions are defined following North (1990, p. 3) as "the rules of the game in the society", imposing constraints on human interactions. "Rules" indicate formal regulations (laws), and norms are meant as informal limits on behaviour (i.e. without official sanctions for breach).

important as well. Informal channels serve to disseminate information, form attitudes towards childcare, employment and social responsibility, prevent breach and support rule enforcement among participants. The paper also aims to assess whether some version of conditionality in social transfers would be applicable in developed countries.

The research hypothesis assumes that conditionality of transfers increases the efficiency of public social spending. To verify the hypothesis, an extensive analysis of available studies was performed[4]. Initial results suggest that imposing certain conditions on social spending could be used by developed countries to improve efficiency and help achieve important social goals. In spite of obvious differences in terms of development and income level, as well as divergent cultural and regulatory features, there are still valuable policy lessons to be learned from Latin America's experience.

1. Conditionality in cash transfers

In developing regions of the world, a significant number of households live in poverty or extreme poverty. They suffer inadequate income and living conditions, lack of access to health care, education and other public services, such as sanitation or drinking water. Poor households also face liquidity constraints and cannot borrow against future profits from the human capital of their children (Araújo et al., 2017). They are unable to effectively insure against most individual and global risks. This results in an inter-generational poverty trap in which children of poor parents are significantly more likely to be poor in adulthood. Long experience in many countries suggests that households are not able to break away from the vicious circle by themselves and require social assistance[5]. One of the most impor-

[4] At this stage, the hypothesis can only be supported by theoretical arguments and anecdotal evidence rather than rigorously verified by empirical tests. It would be very difficult to disentangle the effects of CCTs from other phenomena that have an impact on poverty rates, employment and income: the general state of the economy, growth rates, exogenous shocks, other (unconditional) forms of social support and other policies influencing the level of disposable income (e.g. minimum wages). Furthermore, data for developing regions is scarce and often incomparable.

[5] Broadly speaking, social assistance (protection) involves a range of tools allowing individuals, households and communities to better face risks and mitigate the effects of shocks that affect their livelihoods, as well as giving support for people who – for all kinds of reasons – are not capable of providing basic subsistence for themselves or their families. The same factors that increase the risk of poverty – low qualifications, poor health, regional features – also make private income insurance impossible, hence the need for public intervention.

tant policy tools in this context is direct income redistribution, in particular transfers to poor or vulnerable households.

CCT programs provide social assistance in the form of cash transfers (sometimes supplemented by in-kind transfers), dependent upon fulfilment of some pre-defined requirements (Adato & Hoddinott, 2010). The programs are usually aimed at poor (extremely poor) families with children; sometimes other groups are included as well. CCTs were first introduced in Latin America in the 1990s. Their initial success as an anti-poverty tool led to increased popularity, mainly in poor and developing countries[6].

The main goal of CCTs is to reduce poverty, both directly and immediately – through higher disposable income – and indirectly, in the long term, by providing beneficiaries (especially children and youth) with more human capital. Breaking up the inter-generational poverty transmission would allow the programs' participants to become independent of social assistance in the future. Whether or not the goal can be reached depends on two main aspects: 1) the details of the program construction (formal rules written in the law) and the impact of the rules on the participants' behaviour as well as 2) the normative stance (informal norms). An important element of the program's efficiency is the interplay of formal and informal institutions which can either support or undermine each other (see, for example Pejovich, 1999).

The minimum requirements to set up a CCT are similar to other transfer programs (Fischbein & Schady, 2009). It is necessary to establish the eligibility criteria and enrolment methods, provide a mechanism to pay the benefits, create a monitoring and evaluation system and construct channels to monitor compliance with requirements and enforce them when necessary. The conditions included in a CCT program are usually related to the households' consumption (income or assets), nutrition, health and education, as well as activity and employability. In the long-term, they lead to human capital accumulation and potentially higher employment and better wages. Higher earnings, in turn, should make the families independent of social support, thus limiting public spending in the future.

There is a lively debate in the literature whether or not the transfer should be conditional. Pero and Szerman (2010) explain the social importance of conditionalities from different viewpoints. A liberal standpoint assumes that poverty results from choices made by the poor. As a consequence, potential beneficiaries must undertake certain obligations leading to positive social returns in order to "de-

[6] The nature of conditions, related mostly to 'primary health care' and basic education, suggests that this policy tool is inappropriate for developed countries, where the requirements are fulfilled by other means. It seems, however – as argued later in the paper – that the conditional construction of social programs (and other public spending programs) can be used much more widely, if properly defined.

serve" aid. From the social-democratic perspective, conditionalities pave a way to universal access to basic education and healthcare. Seen in this light, conditions are an entitlement rather than a burden. The right to education and healthcare is strengthened and extended to groups previously excluded (Cecchini & Madariaga, 2011). In any case, imposing some conditions on benefits tends to encourage social support for the program.

The main argument supporting the introduction of conditionalities is their effectiveness in breaking up the intergenerational transmission of poverty (Amarante & Brun, 2016). Fischbein and Schady (2009) claim that CCT programs constitute a new form of social contract between the state and beneficiaries, introducing *co-responsibilities* (not just conditions to be fulfilled). It means that all the interested parties – poor households, the government, taxpayers and donors – share the responsibility for achieving the program's goals. In their somewhat strong words, "[w]hen conditions are seen as co-responsibilities, they [the programs] appear to treat the recipient more as an adult capable of agency to resolve his or her own problems. The state is seen as a partner in the process, not a nanny" (Fischbein & Schady, 2009, p. 10)[7].

The most general difficulty with the concept of CCTs is the fact that they may mis-identify the proper response to poverty. Structural poverty exhibits low variation in time and requires strategic, long-term intervention (Stampini & Tornarolli, 2012) focused on its many sources and dimensions. It probably should not be based on demographic characteristics of a household, such as having children in a given age. Unconditional transfers can be designed to support all poor households (or households in need of help for reasons other than poverty), regardless of their individual features. Proponents of unconditional transfers argue that designing, monitoring and enforcing conditionalities create much higher costs – in terms of administrative and organisational capacities as well as direct expenditure – in comparison with other social programs (Caldés et al., 2010). Those additional costs siphon out a part of social spending away from those in need.

From the perspective of household's decision-making, there are several problems with attaching conditions to social transfers. First of all, for some of the poorest households the requirements might be too costly or too difficult to fulfil; they might not be able to provide the expected documents, etc. (Fultz & Francis, 2013). Moreover, trying to comply with the conditions might lead to costly or unproductive behaviour, e.g. buying school uniforms or cutting working hours in an effort

[7] A similar sentiment is expressed by Behrman and Skoufias (2010, p. 146): "If those who receive public welfare experience a stigma because of it, fulfilling conditionalities or co-responsibilities may lessen such a stigma by making the recipients active participants in the process, in some important sense 'earning the transfers' rather than passively receiving handouts from other members of society. Such an effect might offset part of the welfare loss due to the conditionalities".

to stay "poor enough" (Izquierdo et al., 2018). Households may also spend time on meeting the criteria instead of working, leading to a reallocation of time away from work (de Brauw et al., 2015).

CCTs (or, more precisely, the imposed conditions on behaviour) have been criticised as unjust and paternalistic (Standing, 2002). "Policymakers, experts, or the general populace may think that they know better than the poor what is best for the poor and therefore make resource transfers conditional on the use of the resources transferred for particular desirable ends – that is, education, health, and nutrition, not alcohol, cosmetics, and leisure time" (Behrman & Skoufias, 2010, p. 145). The paternalistic stance assumes that the poor are unable to make correct decisions and need additional incentives to do "what is good for them". On the other hand, paternalistic policies may be justified if the beliefs or information on which individuals base their decisions are persistently incorrect, if there is some conflict of interest, or if the agents behave myopically (Fischbein & Schady, 2009).

Further critique of conditionalities can be based on social and political grounds. Most CCTs tend to reproduce traditional gender roles and increase the burden on female heads of households with additional unpaid work (Fultz & Francis, 2013). Conditionalities create a divide between the "deserving" and "undeserving" poor[8]. Targeting mechanisms leave some of those in genuine need outside the program and undermine the universality principle. CCTs can be used as a political tool in elections; corruption might also be a problem (Cecchini & Atuesta, 2017). Overall, co-responsibilities make income redistribution towards the poor more socially acceptable and efficient at the cost of some welfare loss among the beneficiaries.

2. Rules and norms in CCTs

The most important feature of CCTs – as well as any other policy intervention – might seem trivial but still merits an explicit formulation: regulations (laws, formal rules) that create a CCT program are crucial in determining its scope, results and costs. They should be carefully designed, subject to public debate, constantly analysed in terms of results and effectiveness, and revised when needed. Two focal elements of program design are selection criteria and measures aimed at human capital accumulation and employability. The chosen targeting criteria and selection methods should be clearly justified to gather support for the programs both

[8] The same factors that make people poor (e.g. lack of education or even basic skills, health problems, living in an under-developed locality) might prevent a family from fulfilling the required conditions, exacerbating the problem rather than solving it.

among the beneficiaries and among the taxpayers. The main problems in this regard are exclusion and inclusion errors[9], limited resources, and the need for exit mechanisms. Importantly, there exist interactions between formal rules of the programs and informal, social and individual norms of behaviour.

Cecchini and Madariaga (2011) point out that the scarcity of resources makes selection and targeting of social support programs necessary. In their words, "[t]he use of targeting mechanisms in CCTs should not be seen as an end in itself, but as a tool of social policy to 'do more with less' and make social investment more progressive by targeting public efforts on the most needy" (Cecchini & Madariaga, 2011, p. 37). According to Adato and Hoddinott (2010), two main factors justify the selection of beneficiaries in social programs. First, marginal social returns of any transfer decrease with the household's income – targeting the poorest maximises total welfare gain at a given level of spending. Second, targeting saves limited resources and increases efficiency by providing support to those who need it the most. From the practical perspective, including selection rules is based on previous experience with various poverty-alleviating programs and is also considered one of the sources of the success of CCTs (Fischbein & Schady, 2009).

