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RESILIENCE AND SUSTAINABILITY IN MANAGEMENT: A MULTIDISCIPLINARY OUTLOOK ON GLOBAL TRENDS



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A Sustainable Energy Future For All Sustainable Energy for all is an idea whose time has come

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Abstract: Today's, the use of renewable energy has become one of the main pillars of the transition to a sustainable energy system. Interest in the world's renewable sources of energy has increased as a component of the national energy mix in most countries, particularly as one of three goals for Goal 7 of the 2030 Agenda for Sustainable Development adopted by the United Nations in September 2015, in addition to its prominent role in preserving the environment and reducing harmful emissions, taking into account the Paris Convention on Climate Change. (adopted at the meetings of the 21 session of the United Nations Conference of the Parties, held in December 2015) development ", which included making \$ 100 billion available to developing countries by 2025 to assist them in the areas of climate change mitigation and adaptation.

Energy is the backbone of the modern economy, enabling investments and launching new innovations and industries to create jobs, inclusive growth and shared prosperity on a livable planet. It is therefore necessary to increase their accessibility and achieve climate goals while increasing their efficiency and increasing investments in renewable energy projects that allow for the gradual reduction of fossil fuel use.

Renewable sources of energy, including solar, wind, hydropower, biofuels and others, are at the centre of the transition to less carbon-intensive and more sustainable energy systems.

Therefore, generation capacity has grown rapidly in recent years, driven by the support of policies and sharp reductions in solar, photovoltaic and wind costs in particular.

The deployment of renewable energy sources in the energy, heat and transport sectors is one of the key possible factors for maintaining average global temperatures below 1.5 ° C. In a net zero emissions scenario by 2050, renewables allow almost complete decarbonization.

Keys words: *Sustainable Development - Renewable Energy - Conventions - National Experiences of successful countries*

Introduction

The United Nations adopted the Sustainable Development Goals (SDGs) in 2015, also formally known as Transforming Our World "Agenda 2030 for Sustainable Development", as a global call to work to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. It is a set of 17 goals set by the United Nations, in a United Nations General Assembly resolution in September 2015, and the sustainable development agenda was incorporated in January 2016 through 17 goals in the 2030 Agenda for Sustainable Development. (Kjaerheim, 2005).

These broad objectives are interrelated, although each has its own specific small targets, which represent a total of 169 targets. Sustainable development goals cover a wide range of social, economic and environmental development issues (poverty, hunger, health, education, climate change, gender equality, water and sanitation, energy, environment and social justice).

Although the sustainable development goals are not legally binding, until States have the primary responsibility to follow up and review progress, timely collection of qualitative data -- accessible -- and regional follow-up and review based on national analysis and contribution to global follow-up and review is required.

The plan aims to determine the direction of global and national development policies and to provide new options and opportunities to bridge the gap between human rights and development. It also constitutes an overarching framework that guides global and national development action.

The 2030 Plan is the natural and acceptable development of norms that better regulate human life on the planet and are the outcome of human rights treaties, affirming and promoting them, as well as clearly enshrined in the Universal Declaration of Human Rights, international human rights treaties and other relevant instruments such as the Declaration on the Right to Development (para. 10). The sustainable development goals seek to "realize human rights for all" and are universally applicable to all people in all countries, including developed and developing countries alike. More importantly, the 2030 Agenda must be implemented in a manner consistent with international law.

Sustainable development goals 17 have been integrated. They recognize that action in one area will affect results in others, and that development must balance social, economic and environmental sustainability.

Countries have therefore committed themselves to prioritizing progress for those far from behind. One of the goals of sustainable

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development is access to sustainable energy. which translated into the seventh goal and its five goal.

-Sustainable development: a comprehensive approach

Sustainable development and renewable sources of energy are interrelated. Sustainable development is a comprehensive approach to societal progress that prioritizes the prosperity of present and future generations. It emphasizes responsible resource management, equitable access to resources and the protection of ecosystems. "It is essential for sustainable development, taking into account economic, social and environmental factors:

– Economic progress

Sustainable development recognizes that economic growth is necessary to improve living standards, reduce poverty and drive sustainable development. However, it goes beyond mere GDP growth by emphasizing the quality and distribution of growth. Within the framework of sustainable development, economic prosperity should be inclusive and benefit all members of society

– Social Justice

Social equality is another vital pillar of sustainable development. It calls for an equitable distribution of benefits and opportunities among different segments of the population. Access to education, health care, clean energy and basic services are essential elements of social justice. Sustainable development aims to close the gap between rich and poor and to ensure that no one is left behind.

– Environmental liability

The most important aspect of sustainable development, environmental responsibility, requires the prudent use of natural resources, the reduction of waste and pollution, and the protection of ecosystems. This aspect is where renewables play.

Energy for Sustainable Development: Catalysing Change

In 2002, energy was linked, for the first time, to energy security, climate change and sustainable development by intergovernmental policy,⁸⁹ driving international action on renewable energy. Spurred by an express renewable energy political agenda,⁹⁰ over 118 countries went on to implement domestic renewable energy laws and policies to varying degrees.⁹¹ Of lasting impact to international renewable energy law and policy is the first major non-binding international instrument to emerge from this movement, the Johannesburg Plan of Implementation ('Johannesburg Plan').⁹² While arguably lacking specificity, it provides clear goals for states to Develop and disseminate alternative energy

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technologies with the aim of giving a greater share of the energy mix to renewable energies.(UN, Doc A/RES/S-19/2 ,1997).