Most CCTs use some kind of means test to define eligibility. Selecting an efficient targeting method, as well as setting cut-off points, is an important challenge. The targeting process usually consists of two steps: 1) identifying geographic units with the highest poverty rates and 2) selecting households (families) that fulfil preset criteria in terms of income or the standard of living. The targeting rules vary among countries, but usually they are aimed at families living in poverty or extreme poverty, sometimes also indigent families or families facing a "social risk", such as disability, severe illness, domestic violence or sexual abuse (Cecchini & Madariaga, 2011)[10]. Some programs contain an additional step of consulting with the community which is assumed to possess the best knowledge of local conditions and needs. Community targeting tends to decrease the problem of incomprehension of the program's rules and conflicts between beneficiaries and non-beneficiaries. A much easier way of targeting is categorising families based on some simple and evident criterion, e.g. having children in a certain age or living in a given locality. On the other hand, this method potentially creates significant selection errors.

In practice, the participation requirements include several types of activities: (a) aimed at the children's health (regular health check-ups for pregnant women, lactating mothers and school-age children, obligatory vaccinations, participation

[9] An exclusion error reflects the percentage of households that are not beneficiaries even though they fulfil the criteria; an inclusion error is the percentage of actual beneficiaries who do not fulfil the criteria (Gocłowska-Bolek, 2017, p. 8).

[10] Selection criteria for programs targeted at school-age children depend on the organisation of school systems.

in courses on nutrition and health, etc.), (b) increasing skills of children and youth (school enrolment and regular attendance), and (c) supporting employability of adult participants (vocational training, community work, self-employment). Fultz and Francis (2013) mention an important positive externality of CCTs, operating at the intersection of formal and informal rules: knowledge and good practices tend to spread to non-participants, improving the overall results.

A significant aspect of school enrolment in developing countries is a fall in the incidence of child labour. Fischbein and Schady (2009, p. 114) stress that "a reduction in child work is often seen as a good in its own right". The negative consequences of child labour are both short and long term. They include an immediate adverse impact on the physical and mental health of children, as well as reduced educational achievements and lower future earnings. CCTs limit the frequency and amount of work among school-age children through several mechanisms. First, the conditionality of regular school attendance leaves less time for work. Second, the transfer directly compensates for the loss of income[11]. Third, the formulation of conditions might increase the parents' awareness of the problem and affect their stance towards child labour. Again, the positive results are not limited to participants only; other families often imitate the example of their neighbours.

Most CCT programs assign the mother as the transfer recipient in a household. Research shows that women are more likely to spend money on food, health, education and other services than men. Fischbein and Schady (2009) claim that mothers' objectives align more closely with those of their children, especially their daughters. Being assigned the transfer strengthens the position and bargaining power of women. If the programs achieve the goal of higher school enrolment, it benefits girls as well (Cecchini & Madariaga, 2011). On the other hand, added responsibilities might decrease the women's labour supply and perpetuate traditional roles in the household (Fultz & Francis, 2013).

An important, yet too rarely mentioned, feature of CCT targeting is identifying success stories (or unavoidable failures) and designing proper reactions. Exit mechanisms devise rules of eliminating from the program those families that no longer fulfil the criteria (or breach the conditions). What is often lacking is a graduation strategy – identifying beneficiaries that are no longer in need of public help, even if formal criteria are still met (Cecchini & Madariaga, 2011). Most families stay in the program for a limited time only (usually as long as they have school-age children; sometimes other thresholds are introduced). In the absence of other forms of support, this could leave them in the same or worse condition than before the intervention. On the other hand, unlimited and un-conditioned participation could decrease activity and develop benefit dependency, which undermines the long-

[11] In some CCTs a deliberate effort is made to estimate the income loss and direct costs of schooling, and to calculate the amount of the benefit accordingly (Adato & Hoddinott, 2010).

term objectives of the programs. Activation measures are an important element to devise appropriate graduation strategies. Exiting from CCTs should mean exiting poverty and joining other forms of (preferably contributory) social protection schemes. The best way to a permanent escape from poverty leads through productive and well-remunerated employment (López Mourelo & Escudero, 2016) – and for that goal the construction of CCTs is often problematic.

Theoretically, the effectiveness of activation measures towards the CCT beneficiaries depends on two main factors: their willingness to participate in employment-related programs and the efficacy of labour market policies in actually improving the employability and wages. Some experts (Araújo et al., 2017) expect CCTs to reduce the households' labour supply for several reasons. One reason, which has already been discussed above, is lower incidence of child labour, but the number of working hours supplied by adults can decrease as well (Izquierdo et al., 2018). If leisure is a normal good, additional income will shift time allocation towards more leisure and less work. An important potential disincentive is a desire to appear "poor enough" to still qualify for CCT if the program is means-tested. Fulfilling the conditionalities (taking children to school or to a doctor) is time consuming. The same is true for additional formalities, meetings, taking part in obligatory courses, etc. CCTs might also encourage informality – hiding income is easier when working informally (de Brauw et al., 2015).

On the other hand, empirical evidence does not suggest significant decreases in labour supply among the beneficiaries of CCTs (Foguel & Paes de Barros, 2010) and sometimes even notes a slight increase in activity (Del Boca et al., 2021). There can be several explanations for this phenomenon. Income elasticity of leisure is probably quite low among the very poor – additional cash from the transfer is not enough to affect the allocation of time (Fischbein & Schady, 2009). For many households the transfer barely makes up for lost income from child labour and the additional expenditures on healthcare and schooling. If households treat the transfer as a temporary benefit rather than a permanent entitlement, the labour supply is not likely to be affected. Additional income can allow poor households to overcome liquidity constraints and look for a (better) job. Gerard et al. (2021) study the potential labour market disincentives that might be caused by cash transfers on the example of Brazil's *Bolsa Familia* and find that participation in the program actually increased local formal employment rates. They claim, however, that the effect is mostly due to an increase in labour demand and they "find no evidence that benefits increase formal labour supply" (Gerard et al., 2021, p. 4).

Introducing conditions to social transfers requires the government to invest in making the fulfilment of those conditions possible – it is one of the reasons for the "co-responsibility" label that more and more often replaces the "conditionality" in the CCT acronym. It means expanding the supply and accessibility of social services, as well as improving their quality. More active social work may be needed

to support families in the new situation. The practical problem in many countries is poor infrastructure, inadequate resources and low quality of public services. All of those can seriously limit the effectiveness of CCTs. The government's active involvement enforces higher efficiency of administration – selection, registration and supervision of the program's performance.

Many countries try to increase participation of social actors in the design, implementation and evaluation of CCTs, treating them as a universal citizen right that can be demanded by all. Citizen involvement takes an indirect form (complaints and grievances, requests and suggestions) or a direct form of participation in commissions or other collective bodies affecting the functioning of the program, ranging from advisory capacity only to active control of the management. Cecchini and Madariaga (2011, p. 158) conclude quite strongly that "well-defined accountability mechanisms that establish responsibilities and functions of the relevant public and private actors make it easier to view the CCTs in terms of entitlement and rights, instead of as instruments of patronage that can be manipulated by the various political actors".

Some CCTs (most notably the *Progresa* in Mexico) provided resources for a full and rigorous evaluation of the program's impact on poverty, school attendance and health. Impact evaluation was included in the program design from the very beginning, with experimental methodologies to identify the consequences and attribute them precisely to the program's components (Yaschine & Orozco, 2010). Quantitative evaluations of CCT programs measure the change in the indicators that the program aims to influence (nutrition, health, school enrolment and attendance). Qualitative methods are used in order to provide explanation for these changes, or lack thereof.

Most of the empirical evidence on the effects of CCTs comes from country studies, and comparative analyses are relatively scarce (Amarante & Brun, 2016). The main problem with any quantitative evaluation is the lack of a natural control group. If beneficiaries are qualified to the program based on pre-defined criteria, then non-beneficiaries are by definition significantly different in some respects (relative poverty, demographics, skills, assets). Missing out on those differences might cause a selection bias. A proxy for the counterfactual has to be constructed based on non-beneficiaries, which obviously is not an easy task because of targeting. Another solution is assigning individuals (households) to the program randomly from those fulfilling eligibility criteria (Ravallion, 2008), but it is highly questionable on ethical grounds. In practice, the effects of the programs are usually evaluated in experiments or quasi-experiments where beneficiaries (treatment group) are compared with a control group with similar socio-economic characteristics. Selective qualitative analyses are also undertaken to assess deeper impacts of program participation (changes in within-household relationships, attitudes towards public institutions, child labour, women empowerment, etc.). There is a general

agreement about the positive results of CCTs in terms of increasing consumption, improving living standards at the bottom of the distribution, and reducing poverty and inequality (Nazareno & de Castro Galvao, 2023). On the other hand, direct assessments of cost-efficiency and macroeconomic results remain elusive due to complex inter-correlations between poverty rates and many other variables, both economic and political. Brazil's experience in the last several decades provides an illustration of the problem.

3. CCTs in Latin America

Figure 1 shows some significant changes in poverty rates that might be tied to social support programs, but the relationship is far from clear. For example, in 1988, new Constitution was passed in Brazil that confirmed access to social protection as a universal citizen right, increasing both the scope and generosity of transfers. The expected fall in poverty did not materialise; on the contrary, all poverty gaps were on the increase in the next few years. Introducing CCTs in mid-1990s seems to have reversed the trend and helped reduce poverty indicators over the next decades. Careful examination shows, however, a very strong negative correlation between these indicators and real GDP per capita: –0.922, –0.937 and –0.955 for the $2.15, $3.65 and $6.85 poverty lines, respectively. Apparently, strong economic growth

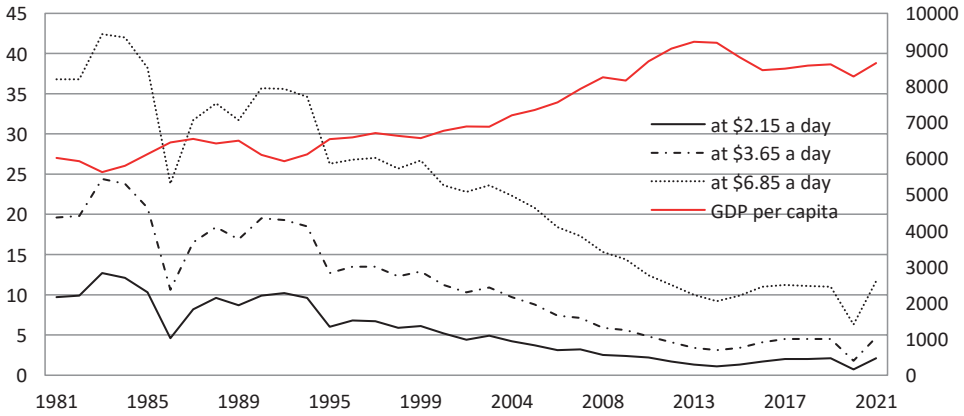

Figure 1. Poverty gap* (%, left axis) and real GDP per capita (2017 USD, PPP, right axis) in Brazil, 1981–2021

* A poverty gap is the mean shortfall in income or consumption from the poverty line (drawn at 2.15, 3.65 and 6.85 in 2017 USD a day, respectively), expressed as a percentage of the poverty line. The non-poor have zero shortfall.

Source: own elaboration based on (The World Bank, n.d.).

is the best way to lower poverty and improve income distribution. Still, it seems that precise streamlining of scarce resources makes it somewhat easier to achieve the desired results with more efficiency and in a way that is socially acceptable. Before the advent of CCTs, social protection in Latin America – insofar as it existed – tended to rely on contributory benefits (health care, old-age pensions, unemployment insurance) linked to formal employment. It was problematic in the context of widespread informality in most countries. The lack of access to social protection created a vicious circle, with the poor and vulnerable forced to take up informal, low-quality and low-wage jobs, preventing them from human capital accumulation or savings that would enable social advancement. Children in poor families lacked access to good quality education (or any education at all) and had to work for their sustenance since an early age, thus staying in low-quality, low-paid informal jobs and completing the circle. Severe economic crises that hit the region in the 1980s and 1990s exacerbated the problems of unemployment, inequality and poverty, leading finally to the creation of the first CCT programs in Brazil and Mexico.

The impulse to design an innovative policy tool was twofold. Firstly, and most importantly, there was widespread poverty and income inequalities, higher than in other regions with similar development levels, despite relatively high social spending. Visible inefficiencies called for improvement of social safety nets (Pero & Szerman, 2010). The second reason was market-oriented economic reforms and pressure from globalisation. Yaschine and Orozco (2010) discuss the case of Mexico in the 1990s and the pressing need to increase competitiveness – in the context of NAFTA – through human capital development that would be accessible even to the poor. Similar neo-liberal reforms were undertaken in Argentina since the beginning of the 1990s, with the country facing a huge challenge to reorient the economy after the post-war period of import substitution. Brazil was burdened by the world's largest income inequalities.

In Latin America, the anti-poverty programs became part of a model of "shared development" (*modelo de desarollo compartido*). In Mexico, special integrated development policies have been targeted to the poor since the 1970s (Yaschine & Orozco, 2010). Over time a tendency became apparent to shift from broad social support programs with lax targeting towards those with strict targeting, based on direct transfers conditioned on specific behaviour of the beneficiaries. Another novelty was the payment in cash instead of previously widespread in-kind support (e.g. food baskets) under the assumption that households themselves are better equipped to diagnose and fulfil their immediate needs than public administration (Stampini & Tornarolli, 2012). Transfers were usually paid to mothers who provide most of the direct child-care and tend to spend relatively more income on the children's needs.

The first cash-transfer programs targeted at families living in extreme poverty, conditional upon educational achievements, were introduced in the 1990s

in Brazilian municipalities (Cecchini & Madariaga, 2011)[12]. The *Bolsa Escola* and *Programa de Garantia de Renda Minima* covered initially the federal district and Sao Paulo, respectively, providing transfers conditional on school attendance. They were soon extended to other cities and regions. Brazil was also one of the first countries in Latin America to introduce a classic CCT (*Bolsa Familia* in 1997).

Mexico introduced the *Progresa* (*Programa de Educación, Salud y Alimentación*, Education, Health and Food Program) in 1997, renamed later (2001) *Oportunidades*; it was the first nationwide CCT program. It was created in the aftermath of a severe economic crisis that hit the country in 1994–1995. At the time, around 20% of the population lived in extreme poverty, with the numbers higher in rural regions (Dávila Lárraga, 2016, p. 7). The goal was, at first, to provide the poorest families with income necessary to overcome food poverty, at the same time introducing co-responsibility requirements in the form of preventive medical check-ups for all household members and school attendance of minimum 85% for children and adolescents (Cecchini & Atuesta, 2017, p. 15). Yaschine and Orozco (2010) list several main features of *Progresa* that became the basis for other CCT programs: targeting the extremely poor, using objective selection mechanisms, cash instead of in-kind transfers, an integrated, multi-sectoral design, participation conditional on co-responsibility, emphasis on the demand-side in the usage of public services, as well as regular impact evaluation. Following a series of severe economic crises at the turn of the century, a new wave of CCTs was introduced in the region in the 2000s.

The growing coverage of CCTs, coupled with good economic conditions in the 2000s, allowed many households to lift out of poverty; by 2006, the number of beneficiaries of CCTs exceeded the official numbers of the poor. An important supporting element took the form of extending access to education and healthcare in sub-regions and localities previously neglected. Still, many of the programs do not manage to reach even those living in extreme poverty. Another problem lies in the fact that worsened economic conditions (like the very low average GDP growth in the region after 2014) usually quickly affect social and labour market indicators (Vegh, et al., 2019).

Long-term experience with CCTs in the region suggests that monetary transfers themselves are not enough to bring most families out of poverty or reduce their vulnerability; hence the increasing importance of activation measures in the construction of the programs (Cecchini & Madariaga, 2011). Stampini and Tornarolli (2012) point out that most of the beneficiaries – despite their educational achievements and health improvement – are still unable to gain stronger positions in the

[12] Honduras started PRAF (*Programa de Asignación Familiar*) back in 1990, but at first the transfers were unconditional; conditions concerning health and education were added in 1998 (Stampini & Tornarolli, 2012).

labour market. They postulate focusing on a new generation of CCT programs, centred on high quality of public services, mostly in education. These new solutions should also include vocational training, supporting self-employment, labour-market intermediation, as well as direct and indirect job creation, preferably in the formal sector.

Some studies show higher effectiveness of CCTs if they include provisions supporting equality in terms of gender, ethnicity, etc. (Molina-Milan et al., 2016). In most programs in the region the designated recipient of the transfer is the female head of the household. It serves to empower women and strengthen their role in decision-making (Fultz & Francis, 2013); it also gives them greater visibility and participation in the community (Cecchini & Madariaga, 2011). On the other hand, being responsible for fulfilling the conditions may reinforce the traditional social role of women and keep them out of the labour market.

CCTs are an important building block in the creation of universal social protection that has been lacking so far in the region. They provide a steady stream of cash so they may help cushion the impact of systemic or idiosyncratic shocks, on both the micro and macro scale. The importance of efficient social safety nets becomes paramount during crises, which have been quite common in recent years. One of the examples is the role of CCTs during the COVID-19 pandemic. Specific features of the crisis caused by COVID-19 led to predictions of increased income disparities (as well as increased poverty) both within and across countries (The World Bank, 2022). At least in developed countries for which there is much more research, the effects of the pandemic tended to increase inequalities, with women, youth and minorities being the most negatively affected. The situation was even more dire in developing regions. Those living in poverty usually could not comply with safety measures, especially if they worked informally and lacked access to social insurance. In Latin America, the asymmetric impact of the COVID-19 pandemic on income distribution was expected to exacerbate income inequalities and increase poverty for the first time in two decades (Decerf et al., 2021). Countermeasures undertaken by countries differed in scale and efficiency, with the richest countries providing the most support.

In Latin America, CCTs allowed the governments to quickly reach the poorest households – they were already providing support for the lowest quintile of the population. During the pandemic Brazil launched one of the world's largest emergency-aid (EA) programs. The program was successful in targeting those who were most in need and reduced both income inequalities and poverty rates, even compared to the pre-pandemic levels (Nazareno & de Castro Galvao, 2023). The EA used the pre-existing structure of social support to quickly transfer cash even to most remote areas of the country; almost 40% of the population received the aid. Estimates show that without the EA, extreme poverty rates in Brazil would increase by 5–14%; after EA poverty rates actually fell to 4% (Nazareno & de Castro

Galvao, 2023, p. 21), inequality measures decreased as well. Interestingly, the indicators connected with the labour market (activity or employment rates) were not significantly affected.

4. Concluding remarks

As shown above, the empirical evidence clearly indicates significant improvements in economic and social indicators among the beneficiaries of CCT programs. They achieve higher consumption, better living standards, lower poverty rates and less pronounced income inequalities. They also usually acquire more human capital, which unfortunately does not translate into proportionately higher wages. Possible explanations for the last shortcoming include (1) low quality of public services, most notably education (especially in structurally poor regions), (2) lack of effective labour demand in the formal sector that would allow the beneficiaries to undertake productive, well-remunerated employment, (3) sub-optimal design of the programs (i.e. excessive resources spent on fulfilling or enforcing the conditionalities instead of income-generating activities), (4) other individual or local factors that have so far not been included in the available data and thus bias the results.

Permanent exit from poverty requires good-quality employment, decent wages and access to social insurance; human capital accumulation is an important precondition but in itself is not enough. Further improvements on the supply side are necessary, making the governments responsible for the provision of widely accessible, good-quality public services. The conditionalities should focus on results rather than mere efforts; education and training should be more oriented at the needs of local labour markets.

One of the most important advantages of CCTs is reaching out to groups previously excluded from social protection systems: the inactive or unemployed and the informal workers. Changes that are taking place in many regions, including developed countries, indicate that the need for non-standard social protection would increase: precarisation of work, deregulation and globalisation, population ageing, mass migration, fiscal pressures will combine to undermine the traditional, contributory social insurance based on formal employment contracts.

In this context, the prioritisation in spending limited resources through careful targeting seems an obvious necessity. It increases the efficiency of public spending and allows the government to focus on intended goals, thus supporting the research hypothesis. The goals themselves should be subjected to open and pertinent discussion, involving all the interested parties. Such wide involvement not only increases support for social support programs but also facilitates achieving

the goals through better information and more cohesion. In designing the formal rules one should not ignore the informal context of individual, community and social norms.