Previous Studies and literature review

Previous studies, including the International Energy Agency's Global Energy Outlook, the IPCC assessment reports and the Global Energy Assessment by the International Institute for Applied Systems Analysis, show that the current development of global energy systems may not achieve the goals adopted to achieve Goal 7 of the Sustainable Development Goals unless transformative initiatives are taken.

A large part of greenhouse gas emissions can be attributed to the energy sector. Renewable energy seems to be a way to decarbonize economies. To combat global warming, which may have significant impacts on ecosystems and economies, it is necessary to understand the empirical determinants of renewable energy deployment in order to guide public policies and promote future research. This paper aims to review the growing but limited collection of literature that emerged in the late 2000s to examine the quantitative determinants of the development of renewable technologies at the country level. Results show that there is little consensus on the impact of the economic, environmental and energy determinants that have been mostly studied. Other key determinants considered are organizational, political and demographic. Results are often mitigated by the fact that authors use varied metrics to deploy RE and have a variety of frameworks.)Bourcet2020(First, a bibliometric tool is used and then a more in-depth analysis of selected literature is performed, focusing on the type of renewable energy analyzed and the level of development of countries, the dimension of sustainability focused on and the country's development level, and the type of renewable energies focused on and the dimension of sustainability analyzed. It represents a milestone in the topic giving insights on the state of the art of the research on this research area, enhancing empirical evidence on the kind of relationships and developing a discussion on how closely aligned the political and institutional discourses are with the research concerns. We conclude that, while studies on lower-income countries focus on lower-rung energies, studies on higher-income countries focus on the study of more diversified sources. Moreover, wind-solar energy is the most reported in the articles concerned with environmental sustainability. Our main recommendation is to further investigate the implementation of modern renewable energies in developing countries, to help those countries to climb the energy ladder toward cleaner energy supply.(Garrido, Sequeira, and Santos,2020).

The new direction of research depends on the main thread in the literature, and remains interested in mapping the global energy

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architecture. energy, the engine of development and economic growth, is a blatant exception ". From this observation, a large number of scientists have addressed the question: "Who governs energy?" (Florini and Sofakul, 2009). This question is not easy to answer. This was followed by various mapping exercises, all of which reached a different set of institutional arrangements.

Some focus exclusively on intergovernmental organizations and summit processes, others also include international non-governmental organizations, multilateral financial institutions and hybrid entities, and include everything from transnational advocacy networks to parastatal bodies, global policy networks and public-private partnerships (Sofakul and Florini, 2012).

A group of scientists began to conceive of this mixture of institutions as a single organism, the "system complex," assessing how it behaved over time, thus moving from still shots to dynamic shots of the global energy architecture. The concept of "system pool" to refer to "a group of partially overlapping and non-sequenced institutions governing a particular case area". This term is similar to the Berman et al. (2009) concept of "global governance architecture", which they define as "the overarching system of viable or active public and private institutions in a particular area of global policy."

Ness (Ness, D, 2008) introduced the model of economic development described as "take, make and dispose", whereby the exploitation of raw materials and non-renewable energy provided the basis of development of world economies, which in turn led to unprecedented growth. Unfortunately, this linear economic model highlights the economic goals at the expense of environmental and social dimensions, pushing the world to its physical limit. In fact, this linear model threatens the very stability of economies and the integrity of ecosystems that are vital for human survival. In this line, Yuan et al. (Yuan, Z.; Bi, J.; Moriguichi, 2008) focused on the Chinese case and argued that the rapid economic growth of this country supported in the linear economic model has made the country a leading world economic power, increased the wealth of the population, and brought unprecedented business and employment opportunities. The downside is that all of this has provoked serious natural resource depletion and environmental pollution. In addition, recognizing the importance of China adopting a circular economy model, (Feng and Yan, 2007) suggested implementing a framework to change the economic paradigm. (Su, Heshmati, Geng, 2017) pointed to environmental deterioration and scarcity of resources as two of the most urgent problems that must be tackled. They emphasized the importance of greater efficiency in the use of materials and energy to

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achieve a circular economy. Organizations find themselves compelled to implement strategies concerned simultaneously with the economic growth and sustainability as a way of addressing the challenges associated to the climate change, resource scarcity, dependence on fossil fuels, uncertainty in government regulations, high competitiveness, and globalization (Yuan, Z.; Bi, J.; Moriguchi, 2008). In this context, the pure economic business perspective of companies is evolving to one that includes more regard for sustainability, adding social and environmental concerns to their operations as a result. (Cole, Rayner, Bates, 1997).

Methodology

The research focuses on the concepts of sustainable development and renewable energy and their relationship to the achievement of sustainable development goals through their tripartite dimensions "economic, social and environmental. International conventions urging the use of renewable energy were reviewed in accordance with the descriptive analytical method and clarified successful and leading countries in this area, clarified the role of successful States in developing strategies and plans to develop the role of energy, and identified each State that regulates energy investments taking into account the environmental, economic and social dimensions of these bodies' regulations and decisions. Accordingly, research provides a comparative aspect for identifying, adapting and using appropriate strategies to regulate each country's energy use according to renewable energy sources in its energy investments and reducing emissions to achieve Goal 7 of the Sustainable Development Goals.

Definition and promotion of sustainable development goals

Development meets today's needs without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987). It assumes the conservation of natural assets for future growth and development. (United Nations, 1993.; Drexhage, and Murphy, 2010)

Sustainable development calls for concerted efforts to build an inclusive and sustainable future for people and the planet. Through economic growth, social inclusion and environmental protection.

Sustainable development goals can be promoted through current development plans and strategies without compromising future generations' ability to meet their own needs. (United Nations, 2003).