An important field for further study is analysis of the construction and functioning of social-support programs in high-income countries as well as examination of the potential for introducing conditionalities or co-responsibilities. In developed regions, education is often compulsory and tends to be universal; wide access to healthcare is also usually possible. Therefore, the goals – and hence the conditions of CCTs – should differ from those imposed in developing countries. This suggests another research avenue – to identify conditionalities applicable at higher income levels, helping developed countries to better deal with future challenges and hazards. Possible co-responsibilities include details of childcare (e.g. enforcing obligatory vaccination, dental care), actual progress in education (achievements instead of simple attendance) as well as parent activation (conditions pertinent to labour market participation).

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Local housing strategies in Poland as a tool to develop social and affordable housing: Barriers for development

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Abstract

Polish municipalities need to align with the trend of social housing development, expanding beyond public housing providers. The paper seeks to diagnose the barriers to the development of well-defined housing strategies at the local level in Poland. Based on existing housing strategies of some Polish municipalities and the experience gained during work on a housing strategy for a medium-sized city in Poland, the following impediments have been identified: a lack of robust demographic data, insufficient housing inventories, as well as a need for skilled experts and guidance for structured strategies. Given the impending EU investments in housing, local strategies gain significance, particularly in crisis-affected cities. The forthcoming financial aid for social housing amplifies the necessity for well-crafted strategies in Poland.

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Keywords

- housing
- housing policy
- local housing strategy
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Introduction

Currently, the significance of housing policy across Europe is increasing at various levels: local, regional and national. This shift was notably underscored in January 2021, when the European Parliament embraced the pivotal report titled "Access to Decent and Affordable Housing for All" (European Parliament resolution, 2021). This report explicitly urges the European Commission to devise a comprehensive strategy focusing on affordable and social housing, prioritising housing rights over market interests and setting a bold target to eradicate homelessness by 2030. Emphasising the crucial role of regional and local authorities within Member States, it stresses their responsibility to craft and implement housing policies that uphold the fundamental right to housing within their respective markets.

Many European countries take significant proactive measures to amplify affordable and social housing initiatives. This momentum is echoed through various channels, such as the Housing Europe-organised "social housing festivals", biennial events where individuals from diverse countries convene to exchange invaluable experiences and advocate for best practices in affordable and social housing[2]. For instance, in France, each municipality is legally bound to maintain a substantial stock of social housing, amounting to at least 20% of the total housing inventory (Nowak, 2021). Meanwhile, Germany is engaged in robust discussions and scholarly explorations focusing on local housing policy design, as evidenced by recent publications by Rink and Egner (2020) as well as Egner et al. (2018). These discussions underscore the failure of the laissez-faire approach, revealing that unchecked market forces have exacerbated housing price hikes, consequently restricting access to housing for lower-income households. This discourse in Germany unequivocally highlights the necessity of political intervention in housing markets, emphasising that housing is not merely an economic commodity but a societal necessity requiring governance.

Across the Anglo-Saxon sphere, municipalities bear the responsibility of enacting localised housing strategies. In Scotland and Ireland, the formulation of such strategies begins with a thorough assessment termed the Housing Need and Demand Assessment (HNDA). This meticulous study serves as a precursor to housing strategies, allowing for a comprehensive identification and quantification of housing deficits and challenges. The resultant strategy document is then tailored to address the identified gaps, based on the findings of the HNDA (Government of Ireland, n.d.).

[2] https://www.socialhousingfestival.eu/

In Poland, we find ourselves at the onset of a remarkable transformation. The increasing demand for social housing is evident due to a rising number of individuals, particularly the younger demographic, experiencing housing deprivation. This is evidenced by a noticeable surge in young adults choosing to reside with their parents. In 2018, more than every third person (36%) aged 25 to 34 in Poland lived with parents and did not start their own family. This is well above the European average of 28.5%. Compared to 2005, the share of these persons grew by 9% in Poland, which is one of the highest increases reported in the EU (Peszat et al., 2020). Notably, despite a substantial upswing in housing production to nearly 240,000 units in 2022, the persisting trend of housing strain remains a paradoxical challenge. The increasing focus on fair and inclusive housing is shown by many new publications (Lis, 2019; Nowak, 2021) and tools that aim to improve social housing in Polish towns. At the beginning of 2022, with the introduction of legal regulations called the "housing pact", municipalities got greater financial support to build dwellings on their own or with Social Housing Associations. Additionally, the "property for land" initiative appears to be an efficacious yet underutilised mechanism, wherein developers exchange a parcel of land for a designated set of residential units offered to the municipality. Subsequently, since March 2023, private investors have been afforded a significant opportunity to collaborate and construct housing tailored to their requirements. These building cooperatives, as they are termed, hold substantial potential in addressing the housing needs of individuals with moderate incomes. This instrument might be very successful as proved by practices adopted in numerous Western municipalities.

Consequently, Polish municipalities are increasingly endowed with many instruments that hold considerable potential for expanding their social and affordable housing initiatives. However, there exists a lack of both measures and experiential guidance on how to effectively utilise and synchronise these resources. While Polish municipalities are legally mandated to craft strategy documents solely for the communal sector, no such obligation exists for sectors encompassing social rental housing, affordable housing and commercial housing. Obviously, there is an evident lack of comprehensive documents that integrate these sectors into a unified housing strategy. Each sector caters to different housing requirements. The communal sector primarily serves the most vulnerable groups, comprising individuals facing unmet housing needs (lack of tenure) and extremely low incomes. Social rental and affordable housing aim to accommodate those with low and moderate income levels. The commercial sector, responsible for the majority of flat constructions in Poland, is anticipated to address the housing needs of a small part of the Polish population: at the end of 2022, acquisitions of flats for personal use were estimated at 30%, while those made for investment intentions accounted for 70% (NBP, 2023). Such a situation definitely calls for action, and municipalities should try to coordinate housing development in all sectors within their areas.

Nonetheless, few municipalities in Poland have successfully formulated housing strategy documents. Examples include Dąbrowa Górnicza ("Polityka mieszkaniowa gminy Dąbrowa Górnicza na lata 2018–2027", 2017), Poznań (Gawron et al., 2017), Bytom (Jadach-Sepioło et al., 2018) and Tarnów (Utila, 2023). Several other cities are in the process of adopting such strategies, as observed in Stalowa Wola (LPW, 2022/2023). Conversely, in Katowice, the resolution pertaining to the housing development strategy was annulled by the voivod (regional governor) in 2023.

Due to the limited number of comprehensive local housing strategy documents, this paper seeks to identify the factors hindering Polish municipalities from formulating housing strategies. Defining these barriers is crucial, given that establishing a coherent local housing policy is expected to be a significant challenge for municipalities in the foreseeable future. Demographic shifts, depopulation and the ongoing spatial planning reform collectively compel municipalities to adopt proactive roles in shaping all housing sectors within their jurisdictional boundaries in an integrated way.

In this paper, a comprehensive understanding of social housing, as advocated by (Granath Hansson & Lundgren, 2019), is acknowledged. Social housing is conceptualised as a system meeting two distinct criteria:

1. The target group for social housing is households with limited financial resources. To make sure that the housing provided is occupied by the target group, a distribution system with that aim has to be in place. Moreover, housing must be provided long term, rather than temporary.
2. Social housing systems provide below-market rents or prices and hence are not self-supporting, but need some form of public or private financial contribution (subsidy).

In this conceptualisation, even apartments offered for purchase by Housing Associations fall within the scope of social housing. The same classification extends to apartments constructed by building cooperatives. This interpretation of social housing was also adopted in 2013 by the mayors of 30 European cities, notably including the mayors of Krakow and Warsaw (Large European cities, 2013). In other words, both social tenancy for a defined time and the sale of dwellings below market value fall under the umbrella definition of social housing.

1. Methodology

The methodological approach in this study is mainly rooted in desk research, focusing on the analysis of existing local housing strategies. This analysis encom-

passes documents developed for municipalities: Dąbrowa Górnicza, Poznań, Bytom, Tarnów, Stalowa Wola and Katowice. Notably, it is intriguing to observe that municipalities grappling with demographic challenges such as depopulation and ageing have taken the lead in formulating housing strategies. This trend underscores their proactive approach in addressing local housing development issues, signifying a recognition of the correlation between favourable housing conditions and the retention or attraction of residents to a city. An interesting observation emerges as even such cities as Poznań, despite their commendable economic performance, confront substantial demographic challenges.

The use of data from the Central Statistical Office (CSO), alongside personal inquiries made to the CSO on specific matters, enriched the analytical framework of this study.

Furthermore, this research delves into international examples, examining housing strategies from Munich and Berlin. Additionally, the Housing Need and Demand Assessment (HNDA) tool has undergone review as part of this comprehensive analysis, together with Polish respective documents.

Furthermore, this article draws from the ongoing work on the forthcoming Housing Development and Management Strategy until 2035 for Starachowice, a mid-sized city located in central Poland. It is noteworthy that the author of this paper is a co-author of this strategy, offering an enriched perspective shaped by direct involvement in the strategy building process.

2. Results

2.1. Lack of reliable demographic data

A handbook by Krystek-Kucewicz et al. (2020) outlining the integrated housing policy of Polish municipalities advocates for the utilisation of demographic projections to gauge housing demand. This aligns with a strategic perspective. Analogous to military strategy, the development of a housing strategy reflects a structured and forward-thinking methodology. Just as military strategy necessitates careful planning, resource allocation and tactical manoeuvres to attain specific objectives, a housing strategy necessitates a similarly systematic approach. However, to execute this, comprehensive data is imperative, particularly concerning past and future demographic developments. This necessity is underscored by the housing strategies implemented in Munich and Berlin, which notably incorporate highly detailed data regarding anticipated demographic shifts.

Upon reviewing selected Polish documents, it becomes evident that this crucial component is absent. The housing strategies of Katowice ("Strategia mieszkalnictwa miasta Katowice na lata 2022–2030", 2022), Stalowa Wola (LPW, 2022/2023) and Tarnów (Utila 2023) rely on demographic projections only until 2030. This limitation in the projection duration restricts the overall timeframe of the strategies, which are bound by the year 2030. A more effective strategy should encompass a longer duration, ideally spanning at least 10 years, with provisions for periodic updates at specified intervals.

Demographic forecasts extending to 2050 are available only for level of poviats. The absence of more current and precise forecasting data at the municipal level poses a notable gap. This deficiency hampers the effective formulation of Polish housing policy, particularly at the municipal level. Ideally, municipalities should have access to detailed and freely available information regarding both projected resident numbers and age demographics in forthcoming years. Contrarily, in the West, even smaller administrative units than Polish municipalities possess access to accurate and reliable demographic data, empowering them to tailor their housing policies adeptly. This lack of data stands as a significant impediment to strategic planning, as robust planning fundamentally relies on substantive data for setting realistic objectives.

Mid-sized cities, not being poviats, often struggling with concurrent demographic and economic crises, are particularly confronted with an absence of dependable demographic data, potentially exacerbating their developmental challenges.

However, the enumeration of households in a given area is equally significant in crafting housing strategy. The National Censuses of 2002 and 2021 offer insights into household numbers within municipalities. During the formulation of a housing strategy for Starachowice, an exhaustive analysis of the 2002 and 2021 Census datasets was undertaken. The results are presented in Table 1.

Table 1. Census 2002 and 2021 results for households

	Census 2002	Census 2021	Difference in %
Population in households	54 348	45 847	–15.6
Total number of households	20 602	17 207	–16.5
1-person households	4 918	4 379	–11.0
2-person households	5 653	5 055	–10.6
3-person households	4 494	3 419	–23.9
4-person households	3 768	2 398	–36.4
5-person and larger households	1 769	1 956	10.6

Source: own calculation based on CSO data derived form https://bdl.stat.gov.pl/bdl/start

The noticeable surge in the prevalence of 5-person and larger households has become apparent. Consequently, an inquiry was directed to the CSO asking about this intensification in the prevalence of larger households. The CSO responded, attributing the substantial increase in the count of households comprising 5 or more individuals, coupled with a decline in 3- and 4-person households between the 2002 and 2021 Censuses, to a modification in the household calculation method. In the 2002 Census, households were categorised according to an economic criterion, wherein a household constituted a group of individuals cohabiting and self-supporting, with a dwelling possibly accommodating one or more households. Conversely, the 2021 Census adopted a housing criterion, considering all individuals within a dwelling as a single household. Consequently, due to the methodological shift in data collection, the household statistics from the 2002 and 2021 Censuses lack comparability. Consequently, inferring trends or assessing the rate of change in specific household types is unfeasible. This stands as a substantive barrier impeding municipalities in gauging their current housing needs accurately.

Therefore, an urgent priority lies in swiftly instituting household projections at municipal and regional levels in Poland. The CSO should expeditiously provide robust and reliable data pertaining to population and household projections. This imperative step is crucial to enable precise evaluations of future housing demands.

2.2. Insufficient estimates of general housing needs

None of the selected housing strategies comprehensively addresses housing needs across all sectors: communal, social – administered by the Social Housing Associations, and private – built by individual and commercial investors, encompassing both single and multifamily buildings. The absence of such an inclusive estimation of housing needs across the entire housing asset located in a municipality impedes the derivation of overarching conclusions, resulting in selective outcomes that lack comprehensive depth. Emphasising predominantly the communal sector in these strategies merely replicates existing documents already in effect. Thus, there is a significant omission in addressing the private sector, particularly considering its recent potential to significantly contribute to the creation of social and affordable housing – a primary goal for every housing strategy. A noteworthy model is presented in Berlin's housing strategy, which outlines the necessity for an additional 200,000 new dwellings by 2030, emphasising their construction with a focus on public welfare considerations.

In contrast to Western examples of housing strategies, the Polish counterparts lack precise delineation concerning the specific quantity of flats to be constructed within defined timeframes. Consequently, the described objectives remain nebu-

lous and lack precise specification. Notably, the handbook on strategic approach, endorsed by the Ministry of Funds and Regional Policy (Hoinkis, 2021), advocates for goals to adhere to the SMART criteria: Specific, Measurable, Achievable, Reasonable and Time-bound. Regrettably, this method, widely employed in strategic documents across Western contexts, remains underutilised within the strategic housing framework in Poland.

2.3. Lack of housing inventory

2.3.1. Lack of housing replacement need

In addition to the deficit in demographic data, municipalities face a lack of information regarding housing conditions. Within the selected municipalities, except for Poznań, housing production has remained stagnant over the past three decades. In the Starachowice housing strategy, which is currently under adoption procedure, an assumption was made, advocating that housing replacement should occur approximately every 100 years, equating to an annual replacement rate of 1%. This assumption might not be universally applicable, especially in cities experiencing dynamic housing development. However, it holds significance for cities experiencing considerable delays in housing production, which might be linked to a rapid depopulation.

Curiously, none of the housing strategy documents have addressed this critical issue, signifying a notable oversight. Municipalities should be aware of the state of their housing stock, encompassing properties held by Social Housing Associations and those in private ownership. Understanding the condition of the private housing sector is crucial for the effective implementation of housing strategies, providing a basis to diagnose the necessity for replacements. Notably, interviews conducted with Starachowice residents from May 2022 to November 2023 revealed that older inhabitants often reside in inadequate housing conditions, lacking central heating and suffering from poor thermal insulation, which significantly impacts their comfort, particularly during winter months. Hence, it becomes imperative for municipalities to assess housing conditions across various demographic segments and within different housing sectors.

2.3.2. Lack of solution to the need for new housing

None of the selected strategies addressed the demographic ageing trend and the anticipated turnover of dwellings currently occupied by seniors. In developing

the housing strategy for Starachowice, a survey conducted among 87 seniors revealed that 18% of this group live independently and are aged 75 years or above. This suggests that approximately one-fifth of housing units occupied by seniors could potentially be vacated by 2035. As per the 2021 Census, Starachowice is home to 16,543 seniors. Extrapolating from the survey data, this implies that around 2,977 residences might be potentially freed up back into the housing market by 2035. However, a more conservative estimate suggests that around 1,000 dwellings inhabited now by single seniors could realistically become available by 2035 in Starachowice.

It is notable that such calculations, customary in German local housing policy, are critical in determining the necessity for new housing. Despite being a psychologically and socially intricate subject, cities experiencing pronounced demographic ageing would benefit from examining this matter. Calculating the housing potentially vacated by seniors should be factored into the overall estimation of the demand for new housing.

The provisions on assisted housing have recently been clarified. The cost of the services provided to an older adult living in an assisted flat is significantly lower than the cost of their upkeep in a nursing home, most of which is usually covered by the municipality (e.g. due to lack of descendants). Currently, the cost of living for an older person in a specialised nursing home varies between 4,600 and 7,443 PLN in the poviats of the Małopolska voivodship (Małopolski Urząd Wojewódzki, 2023), and it is quite similar in other voivodships. Hence, it appears prudent for municipalities to develop assisted dwellings within the municipal sector. This is particularly relevant for intensely ageing cities. These dwellings can be dedicated to tenants from both the municipal and private sectors. This anticipation aligns with the potential future enactment of legal mechanisms, possibly pertaining to life-tenancy contracts, wherein the municipality becomes a contractual partner. In exchange for assuming ownership of a senior's dwelling, the municipality would commit to providing housing with appropriate conditions and care. Assisted housing emerges as an optimal solution in this context. It is paramount to underscore that well-designed living conditions, which minimise the risk of hazardous incidents such as falls, offer comfort, functionality and ease of maintenance. These factors unequivocally enhance the quality of life for seniors and contribute to their sustained, healthier longevity.

To address the housing needs across different sectors, a clear specification of the number of dwellings to be constructed is essential. These sectors are: communal (dwellings owned by a commune), social (Social Housing Associations), private (both created by individuals as well as commercial entities). None of the selected housing strategies includes such specific estimations.

2.4. Insufficient involvement of private and commercial sectors in creation of social and affordable housing

Commercial and individual housing has been impacted by novel mechanisms facilitating a more pronounced development of social housing initiatives (e.g. the "property for land" instrument, municipal plots for cooperatives). This facet, albeit marginally addressed, finds mention within the Tarnów strategy (Utila 2023). The strategy suggests the potential acquisition of plots on preferential terms by a developer for a stipulated number of dwellings, augmenting the communal housing stock. However, such recommendations fall short. An initial requisite for a municipality is to conduct an inventory of its land parcels, considering those available for potential transfer towards housing development. This pivotal step is fundamental in establishing a comprehensive understanding of the municipality's land assets available for the expansion of housing initiatives and involving private sector in co-creation of the social housing.

2.5. Lack of know-how

In addition to the aforementioned absence of demographic data and insights into the local housing inventory, municipalities might encounter a deficiency in the knowledge required to formulate comprehensive strategic housing documents. The management of housing development across the municipality, encompassing both public and private housing, demands a holistic approach integrating various domains such as social welfare, spatial planning as well as real estate administration. Notably, none of the surveyed strategies were internally developed by the municipalities themselves; instead, they were outsourced. While outsourcing such endeavours is not inherently disadvantageous, it does underscore potential inadequacies in municipal expertise within this domain.

In Germany, each municipality tailors its housing policy to suit its unique requirements, fostering diverse housing strategy models, such as the renowned Munich model. Conversely, in Anglo-Saxon regions, municipalities are equipped with a defined tool – the Housing Need and Demand Assessment, which facilitate a systematic diagnosis and projection of future housing needs.

As regards Poland, there is scope for deliberation on whether to regulate the creation of housing strategies centrally or to entrust municipalities to devise models tailored to their specific needs. While both approaches have merits and drawbacks, they equally hinge upon reliable demographic data spanning past trends and future projections, coupled with comprehensive housing monitoring which encompasses all sectors within the municipality.

3. Discussion

Amidst fervent discussions and swift advancements in social housing, witnessed across various European countries, it becomes imperative for Polish municipalities to align themselves with these progressive trends. The development of social housing within Polish cities should extend beyond the confines of public housing providers.

Polish municipalities do not possess reliable data on local demographic shifts and households development trends. As a result, existing local housing strategies exhibit a notable level of generality, lacking specific references to population projections and essential estimations of housing needs.

Currently, neither approach within these strategies precisely identifies the quantified housing demand across both general and specific sectors. Such inherent ambiguity within the strategies might impede the accomplishment of pertinent objectives, attributable to the absence of explicit, time-bound targets for pursuit.

Notably, cities experiencing pronounced developmental disparities have been the first to acknowledge the pressing necessity for effective housing strategies, primarily due to dwindling populations and ageing demographics. In contrast, cities with more favourable demographic conditions tend to abstain from formulating housing strategies, albeit they might encounter similar challenges in the future.