All of these elements are interrelated and critical to individuals' and communities' well-being. The mechanism that can bring about a better life for the planet's population by placing these elements in seventeen goals for the eradication of poverty in all its forms and dimensions is an indispensable

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prerequisite for sustainable development. To this end, Sustained, equitable and inclusive economic growth, increasing opportunities for all, reducing inequalities, raising basic living standards, promoting equitable social development and inclusion and promoting integrated and sustainable management of natural resources and ecosystems must be promoted. (Walker, 1996)

The adoption of the 2030 sustainable development plans and their approval by States represent an unparalleled achievement in defining the international community's goals. It represents a stereotypical shift towards a comprehensive and integrated vision of inclusive sustainable development that applies to all people in all countries and is based on the international community's call for human rights. To ensure that this vision follows practical actions, further efforts are needed to integrate sustainable development goals into effective national plans, strategies and laws that must be in line with international conventions and strategies (United Nations,A/RES/70/1, 2015).

Renewable energy (definitions and types)

Interest in non-renewable and renewable alternative energies has increased owing to the depletion of oil resources, the sharp rise in oil prices during the twentieth century, the emergence of poor environmental phenomena and climate changes. Renewable energy is therefore increasingly important and the concept, types and use of energy and its role in promoting sustainable development must be defined through its economic, social and environmental role. (Brown, 2006).

Renewable energy concept:

Renewable energy is energy obtained through energy currents that are replicated in nature in an automatic and periodic manner. It is often the opposite of non-renewable energy found in the Earth's solid stock, and can only be used after human intervention to extract it.

Various international and governmental entities involved in environmental conservation and renewable energy are known as:

The State Energy Agency (IEA) specifies: "Renewable energy consists of energy sources from nature's automatic pathways such as sunlight and rehydration, which are renewed in nature at a higher frequency than consumption" ([http: www.iea.org](http://www.iea.org)) Intergovernmental Panel on Climate Change: "Energy"

Renewable energy is any energy sourced from the Sun, geophysical or biological and refurbished in the nature of a butterfly equivalent or greater than its utilization ratios, or generated from successive and continuous currents in nature such as biomass, wind, solar and hydropower. There are many mechanisms that allow these sources to be converted into primary energies such as heat, electricity and kinetic

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energy, using multiple techniques that allow the provision of energy services from fuel and electricity.(The World Bank, 2021).

UNEP definition: "Renewable energy is energy that is not obtained from a fixed and limited stock of its nature. It is periodically renewed faster than the frequency of its consumption. It appears in the following five forms: biomass, sunlight, wind, hydrogen.

The international recognition of the impact of human activity on climate change (IPCC, 2014) has led to calls for concrete political actions, as highlighted by the recent “Global Warming of 1.5 °C” report of the Intergovernmental Panel on Climate Change (IPCC, 2018). As more than two-thirds of anthropogenic greenhouse gases (GHG) emissions are related to the energy sector (IEA, 2018, p. 3), low-carbon renewable energy (RE) sources (IPCC, 2012) are likely to help curb emissions. However, as shown by Fig. fossil fuel sources have continued to dominate total energy consumption over the past few decades, while RE consumption increases slowly. Indeed, even though RE technologies, in particular wind and solar, have been known for decades, their large scale deployment takes time (Fouquet, 2016). This reveals the existence of barriers to, and factors facilitating, RE technologies’ deployment (see for instance Painuly, 2001). Furthermore, significant differences exist between countries regarding RE development levels (Reboredo, 2015).

Sustainable development and renewable sources of energy: a symbiotic relationship

Relationship between Renewable Energies and Sustainability

Much of society acknowledges the key role of energy in supporting sustainability goals. This is especially recognized in the case of RE, along with growing attention to the benefits that it can offer to achieve the “Sustainable Energy for All” goals, to reduce poverty, boost economic growth, and in general promote sustainable development (Akadiri, Alkawfi, Ugural, Akadiri,2019) This justifies the importance of examining published papers to see the extent to which the relationship between renewable energies and sustainability has been addressed. The influence of renewable energies on sustainability has been the focus of some works, but mostly separately. Some literature reviews on RE(s) can be found with a special focus on methods of assessing regional economic impacts of a transition to RE generation, with the main objective of characterizing local energy planning and implementation processes in the post-liberalization era], or to determine the social and political impact of RE(s) (Sheikh, N.J.; Kocaoglu, D.F.; Lutzenhiser, 2016).

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In addition, the research developments with renewable energy source water pumping systems are reviewed in (Mohanraj, Chandramohan, Chandrasekar, 2013)

Renewable energy in the service sector in general and in the tourism industry specifically is explored

Sustainable development and renewable sources of energy work together in harmony. While sustainable development provides a broader framework for societal progress, renewable energy sources offer practical solutions to pressing environmental challenges that impede progress. Together, they form a formidable alliance for a greener future.

The United Nations sustainable development goals provide a road map for global development efforts. Many of these goals are closely linked to renewable energy sources and their role in achieving sustainability:

Goal 7: Clean and affordable energy

Goal 7 clearly targets access to modern, reliable, sustainable and affordable energy. Renewable sources of energy are essential to this goal by providing clean and affordable energy options.

Goal 9: Industry, innovation and infrastructure

Goal 9: highlights the importance of innovation and infrastructure development. Renewable energy technologies stimulate innovation and create sustainable infrastructure that supports economic growth and development.

Goal 10: Reduce inequality

Goal 10 aims to reduce inequality within and among States. Access to renewable energy can help close the energy access gap and promote social justice by ensuring marginalized communities' access to modern energy services.

Goal 13: Climate action

Goal 13 calls for immediate action to combat climate change and its impacts. Renewables must gradually replace fossil fuels to reduce greenhouse gas emissions and combat climate change.