It is necessary to highlight the critical requirements for increasing the number of housing strategies and raising their quality:

- comprehensive demographic data,
- thorough housing inventories,
- comprehensive handbooks and proficient experts capable of formulating coherent and structured housing strategies.

Housing strategies at the local level are gaining on importance due to the anticipated significant financial investments in housing within the European Union in the forthcoming years. Housing, serving as a potential catalyst for economic development, holds particular relevance for cities facing crises. Additionally, the forthcoming financial support specifically designated for social housing presents a substantial opportunity, underscoring the acute need for well-crafted local housing strategies in Poland.

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Job insecurity and job performance as the key research issues of the modern labour market

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Abstract

This paper focuses on analyzing the contemporary labor market, particularly examining the concept of "insecurity" related to employment and job retention. Despite the increasing research on job insecurity and its impact on employee performance, findings remain mixed and inconclusive. The objectives are to explore job insecurity conceptualizations and theoretical perspectives explaining its relationship with job performance. The main questions include whether a meaningful relationship exists between job insecurity and job performance as identified in literature, and the expected impact of job insecurity on performance. A systematic literature review methodology was used, involving a review and analysis of literature on job insecurity and its relation to various dimensions of employee performance. Two databases, Web of Science and Scopus, were utilized, including papers published before June 2023. This review contributes to the systematization of current empirical evidence in this research area, which is crucial for understanding the consequences of job insecurity on performance. This understanding is vital for organizations and policymakers, considering the different conceptualizations of job insecurity and their impact on employee performance.

Keywords

- job insecurity
- job performance
- labour market
- systematic literature review

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Introduction

Increasing globalisation and transformations of the modern labour market have changed the traditional employment model, introducing "insecurity" associated with taking up and maintaining work (Franken et al., 2009). Job insecurity, understood as "perceived threat of job loss and the worries related to that threat" (De Witte, 2005, p. 1) is an unavoidable and widespread phenomenon in today's professional world (Choonara, 2020; Debus et al., 2019; Huang et al., 2013; Jiang et al., 2020; Probst et al., 2017; Richter et al., 2020; Rosenblatt & Ruvio, 1996; Sverke & Hellgren, 2002). In theoretical terms, job insecurity is most often defined as "the perception that the future of one's job is unstable or at risk, regardless of any actual objective level of job security" (Probst, et al., 2014, p. 32). According to Sverke et al. (2002), job insecurity is "a subjectively experienced anticipation of the fundamental and unwanted event related to job loss". In the literature, job insecurity is also referred to as a "discrepancy between the level of confidence experienced by an individual and the level of confidence that he or she would like to feel" (Hartley et al., 1991), "expectations of continuity in work" (Davy et al., 1997, p. 323), a "concern about the continuing existence of jobs" (Awosusi & Fasanmi, 2014, p. 404), and finally a "perceived threat to the continuity and stability of employment as it is currently experienced" (Shoss, 2017, p. 1914). What all of these definitions have in common is that job insecurity is approached as a subjective phenomenon based on an individual perception of a given situation. Job insecurity based on individual perceptions is shaped by various factors, including the situation on the labour market, organisational and professional factors, as well as personal circumstances such as availability of resources, education or age (Jiang & Lavaysse, 2018; Kiersztyn, 2020; Salas-Nicás et al., 2020; Symeonaki et al., 2019). There are several approaches that assume an objective understanding of job security, interpreted as an "independently determined probability that employees will have the same job in the foreseeable future" (Sverke et al., 2002, p. 243).

From a psychological point of view, it is important to consider an individual interpretation of the environment in order to be able to understand the reactions and individual differences that will contribute to a more diverse and more exhaustive description of the situation of employees in the workplace. Paying attention to the interaction of individual and organisational contexts is essential for comprehending the causes of job insecurity, where perceptions of employees are seen as a link between the objective professional situation and the negative consequences that job insecurity tends to be associated with.

Job insecurity is a complex phenomenon that can affect the individual not only at work, but also outside of it; the same goes for the organisation in which

the individual works. Chirkowska-Smolak (2015) indicates that lack of job security refers to the negative reactions of employees to change in their work and reflects anxiety that accompanies serious and undesirable organisational transformations that threaten the sustainability of employment. Therefore, the employee has to decide between two possible alternatives: keep the job or lose it. This prompts certain insecurity about the future, which refers not only to professional life but also to aspects related to family life, social relations or health (Awosusi & Fasanmi, 2014).

Job insecurity, understood as a subjective perception that our job position is unstable or threatened, and the anxiety and fear that often accompany such an opinion, is a psychosocial threat that may cause significant problems for the organisation as well as disturb the health and well-being of its employees. A meta-analysis of the consequences of job insecurity (Cheng & Chan, 2008; Hsieh & Kao, 2022; Pap et al., 2020; Richter & Näswall, 2019; Sverke et al., 2002) showed that it is significantly negatively correlated with job satisfaction, professional involvement, organisation dedication, trust, as well as the physical and mental health condition, yet positively correlated with a desire to leave work. Research also found that job insecurity is a powerful stress factor in many contemporary employees (Jordan et al., 2002).

Given the prevalence of job insecurity around the world and its negative consequences, it seems necessary to identify potential moderators that could balance out perceptions and reactions to it. Rosen et al. (2010) consider it reasonable to conduct further research on contextual factors moderating job insecurity, not only due to their crucial importance for the development of theoretical literature but also because of the practical implications for an organisation in the context of managing the crisis of job insecurity.

The paper is conceptual, while the considerations contained in it are cognitive. The aim of the paper is to recognise and bring forth the current achievements of research studies related to job insecurity and job performance in order to identify the main research areas related to this topic in social sciences. Given the mixed results related to the impact of job insecurity on job performance, it is relevant to explore what potential mechanisms affect this relationship.

A systematic review of the literature was used to identify the existing research directions and trends. This systematic literature review based on empirical studies on the relationship between job insecurity and performance aimed to identify what is known about the conceptualisations of job insecurity and its relationship with specific performance indicators, as well as what factors play a role in this relationship. The identification of the subject of the study, i.e. the set of publications to be analysed, was carried out using the Web of Science and Scopus databases. Analysis of the articles making up the sample made it possible to identify key areas of research into job insecurity, which included the essence of the

concept and its impact on job performance. The analytical approach was used to identify and assess the existing theoretical approaches, as well as to identify key knowledge gaps and limitations of previous studies, constituting jointly the basis for putting forward operationalisation and measurement assumptions for future explanatory research.

The paper is organised as follows: in the theoretical framework section the authors provide definitions of the constructs used in the paper regarding job insecurity. Next, in the method section the authors discuss the literature under analysis, including the search strategy and inclusion and exclusion criteria of the systematic literature review. Afterwards, in the results section the authors present the evidence about the relationship between job insecurity and various aspects that determine employee performance. Finally, the paper provides a conclusion based on the objectives of the study.

1. Method

The study used a systematic literature review. The authors focused on exploring the conceptualisations of job insecurity and its relationship with job performance indicators. Therefore, we did not conduct a meta-analysis, but perform a qualitative systematic review of the available literature on the relationship between job insecurity and employer performance to create this overview. Opting for a systematic review has not only allowed for a formalised objective synthesis and assessment of research to date, but more importantly, it has enabled the identification of both researched and as yet unexplored areas. This, in turn, provided a framework for further research whose future findings could be generalised in the world literature. A systematic review (compared to traditional, which is often subjective and incomplete) is also advantageous as it poses research questions prior to commencing proper analysis, meaning it pre-emptively compiles a full list of relevant works along with the criteria for inclusion or exclusion of particular literature items (Wyrwa & Kaźmierczyk, 2020).

Our systematic review is based on a method that addresses the research question while also detailing the search criteria and providing an adequate structure for the synthesis of the results.

The systematic literature review procedure comprised the following stages: defining research goals and selecting primary literature (stage one), selecting publications and developing a publication database (stage two), as well as analysing the content and verifying the relevance of the obtained results to further research (stage three).

The selection of search criteria began with those related to the research model and the adopted cognitive context. The inclusion criteria were: (1) studies carried out on samples of workers, (2) qualitative and quantitative empirical studies, (3) studies that evaluated the relationship between job insecurity and performance behaviours and (4) studies published in scientific journals found on Web of Science and Scopus, which are considered the most comprehensive databases of peer-reviewed journals in social sciences. We followed previous literature reviews by restricting the search to peer-reviewed scientific journal articles written in English and we did not specify the year of publication, as the interest was in retrieving as many published articles as possible.

Taking into account not only the assumptions but also the practice of conducting a systematic literature review in research activities, we made decisions regarding the separation and application of the inclusion criteria for adding a publication to the database. It was assumed that the search criteria should be included in the title and abstract of the analysed papers. The titles and abstracts were identified through keyword-based searches of databases. We tested the research databases using a set of phrases that combined the following keywords: "job insecurity", "job performance", "employee performance" and "research".

The database search yielded 498 publications, which were then subjected to a further "cleaning" process. After removing theoretical papers, duplicates, and those to which full access was limited (i.e. paywalled), the total sample was reduced to nearly 250 items. In the last stage of our research, we conducted a qualitative analysis of the publications. We applied thematic analysis to identify, analyse and interpret information from the included studies regarding the conceptualisation of job insecurity and its relationship with performance indicators. This stage included a detailed content analysis of entire texts in our publications database.

2. Theoretical framework of job insecurity

The first attempt at putting job insecurity into a theoretical model was done by Greenhalgh and Rosenblatt (1984). They determined job insecurity to be "perceived powerlessness in maintaining the desired continuity in the threatened employment situation" (Greenhalgh & Rosenblatt, 1984). The "desired continuity" included in the definition meant not only the maintenance of a job itself but also all its features such as the amount of remuneration, career development opportunities and the level of autonomy. On the basis of this definition, the phenomenon of job insecurity comprises two main elements: a threat and powerlessness

to counteract it. Greenhalgh and Rosenblatt understood it as a product of multiplication: if at least one of the elements does not exist, the individual will not experience job insecurity.

Experiencing job insecurity causes specific, negative reactions in employees. These include reduction of effort put into work, increased willingness to leave and resistance to change. Employee reactions further affect the organisational efficiency through an increased level of departures, decreased performance and overall deterioration of adaptability. These correlations between job insecurity and its consequences are moderated by variables such as: social support, work dependence and individual differences (Chojnacki, 2015b).