Clean and reasonable energy: "Call for change of course and reform":

The publication of the 1972 (Growth Limits) Meadows, Randa Behrens, 1972(stimulated the international community to think about an alternative development model more concerned with sustainable global economic development, social progress, and environmental protection. Sustainable development demands a collective effort to construct a future for society and the Earth that is both inclusive and sustainable. Together with businesses and social participants, governments are taking proactive measures to fulfill the UN's global sustainable development agenda by

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2030]. These ambitions are linked with many challenges, including the creation of new jobs, sustainable cities and industries, sustaining biodiversity, sustainable consumption and production, and addressing the challenge of climate change. (Jiahua, 2015).

Energy is related and supports many sustainable development goals which are central to many of the challenges and opportunities facing the world and that are associated with income, pollution, and ecosystems.) United Nations, (17 Goals to Transform Our World, 2018) Concerning energy demand and from the point of view in developing nations differ from industrialized nations in both quantity and quality. As the standard of living increases, for example, there is greater demand for electricity in countries and in small, decentralized villages. Therefore, it would be greatly beneficial to electrify small communities of developing countries with alternative sources of energy from the outset in parallel with the rising standard of living in those communities. Gradually disseminating RE(s) to rural communities in a way that keeps pace with their development would bring considerable long-run benefits to their economies and environments. (Sorrell, S. Reducing, 2015)

As an illustrative tool, the authors of described an energy ladder, which relates the energy mix with the level of a country's development. According to this energy ladder, richer countries tend to diversify the energy sources and abandon fossil fuel and hydroelectric sources to a greater extent, making them more dependent on sophisticated sources of RE (wind, solar, and manufactured biomass). This calls attention to the question of whether the relationship between RE and sustainability mirrors the energy ladder or some other relationship between the energy mix and the level of countries' development. (Burke, P.J. Income, 2010) Reliance on fossil fuels to drive economic growth is no longer appropriate after the launch of the Sustainable Development Goals.

The provision of energy services -- such as lighting, heat, cooking, communications and mobility -- is critical to the social, economic and environmental interest. But the use of fossil fuels to meet these needs can also lead to high greenhouse gas emissions, which can become a threat to our planet. Ironically, the greatest threat to developing countries. They are either constrained by extreme poverty or by the high cost of access to energy. 2015 was a milestone in the global energy debate with the adoption by the United Nations of the Sustainable Development Goals, including the Renewable Energy Goal (Goal 7), which aims to "ensure access to an affordable, reliable and sustainable method

Everyone must therefore have access to clean, modern, reliable and affordable energy sources. The objectives include a significant increase in the share of renewable energy in the global mix.

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If we do not achieve the energy goal, it will be extremely difficult to provide access to quality health care or education, achieve gender equality, create jobs and growth, ensure sustainable consumption or effectively combat climate change that threatens to undermine the achievement of all the goals. Sustainable development goal 7 is essential for every aspect of development. For this reason, we need to achieve it before 2030 in order to create conditions for progress on other goals.

The role of renewable energy in achieving the economic, social and environmental dimension of development

The role of renewable energy in achieving the economic dimension

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Economic implications and advantages of the energy shift, The economic repercussions of migrating towards a low-carbon energy sector are both significant and multifaceted, especially when analyzed through a global lens. The expenditure directed towards a low-carbon energy sector represents about 0.5% of the worldwide GDP by the anticipated year of 2050 (Fragkos, Tasios, Paroussos, Capros, Tsani, 2017). Dissecting these investments further, the period from 2015 to 2050 would demand an infusion of around 28 trillion USD. This translates to a consistent outlay of approximately 0.81 trillion USD annually over this 35-year span (World Energy Investment 2022). It is crucial to note that this financial commitment is supplementary to the baseline investments outlined in the reference scenario, which stands at a whopping 92 trillion USD. In terms of annual spending, this culminates to an average of 2.78 trillion USD, marking a rise by 28% (Renewable Energy Market, 2023).

However, it is pivotal to understand that this expenditure is not an economic drain but rather a catalyst for growth. The REM posits an intriguing prospect: this transition can potentially amplify global GDP by a substantial 2% by 2050 when juxtaposed against the reference scenario. This statistic fundamentally alters the perception of the transition from a cost-centric viewpoint to one of long-term economic prosperity. However, this trajectory isn't devoid of challenges. A significant concern surfaces in the realm of employment. The fossil fuel sector, which has traditionally been a cornerstone. (Global Fossil Fuel Employment, 2023).

Economic development depends on the availability of energy services to raise and improve production and help increase domestic income through improved agricultural and industrial development and job creation. It is understood that without access to modern energy services and fuel sources, increased productivity and therefore employment opportunities cannot be obtained.

Unsustainable production and consumption patterns are changing, as the energy sector is one of the sectors with varying production and consumption patterns, mostly with high wastage rates, and the steady increase in consumption is due to population growth. There is a need to promote the efficient use and sustainability of energy resources. Assist in the implementation of legal and regulatory reforms that emphasize the need for sustainable exploitation of natural resources and development of renewable energy resources, in addition to facilitating access to energy-efficient equipment and in developing financing mechanisms.

Increasing energy demand, which is inevitable for industrialization and urbanization, may lead to significant variations in the distribution of the world's primary energy consumption. Per capita energy

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consumption in industrial market economies is equivalent to three quarters of the world's primary energy as a whole.

-Diversification of energy sources, available in the world from renewable energy sources,

Through it, the use of progressive contribution can be developed in increasing proportions in the availability of energy needs for the various sectors. and diversifying their sources, leading to an abundance of energy consumption to allow excess exports, and to contribute to extending inventory life in oil and gas producing countries. And the abundance of consumption can also represent a reduction in the cost of importing sources of risk for non-oil and gas producing countries. In addition, the potential of large centralized systems generating electricity represents an opportunity to move towards energy import Electricity produced from renewable energy sources

The role of renewable energy in achieving the social dimension of sustainable development

The role of renewable energy in achieving the social dimension of sustainable development:

Access to sustainable energy services contributes to poverty eradication, life-saving, improving health and helping to meet basic human needs. Countries must adhere to energy supply priorities and eradicate poverty in this area. More than 29% of the world's population cannot access energy. This is noted in the document of the United Nations Conference on Sustainable Development, held in Rio de Janeiro in 2012, "The future we want". The Conference also referred to the United Nations Secretary- General's initiative, "Sustainable energy for all", focusing on access to energy, energy efficiency and renewable sources of energy, working to make sustainable energy for all a reality and helping to eradicate poverty.

Renewable energy contributes to social dimensions by:

- Individual consumption of renewable energy sources plays an important role in improving human development indicators, by affecting the improvement of education and health services, thereby improving the standard of living, and giving a picture of electricity, because it is an irreplaceable source of energy in many uses such as lighting.
- The source of renewable energy locally and adapted to the realities of development in the areas of deputies and rehabilitation, as well as contributing to meeting needs, thus providing local development conditions for different regions in developing countries.
- Renewable energy is not harmful to health, nor is the waste from exploiting this low- risk energy compared to fossil energy.

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Renewable energy is at the core of sustainable development, as it is a key resource whose numerical heights depend on aspects of human life, so it is essential to ensure the sustainability and sustainability of the quantity needed and sufficient to meet their needs. as well as needs that are equally received and remain clean.

- Infrastructure projects such as health facilities, hospitals and schools, especially in isolated desert areas, need huge sources of funding, but if they are designed with green building technologies, their energy is derived from renewable energies (sun, wind, water, etc.), they will reduce the cost of investing and work on this opportunity.

The role of renewable energy in achieving the environmental dimension of sustainable development

In the light of the world's obvious climate changes, it was necessary to think about how to reduce Emission of greenhouse gases from the use of fossil energy sources, which are closely related to these climate changes. Because of the potential for petroleum and gas depletion after years not exceeding the century, it has become necessary to move towards clean alternative energy that is not exhausted in its multiple forms. Because renewable energy systems depend on local energy sources available in all countries, they are a safe source of supply, they cannot be implemented and do not harm the environment.

Opportunities and challenges

When we talk about renewable energy and sustainable development, there are a range of opportunities and challenges that affect the achievement of the goals set out in this area. Here are the highlights of these opportunities and challenges:

Challenges

Predicting the exact timing and extent of energy transitions is inherently difficult due to the complex interplay of numerous factors. Historically, shifts in dominant energy sources, such as the transition from biomass to coal or from coal to oil, have not occurred solely due to technological advancements. These transitions have been deeply influenced by a combination of evolving economic landscapes, such as changes in market structures and resource availability; sociopolitical dynamics, including policy decisions and public opinion; global events, such as wars or environmental crises, which can drastically alter priorities and resources; and fluctuating consumer demands, driven by changes in lifestyle, awareness, and economic capabilities(Griffiths, Sovacool, Kim, Bazilian,. Uratani, 2022(This multifaceted nature of energy transitions means that they are not linear or predictable, but rather dynamic processes influenced by a tapestry of global and local factors, making accurate forecasting a challenging endeavor. For instance, the technological potential of renewables

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has been evident for decades, but their large-scale adoption has been influenced by factors ranging from the plummeting costs of solar photovoltaics (PV) and wind turbines, driven by manufacturing innovations and economies of scale, to heightened global awareness about climate change and its catastrophic repercussions (Azarpour, Mohammadzadeh, Rezaei, Zendejboudi, (2022) Adding to the complexity is the inherent inertia of established energy systems; existing infrastructure, designed for particular energy sources, has lifespans extending over decades, making swift transitions costly and logistically challenging Irmak, Kabalci, Kabalci, (2023) Furthermore, powerful fossil fuel lobbies, with vested economic and political interests, can create barriers for emerging energy technologies through regulatory and policy pushbacks (Hoicka, Lowitzsch, Brisbois, Kumar, Camargo, (2021) The global interconnectedness of energy markets also introduces unpredictability; events or policy.

Shifts in one part of the world can reverberate across global energy landscapes, affecting supply chains, prices, and adoption rates (Meddeb, Goetz-Köhler, Neugebohrn, Banik, Osterthun, Sergeev, Vehse, 2022) The response to the pandemic, as well as the food and energy crises, have increased debt levels in most developing countries, Most developing countries, in particular the least developed countries, face barriers in accessing international markets for exports. Trade restrictions, tariffs and non-tariff barriers set by developed countries can hinder the exports of countries with small domestic markets that have led to the adoption of an export-led strategy in order to develop. Removing such barriers and refraining from imposing new ones is essential in order to facilitate the transition.

Financing the green transition is another significant challenge, particularly among developing countries. The initial costs of implementing sustainable practices and technologies can be high, and many countries face limited domestic financial resources. Access to affordable capital, investment opportunities and financing mechanisms are crucial in supporting the transition.

Given this intricate web of influencing factors, with many of them being inherently unpredictable or susceptible to rapid change, accurately forecasting the precise timing and full scope of energy transitions becomes a formidable task, requiring multifaceted analysis and continuous adaptation to a dynamically evolving global energy paradigm.

Initial costs:

Starting renewable energy projects requires significant investments in infrastructure and technology. Adequate funding may be difficult to secure, especially in countries with developing economies.