The conceptualisation of job insecurity developed by Greenhalgh and Rosenblatt (2010) distinguished four key elements. The first is desired continuity – if an employee does not want to keep their current job, they will simply go to another organisation or get promoted to a more attractive position – in that case there is no job insecurity. Thus, the first element of the concept of job insecurity is perceived as a threat to various work features, such as opportunities for promotion and the freedom to set one's own schedule. The more job features an individual considers to be at risk, the greater the job insecurity they experience. The second element is a subjective threat – if an employee perceives their job as threatened, it does not matter if it is a factual situation or an inaccurate interpretation of signals transmitted from the environment. Even an unjustified subjective threat may be a source of job insecurity. This assumption is supported by empirical data, which show that this phenomenon is sometimes independent of objective conditions, i.e. some employees in a jeopardised organisation felt secure about their future, while some employed in a company with a stable market situation were worried about their jobs (Roskies & Louis-Guerin, 1990). The third element concerns job features at risk. According to Greenhalgh and Rosenblatt (2010), it is not only the fear of losing one's job as such, but also the deterioration of the employment situation by losing some of the desirable properties of the current job, e.g. if an employee fears undesired relocation, leaving friends, being burdened with unwanted duties or having their rights limited. Such employees may experience a significant degree of job insecurity – strong enough to trigger negative reactions. The last element of the model is perceived to be powerlessness (helplessness). An employee may experience a subjective threat, but if they are convinced of their capability to overcome it, it will not result in negative consequences. Otherwise, they will experience job insecurity.

The above four elements were combined to create a multi-dimensional job insecurity construct, which is an alternative to the previously used one-dimensional concept. However, the inconsistent structure of the job insecurity construct proposed by Greenhalgh and Rosenblatt was criticised in several subsequent studies. Some researchers have stated, among other things, that powerlessness should be

treated as the cause or effect of job insecurity, rather than a separate dimension of the structure (Probst, 2003; Rosenblatt & Ruvio, 1996; Vander Elst et al., 2011).

In any case, the model developed by Greenhalgh and Rosenblatt currently constitutes an important impetus for further research on job insecurity (Chojnacki, 2015a). Despite the passage of over thirty years, this approach is still frequently referenced in literature (Boswell et al., 2014; Wang et al., 2015). Based on the theoretical and multifaceted job insecurity model of Greenhalgh and Rosenblatt (1984), Ashford et al. (1989) developed and justified a precise measure for the phenomenon in question. This multifaceted scale of job insecurity includes the following elements: job functions (significance of job features x probability of losing a given job function), total work (significance of job loss x probability of losing a given element of total work) and powerlessness (perceived powerlessness to confront the threat). Ashford and his colleagues empirically supported the multifaceted nature of job insecurity, demonstrating that their theoretical measure has superior predictive validity compared to previous measures assessing the global perception of job insecurity.

According to the classical models of job insecurity (Greenhalgh & Rosenblatt, 1984), it was assumed that job insecurity is a potentially serious stress factor at work, which causes tension and anxiety. Employees who suffer from increased stress caused by the risk of losing their jobs are exposed to worse results the most (Gilboa et al., 2008).

The second theory, cited by job insecurity researchers, is the transactional theory of stress developed by Lazarus and Folkman (1984). One of the first references to the transactional theory of stress in the context of job insecurity can be found in Jacobson's publication, in which the author states that job insecurity resembles the process of cognitive appraisal as described by Lazarus and Folkman. He also combined Greenhalgh and Rosenblatt's model and Lazarus and Folkman's theory, indicating that the extent to which changes in the work environment lead to an individual experiencing job insecurity depends on: (1) cognitive evaluation of the threat posed by changes, (2) individually perceived availability of resources to counteract the threat, and (3) perceived consequences for the individual if the threat materialises.

In recent years, numerous examples of job insecurity in the context of the transactional stress theory analysis have emerged. Debus et al. (2012) referred to the theory of Lazarus and Folkman, indicating that the cognitive assessment of the stress factor (stressor) is of paramount importance in its relationship with the negative effects, and this assessment is influenced by various factors, including those from culture and society that they think are correlated with the individual process of experiencing stress.

Vander Elst et al. (2011) conducted a study aimed at defining the role of perceived control in the relationship between job insecurity and its negative effects.

The concept of perceived control has been defined as "the employees' situational appraisal of his or her ability to control the job insecure situation" (Vander Elst et al., 2011, p. e216). The results found that perceived control is a mediator of the relationship between job insecurity and its consequences. Having analysed them on the basis of Lazarus and Folkman's theories, the authors pointed out that the recognition of job insecurity is a stage of a primary assessment, which results in a secondary assessment, i.e. in such cases there will be an impression of lack of control resulting in negative consequences. The authors, however, emphasised that perceived control is only a partial mediator of this relationship and recommended further investigation of the mechanism of job insecurity.

Debus et al. (2014) analysed variables that influence the experience of job insecurity. In their opinion, there were two tendencies in the literature that resembled the age-old discussion of nature versus nurture. The former focuses on variables that characterise the individual, such as values or attitudes, while the latter includes environmental factors such as employment conditions or the financial situation of the enterprise. The authors transferred these considerations to the transactional theory of stress, as proposed by Lazarus and Folkman, claiming that the perception of stressors depends on both these groups of factors as well as the interaction occurring between them. For the purposes of the study, the location of the sense of control and negative affectivity were regarded as individual variables, while the company's performance and the type of contract connecting the individual to the organisation were considered environmental variables. The results of the study showed that all of the factors significantly explained job insecurity, whereas the variables related to the individual reduced the prediction error of the dependent variable twice as much. In addition, the effect of the interaction between the sense of control and the type of employment contract turned out to be significant: people on temporary contracts experienced a significantly higher level of job insecurity than people on fixed contracts.

The third theory, presented in the context of research on job insecurity, is the Conservation of Resources (COR) theory by Hobfoll. Its basic assumption is that "people strive to retain, protect, and build resources and that what is threatening to them is the potential or actual loss of these valued resources" (Hobfoll, 1989, p. 513). In this approach, Hobfoll seeks general principles that guide the deliberate behaviour of people. He defines them as the willingness of an individual to maintain, protect and multiply their own resources, which are understood as items, personal properties or circumstances valued by the individual. According to the author, people are constantly searching for resources that are not yet available to maintain, those he or she already has, and to protect the resources which are jeopardised for some reason. Thus, the source of stress is the disturbance of the balance in the exchange of resources between the individual and the environment.

The literature contains a number of examples of the application of Hobfoll's theory as a theoretical explanation of the mechanism of job insecurity. Richter et al. (2014) conducted a study to determine whether work dependence, understood as a need for work due to the resources it provides to an individual, is a moderator of the relationship between job insecurity and personal wellbeing. The relationship between job insecurity and its consequences was justified based on the transactional theory of stress developed by Lazarus, while the "postulated moderator" is based on Hobfoll's COR theory. According to this theory, the wellbeing of an individual depends on the maintenance and acquisition of resources, which are largely provided by work. Job insecurity is a threat to work and, therefore, also a threat to resources such as financial security, significant activities, a sense of belonging or status. Consequently, the more an individual relies on their work to access these resources, the more negative the consequences of job insecurity will be for them. The results of the study demonstrated that work dependence is an important moderator of the relationship between job insecurity and wellbeing, regarded as job satisfaction, but not as subjectively assessed mental health.

De Cuyper et al. (2014) examined if the strategies taken by employees, namely managing one's own image to create a beneficial presentation in terms of diligence and loyalty, will be positively correlated with the (self-reported) results of the work performed and with emotional exhaustion in instances of insecure employment. The authors justified the postulated relationship based on Hobfoll's COR, pointing out that in circumstances of job insecurity, employees feel threatened by the potential loss of resources, which results in them engaging in activities to prevent that scenario from taking place. The results found that this exemplification is positively related to emotional exhaustion only in conditions of high job insecurity because there is no relationship with low insecurity.

Lazarus and Folkman's (1984) transactional theory of stress and Hobfoll's (1989) theory of conservation of resources both provide a theoretical basis for explaining how experiencing stress can lead to exhaustion resulting from an individual assessment of available resources. These theories are consistent with the subjective definition of job insecurity and provide a framework for examining the mechanisms that can underlie the relationship between job insecurity and its consequences. Both theories complement each other. Lazarus and Folkman's transactional theory of stress focuses more on the individual experience of stress and pressure, and is important for understanding individual differences. On the other hand, Hobfoll's COR theory goes beyond this range of activities and takes into account various resources that can affect the management of stress factors. In addition, this theory puts forward a hypothesis that, under certain circumstances, in an unambiguous situation with not much room for differences in interpretation, the external environment should be treated as an additional

component in the stress-exhaustion relationship (Hobfoll, 2001). Hobfoll, in his theory, further points out that in stressful situations, such as high job insecurity, people will try to reduce the loss of professional resources, e.g. by developing a new, separate relationship with work, which in turn may lead to lower performance levels (Hobfoll, 1989).

Hellgren et al. (1999) distinguished the quantitative and qualitative dimension of job insecurity. They referred to the threat of job loss as "quantitative job insecurity", and to the threat of losing specific job features as "qualitative job insecurity". Therefore, quantitative job insecurity indicates perceived threats to the job position as a whole, whereas qualitative job insecurity implies perceived threats to job features, in particular, "threats to quality deterioration in job relations". This approach combines key elements of existing explanations, e.g. the concept of threat, the emphasis on perception that job insecurity may occur when work and its conditions are at risk. However, it does not include such elements as expectations regarding the security and the involuntary nature of threats. Job insecurity is therefore a multidimensional construct that concerns not only the sense of risk of losing employment but also the fear that even if the job is maintained, its conditions will deteriorate. Thus, these are fears related not so much to the loss of employment but to the loss of a job as employees have known them so far (Chirkowska-Smolak & Czumak, 2021). Selected definitions of job insecurity are included in Table 1.