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Technologies and Innovation:

Some renewable energy technologies need technological improvements to become more cost-effective. Despite progress, energy storage remains a challenge in terms of cost and efficiency.

Fluctuations in production:

Dependent on weather conditions, including solar energy and wind, which can lead to production fluctuations that are detrimental to electrical stability. Effective storage solutions must be developed to reduce the impact of fluctuations in energy production.

Infrastructure:

Electrical grids need to be updated to adapt to renewables and effectively distribute them.

Some renewable energy projects may require additional infrastructure to transport energy from remote locations to the areas they need.

Policies and legislation

Policy changes:

Changes in policies and legislation can affect renewable energy investments and projects.

Compliance and application: Ensuring effective implementation of environmental legislation and policies can be a challenge in some countries.

Social and political resistance

Social pressure:

The shift to renewable energy may face resistance from traditional industries and individuals with interests in fossil fuels.

The shift to renewable energy may require cultural changes in lifestyles and consumer patterns that may face resistance.

By addressing these opportunities and challenges, significant progress in renewable energy and sustainable development can be achieved through international cooperation, innovation and effective government support.

Opportunities

Innovation and technological innovation: Developing new technologies can improve renewable energy efficiency and reduce costs.

Several solutions for battery technology and energy storage are provided significantly, enhancing renewable energy's ability to cope with changing demand. Investment and economic growth: Renewable energy projects create new jobs in R&D, manufacturing, and maintenance.

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Renewable energy projects can open new markets for investment and expand the local economy. Emission reduction: Reducing dependence on fossil fuels contributes to improving air and water quality and protecting biodiversity. (United Nations, TD/B/C.I/MEM.8/17 ,2023) The use of renewable energy can help adapt to climate changes and mitigate their impacts.

Sustainability and sustainable energy: Renewable energy can also help reduce dependence on unsustainable fossil energy sources.

Countries contribute to the achievement of sustainable development goals and global climate goals.

Government support and legislation: There must be government support through fiscal incentives, tax breaks, financial support, and investment incentives to promote renewable energy projects.

Environmental legislation: promotes laws and legislation that support the transition to renewable energy and promotes environmental policies.)

<https://www.un.org/en/climatechange/raising-ambition/renewable-energy>)

International conventions and rules

There are several international conventions dealing with renewable energy and sustainable development, which aim at strengthening global cooperation and coordinating efforts to meet challenges and achieve sustainable development goals. Here are the highlights of these agreements:

In 1988, the UNGA acknowledged that climate change is a ‘common concern of mankind’(UN Doc A/RES/43/53 (6 December 1988).precipitating the 1992 *United Nations Framework Convention on Climate Change* (‘UNFCCC’). (United Nations Framework Convention on Climate Change, opened for signature 9 May 1992, 1771) This moment marked an international acknowledgement that fossil fuel-based energy production and consumption, among other things, is both a source of climate change and part of its ‘solution[s] for adaptation and mitigation’. Yet the *UNFCCC*’s direct regulatory role in minimising damage to the atmosphere and natural processes is limited. To date there is no overarching legal framework on the ‘law of the atmosphere’ akin to the law of the sea, despite the International Court of Justice holding that the atmosphere is not an ‘abstraction’ and the UN Security Council considering the link between climate change and international peace and security.

As a framework convention, the UNFCCC mandates few detailed obligations for states parties, and even fewer specifically related to energy. The primary obligation under the UNFCCC is to establish an inventory of GHG emissions and to develop national or regional measures to mitigate climate change. In doing so, states parties are ‘guided’ by principles of international environmental law including intergenerational equity,

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precaution and sustainable development, according to their common but differentiated responsibilities. While such principles may encourage domestic renewable energy uptake, they are not legally binding per se. Rather, such principles are relevant to the interpretation and good faith implementation of the UNFCCC treaty

Sustainable Development Goals (SDGs) (2015)

Goal 7: Clean and affordable energy: aims to ensure access to reliable and sustainable energy at affordable prices for all.

Goal 13: Climate action: Promote urgent measures to combat climate change and its impacts, including by improving energy efficiency and increasing the share of renewable energy.

Convention on Biological Diversity (CBD) 1992:

Objective: This consensus seeks to protect biodiversity and promote the sustainable use of environmental resources, including improving the sustainability of energy production and the use of renewable energy.

Rio Convention on Sustainable Development (1992):

Also known as the "Earth Summit", held in Rio de Janeiro.

Key findings: The adoption of the Environment and Development Charter, which promotes the importance of environmental sustainability, including the use of renewable sources of energy.

The United Nations Framework Convention on Climate Change, known as (UNFCCC 1992)

This Convention has been ratified by 197 countries, including the United States. This historic Convention was the first global treaty to deal explicitly with climate change. The Convention established an annual forum, known as the Conference of the Parties or COP, to stimulate discussions on ways to reduce greenhouse gas concentration in the atmosphere, which subsequently resulted in the "Kyoto" Protocol and the "Paris Agreement".

Objective To consolidate global efforts to combat and mitigate climate change by reducing emissions and promoting sustainability.

Kyoto Protocol (1997)

The Protocol was adopted in 1997, and entered into force in 2005, until it became the first legally binding international climate agreement; He called on developed countries to reduce gas emissions that cause the Earth's temperature to rise by 5% compared with 1990 levels.

The Protocol aims to oblige developed countries to reduce greenhouse gas emissions based on specific targets, which has led many countries to increase their investments in renewable energy.

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While the UNFCCC provides structure and guidance for domestic action, the Kyoto Protocol to the United Nations Framework Convention on Climate Change ('Kyoto Protocol') prescribes legally binding quantified emission limitation or reduction commitments for states parties listed in annex B.¹²⁵ States parties were required to individually or jointly reduce GHG emissions by at least five per cent below 1990 levels during the first commitment period of 2008–12.¹²⁶ To achieve this target, annex B states parties are legally obliged ('shall') to implement domestic policies, but have discretion ('such as') over policy choice. For example, the *Kyoto Protocol's* sole reference to renewable energy is in art 2(1)(a) — a non-exhaustive list of eight non-binding policy options — which suggests that states parties research, develop, promote and increase the use of new and renewable forms of energy. Despite the lack of binding obligations to use renewable energy (and energy efficiency), in practice, 45 million tonnes of carbon dioxide ('CO₂') equivalent have been abated using these clean technologies, by projects established through the Kyoto Protocol's flexibility mechanisms, in particular the clean development mechanism.¹²⁸ In addition, funds have been established to increase the number and value of public-private partnerships on renewable energy. The global climate change regime has evolved considerably since the UNFCCC and Kyoto Protocol were established. It has spawned, among other things, the Copenhagen Accord, which pledged to keep global temperature increases below 2°C and established tracks to negotiate long-term cooperative action for 'deep cuts' in GHG emissions.¹³⁰ Regrettably, despite creating nationally appropriate mitigation actions and pledged targets,¹³¹ binding renewable energy obligations in more recent formal documents are sparse. This position persists notwithstanding the 'emission gap', or more accurately the chasm, of 9–12 gigatonnes of CO₂ between the GHG emission reduction pledges made since Copenhagen and Cancun and those scientifically required to stay below 2°C.¹³² This gap was noted with 'grave concern' in 2011, when states parties agreed to establish a new global platform with 'legal force' to enhance ambition and action on GHG emissions reductions: the Ad Hoc Working Group on the Durban Platform for Enhanced Action ('ADP'). (Camhis, 2006 p. 74).

Paris Convention on Climate Change (2015)

The Convention is the most important international convention to address global climate change to date, requiring all countries to make voluntary and explicit commitments to reduce emissions from warming Earth, in what are known as nationally determined contributions (NDCs). The Convention states that global average temperatures must be "well below" 2C above pre-industrial levels, with all countries of the world

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obliged to "pursue efforts" to limit temperature rises to 1.5 ° C. It also aims to reach what is known as "carbon neutrality" or "net zero emissions" in the second half of the present century, which means that the amount of greenhouse gases emitted is equal to the amount removed from the atmosphere. The objective of this Convention is to limit global temperature rises to less than 2 ° C above pre-industrial levels, and to seek to limit the increase to 1.5 ° C. Focus on renewable energy by encouraging States to promote the use of renewable energy and reduce greenhouse gas emissions.

Successful and leading renewable energy pilot countries

Advanced economies are generally the best performers in the Energy Transition Index (ETI), with leading countries including Sweden, Denmark, Finland and Switzerland rankings. Meanwhile, France entered the top performers due to effective energy efficiency policies, resulting in a 12% reduction in energy density.

Combined, the first 10 countries account for only 2% of the world's population and contribute only 1% of energy-related CO₂ emissions, but major emerging economies such as China and Brazil have also made significant progress, according to international reports. It highlights that China commissioned some solar photovoltaic power (PV) in 2023, as did the entire world in 2022. At the same time, Brazil's long-term hydropower and biofuels plan was central to attracting investment.

Common characteristics of the best performers include: enhancing energy security through a diverse mix of sources, improving energy intensity, an increasing share of clean energy, a carbon pricing mechanism, and a supportive regulatory environment.

There are many countries that are considered leaders in renewable energy thanks to their significant investments in this sector and the innovations they have provided. The most prominent of these States are: aimed at the transition from conventional to renewable energy. Key targets include reducing carbon emissions by 80-95% by 2050, and increasing the share of renewable energy to 65% of total electricity consumption by 2030. (IEA, 2020, Germany, Energy Policy Review) Solar and wind development: Solar and wind projects are supported by financial incentives such as fixed tariffs and safeguards to encourage investment in these technologies. Improving energy efficiency: Strategies include improving energy efficiency in buildings, transport and industry through strict standards and encouraging innovations. Germany is one of the most prominent countries in the field of renewable energy, especially in solar and wind energy. It has made significant efforts under Energiewende, which aims to increase the use of renewable energy and reduce dependence on fossil fuels. (Federal

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Cabinet adopts import strategy for hydrogen and hydrogen derivatives, 2024).

Energy sources that drive forward the energy transition:

Wind and solar energy are the most important forms of renewables. Biomass and hydropower are also valuable building blocks in our energy system.

German:

The German Energiewende: A long-term strategy to reach climate neutrality by 2045

The commitment to Germany's Energiewende (to reach net greenhouse gas emissions by 2045) is set out in the Climate Change Act, which also sets targets for reducing intermediate emissions for 2030 (a reduction of 65% versus 1990 levels) and 2040 (a reduction of at least 88%). From 2050 onwards, Germany aims to have a negative emissions balance, meaning it will use natural basins, such as trees or soil, to remove more greenhouse gases than it emits. In the first Climate Change Act (from 2019), a net zero commitment was originally set for 2050. However, in 2021, it was amended and lifted 5 years after the German Constitutional Court declared Germany's climate change law unconstitutional in part because it transferred the burden of greenhouse gas emissions to future generations.

Energiewende remains the hallmark of Germany's energy policy landscape. For nearly a decade, Energiewende has been a master plan for transforming the country's energy system to make it more efficient and provide it mainly from renewable sources of energy. Energiewende is visible in electricity generation, increasing the share of renewables.