Table 1. Selected definitions of job insecurity

Definition	Authors
"Perceived powerlessness to maintain desired continuity in a threatened job situation".	Greenhalgh & Rosenblatt (1984)
"Concern about the future permanence of the job, or sometimes a concern about a significant deterioration in conditions of employment".	Van Vuuren & Klandermans (1990)
"A discrepancy between the level of security a person experiences and the level she or he might prefer".	Jacobson & Hartley (1991)
"An employee's perception of a potential threat to continuity in his or her current job".	Heaney, Israel & House (1994)
"An overall concern about the continued existence of the job in the future".	De Witte (1999)

Table 1 continued

Definition	Authors
"Quantitative job insecurity refers to concerns about the future existence of the present job. Qualitative job insecurity pertains to perceived threats of impaired quality in the employment relationship, such as deterioration of working conditions, lack of career opportunities, and decreasing salary development".	Hellgren et al. (1999)
"Subjective probability of exogenous job destruction".	Manski & Straub (2000)
"A fundamental and involuntary change concerning the continuity and security within the employing organisation".	Sverke & Hellgren (2002)
"Job security [is] the perceived stability and continuance of one's job as one knows it".	Probst (2003)
"Employees' perceptions about potential involuntary job loss".	De Cuyper, Bernhard-Oettel, Berntson, De Witte & Alarco (2008)
"A concern about the future of one's job".	Klandermans, Hesselink & Van Vuuren (2010)
"An employee's perception of the likelihood of losing their job involuntarily in, say, the next six or twelve months".	Burchell (2011)
"A psychological state in which workers vary in their expectations of future job continuity within an organization".	Loi et al. (2011)
"Worker's perception or concern about potential involuntary job loss".	De Cuyper, Mäkikangas, Kinnunen, Mauno & De Witte (2012)
"Employees' feeling that their job is at risk or that they are likely to face job loss".	Schreurs et al. (2012)
"The overall apprehension of the continuing of one's job".	Keim, Landis, Pierce & Earnest (2014)
"The subjectively perceived and undesired possibility to lose the present job in the future, as well as the fear or worries related to this possibility of job loss".	Vander Elst, De Witte & De Cuyper (2014)
"Individual's evaluation of how likely it is that one will lose one's job in near future".	Ellonen & Nätti (2015)
"The perceived threat of losing the current job in the near future".	Vander Elst, De Cuyper, Baillien, Niesen & De Witte (2016)

Source: (Shoss, 2017, p. 1915).

3. The relationship between job insecurity and job performance

Over the last few years, there has been an increase in the number of studies on the relationship between job insecurity and job performance (Adekiya, 2023; Ma et al., 2023; Nikolova et al., 2023; Shoss & Vancouver, 2023; Qian et al., 2022; Chirumbolo et al., 2020; Debus et al., 2020; Koen et al., 2020; Sverke et al., 2010). The relationship between job insecurity and job performance is ambiguous (Muñoz Medina et al., 2023; De Cuyper et al., 2020; Mao & Hsieh, 2013; Probst et al., 2020; Selenko et al., 2013; Sverke et al., 2019; Van Vuuren et al., 2020). A meta-analysis of stress factors and performance indicated a slight negative effect of job insecurity on job performance (Cheng & Chan, 2008; Gilboa et al., 2008), while other studies did not detect such a correlation whatsoever (Sverke et al., 2002). There are also research results showing that job insecurity may have a negligible positive impact on job performance (Probst, 2002; Probst et al., 2007; Sverke et al., 2002). Yet another study showed that there is a curvilinear relation between job insecurity and increased involvement in work (Ashford et al.,1989; Loi et al., 2011; Staufenbiel & König, 2010), in the sense that the increased effort put into work is the greatest with moderate levels of job insecurity (Brockner et al., 1992). Such inconsistent conclusions are usually interpreted in two ways: (1) by seeking methodological explanations or (2) by recognising moderating variables undiscovered so far (Probst et al., 2007; Sverke et al., 2002). Researchers have also suggested that ambiguous research findings may stem from a non-linear relationship between job insecurity and job performance (Selenko et al., 2013). In particular, Selenko et al. (2013) argue that job insecurity generates stress which reduces enthusiasm and motivation to work among employees. Due to psychophysical stress, employees are not able to invest sufficient energy in their work, which negatively affects their work efficiency. Therefore, along with an increase in the level of job insecurity, a decline in job performance can be expected. On the other hand, they believe that people experiencing an extremely high level of job insecurity may be more resistant and determined in the face of such anxiety, as evidenced by the decision to remain in the organisation despite the high level of uncertainty in maintaining current employment. From this perspective, changes in job performance are perceived as a result of efforts undertaken to deal with stress related to job insecurity. In turn, people who have survived restructuring and other threats become more involved in their work compared to those who need not worry about their jobs. With that being said, empirical evidence for the relationship between job insecurity and job performance is contradictory and fails to explicitly support any of these views (Gilboa et al., 2008; Probst, 2002; Sverke et al., 2002).

Other research results also indicated that the relationship between job insecurity and job performance is more complex. Staufenbiel and König (2010) developed a model in which job insecurity has two effects. On the one hand, it has an indirect negative impact on performance through organisational attitudes (job satisfaction and organisational commitment). At the same time, it has a direct positive impact on job performance, but that impact is nonetheless smaller. In other words, the direct impact of job insecurity that improves job performance is offset by the indirect impact that reduces it, which leads to the deterioration of work efficiency. It is important to note that a significant relationship has also been observed between job insecurity and performance reported by superiors rather than respondents themselves, which helps overcome the concerns about the apparent bias resulting from the use of the same source of information (Podsakoff et al., 2003).

The results of the previous analyses have shown that high levels of insecurity are associated with an increased intent to leave the workplace (Cheng & Chan, 2008). People who decide to stay in the organisation despite high job insecurity may therefore be more adaptive and persistent in the face of this stress factor. This hypothesis is confirmed by a study involving Finnish university employees, in which Selenko et al. (2013) stated that the relationship between job insecurity and job performance (as a self-reported ability to deal with tasks) takes the shape of the letter U. This means that self-reported job performance decreased with a moderate degree of job insecurity, but it increased again with a high level of job insecurity.

It was found that the weak and negative relationship between job insecurity and job performance may be due to the fact that a rational employee who experiences job insecurity is able to cope with it by increasing the effort put into work and maintaining job performance at a level high enough so as to be perceived valuable to the organisation (Greenhalgh & Rosenblatt, 1984; Sverke et al., 2002).

In another study, Brockner et al. (1992) also noted a non-linear relationship between job security and job efficiency among those who have survived dismissals in the company. The effect they discovered, however, took a reverse U-shaped form. They showed that effort put into work was the highest for medium levels of job insecurity, and smaller with low and high levels. The authors justified the choice of such a dependent variable by pointing out that job performance depends on ability and effort, but the level of ability does not change as a consequence of reorganisation.

Despite the differences, studies conducted by Borg and Braun (after: Selenko et al., 2013) and Brockner et al. (1986) seem to indicate that there is empirical evidence to suggest that the relationship between job insecurity and job performance is curvilinear. If this relationship is indeed U-shaped, this may explain why some studies speak of negative correlations, while others cite neutral or even positive links between the two constructs. In studies that found a positive relationship be-

tween job insecurity and job performance, respondents generally indicated a moderate level of job insecurity, roughly the middle of the point-based scale (Probst et al., 2007), while in studies indicating a negative relationship (Schreurs et al., 2012), the average level of job insecurity was often below the centre of the scale.

4. Conclusions

This paper focuses on the relationship between job insecurity and job performance. Over the past decade, job insecurity has attracted increased research attention. Interestingly, less research has been reported on the relationship between job insecurity and job performance. One reason for this might be that the findings on the relationship between job insecurity and job performance have been rather inconsistent and therefore difficult to explain. Still, more studies on contextual job insecurity moderators are recommended, not only due to their crucial importance for the theoretical literature but also owing to practical implications for organisations in the context of managing a job insecurity crisis.

In empirical analysis, the impact of job insecurity on job performance is usually considered within one of two related perspectives. On the one hand, job insecurity is considered to lead to psychosomatic tensions that have a detrimental effect on the psychophysical condition of the employee as well as on work-related behaviours. Due to psychophysical stress, employees are unable to invest enough energy in their work, which negatively affects their performance. On the other hand, changes in work efficiency are perceived as a result of efforts made to deal with stress related to job insecurity. Consequently, employees at risk become more engaged in work than those who do not need to worry about their position in the organisation. Although some studies suggest a negative relationship between these two factors, others do not show any such relationship, or even indicate a positive one. Researchers have found that these contradictory conclusions are probably due to methodological artifacts, including inconsistencies in the considerations of performance. Furthermore, considering the fact that consequences of job insecurity in relation to professional attitudes and job satisfaction tend to occur relatively fast, over time they may have adverse effects on other values such as work efficiency or a sense of belonging to the organisation. Researchers also argue that inconsistent results for performance may be due to a non-linear relationship between job insecurity and job performance, in particular, that job insecurity prompts stress and reduces enthusiasm and motivation to work among employees. Thus, along with an increase in the level of job insecurity, a decline in work productivity can be expected. The same researchers, however, argue that

people subject to extremely high levels of job insecurity may be more resistant and determined in the face of such uncertainty, as evidenced by their decision to remain in the organisation despite not knowing if they will be able to keep the job. As mentioned earlier, a meta-analysis showed that high levels of insecurity are associated with an increased intent to leave the workplace. Employees who decide to stay in an organisation despite experiencing a high level of job insecurity may therefore be more adaptive and persistent in the face of this stressor. This hypothesis is supported by one study which found that the relationship between job insecurity and job performance (analysed as self-reported ability to cope with tasks) takes the form of the letter "U". Put simply, self-reported job performance decreased when accompanied by a moderate degree of job insecurity, but it increased again when accompanied by a high level of job insecurity.

In identifying the problem of insecurity and referring it to the subject of this study, it should be noted that significant quality-related changes have taken place in terms of work. Global trends in this respect are similar, although their scale and pace differ for different societies. However, what they seem to share is the loss of social security and the increased sense of insecurity in individuals on all continents.

Finally, it must be noted that this study has some limitations, which suggests avenues for further research. In reviewing the articles, the study used only two databases (Web of Science and Scopus) and only considered papers published before June 2023. Thus, the scope of the work is restricted to evidence from publications indexed by these platforms. Other studies may include more databases and a longer timeframe. Furthermore, only publications written in English were examined; thus, results of papers written in other languages are beyond the scope of this work. Finally, the systematic literature review carried out in this work was directed to papers published in scientific journals and, due to this, the results obtained do not reflect the state of the field from the perspective of conference publications. The authors intend to address the above-mentioned limitations in future research.

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