However, despite progress in reducing overall emissions, Germany is struggling to meet its near-term emission reduction targets, largely because of uneven progress across sectors. Faces significant challenges in transport and heating. Now, the government must refocus its efforts to achieve stronger emission reductions in underdeveloped sectors. The recently adopted Climate Action Plan, which includes the carbon price in the transport and heating sectors, represents an important step in the right direction.

In its energy transition so far, Germany has maintained a high degree of security of oil, natural gas and electricity supplies. Planned nuclear and coal phase-out operations are set to increase the country's dependence on natural gas, making it increasingly harmful Solar energy: in photovoltaic installations, solar panels directly transform sunlight into electricity. New solar installations are among the most affordable renewables technologies. At the end of 2018, the number of PV installations stood at 1.6 million. These produced around 45 gigawatts of electricity, making PV

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the second largest source of renewable electricity after onshore wind energy, with an installed capacity of over 52 gigawatts.

In the heating sector, solar collectors use energy from the sun to generate heat for domestic hot water or industrial processes.

At present, wind energy is the driving force in expanding renewables. In 2018, onshore and offshore wind energy installations accounted for an installed capacity of 52.5 and 6.4 gigawatts respectively. In total, approximately 110 terawatt hours were generated by onshore (90.5 TWh) and offshore (19.5 TWh) installations. The share of wind energy in Germany's gross electricity consumption now stands at 18.6%. According to plans drafted by the Federal Government, offshore wind capacity is to reach 15 GW by 2030.

Biomass in solid, liquid and gaseous form is used for electricity and heat generation and for the production of biofuels. Biomass accounts for almost 23% of renewable electricity generation, 86% of the renewable energy in total heat and cooling consumption and 88% of the renewables in final energy consumption in the transport sector.

The Federal Cabinet today adopted the import strategy for hydrogen and hydrogen derivatives. The import strategy sets out a clear and reliable framework for the urgently needed imports of hydrogen and hydrogen derivatives to Germany. It is a key component of Germany's hydrogen policy and supports the German government's commitment to developing the domestic market. The import strategy complements Germany's National Hydrogen Strategy.

China

China is the world's largest producer and user of renewable energy, and has huge investments in solar and wind energy. It is also the world's largest producer of solar panels.

"Plan 13" of the Green Energy Scheme: This plan aims to increase the share of renewable energy to 20% of total energy consumption by 2025. This plan includes the promotion of solar, wind and hydropower.

China accounted for 19% of global GDP in 2023 and its annual economic growth rate of 5.2% narrowly exceeded the government's annual target. Despite initial signs that the recovery would be swift, China's economy continues to face some challenges, notably with a troubled property market. Yields on Chinese sovereign bonds have been declining steadily since 2021 and reached a record low in March 2024. The People's Bank of China, as well as other state-owned commercial banks, have continued to lower their interest rates, in contrast to the upward trend in most other major economies.

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Chinese investments in energy remained extremely strong, accounting for one-third of clean energy investments worldwide and an important share of China's overall GDP growth. China has announced dual carbon goals – to peak carbon emissions before 2030 and achieve carbon neutrality before 2060 – and has shown remarkable progress in adding renewable capacity. In 2023, China commissioned as much solar PV as the entire world did in 2022 while its wind additions also grew by 66% year-on-year. Over the past five years, China also added 11 GW of nuclear power, by far the largest of any country in the world. (iea, World Energy Investment 2024,China).

The year 2023 saw robust growth for the so-called “new three” (xin-sanyang) industries – solar cells, lithium batteries and electric vehicles (EV) – which saw a 30% jump in exports in 2023 from a year earlier, making them a major factor in Chinese trade. These trends are expected to continue into 2024, with the largest portion of China's investments heading towards low-emission power.

Ample domestic manufacturing capacity and continued government support for clean technologies provides a foundation for strong clean energy investment within China. However, pressures are increasing on China's ability to export these technologies to other large international markets, including Europe and the United States.

Another issue that requires close attention is China's continued investment in fossil fuels, especially coal with nearly all the new global coal fired capacity. In tandem with its growing renewable capacity, coal still remains the most prominent fuel source in China's energy mix, with coal production reaching a record high in 2023. While China aims to ensure that coal and coal-fired power will play a supporting role in its energy system, these developments reflect a strong emphasis on energy security in China's energy strategy.

Overall energy investment levels in China are comparable to the amounts required to meet national energy and climate goals, although full alignment with the targets implies a rebalancing away from investments in fossil fuel supply.

United States of America

Clean Energy Program: This program includes promoting renewable energy by encouraging investment in solar and wind projects and providing tax incentives to investors.

Clean Energy Goals: Federal policies set targets to reduce carbon emissions and increase the share of renewable energy, and different states are developing laws and procedures to achieve these goals. **Innovation and technology:** The United States supports research and development in areas such as energy storage, energy efficiency improvement, and new

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renewable energy technologies through federal agencies and research institutes. Has remarkable progress in solar and wind energy, as well as the development of new technologies in renewable energy. There are many US states that invest heavily in clean energy projects.

The American Clean Energy Initiative is a set of policies and programmes designed to reduce greenhouse gas emissions, increase energy efficiency and promote the development and dissemination of clean energy technologies. This initiative was launched in 2009:

The United States has many advantages in this transformation, including strong R&D infrastructure, a strong manufacturing sector, and diverse renewable energy resources. Investments in clean energy technologies through legislative acts such as the Bipartisan Infrastructure Act and the proposed Reconstruction Act will provide funding and resources to support these ambitious goals.

- Access to 100% zero carbon electricity by 2035

This goal focuses on the energy sector, with a view to eliminating carbon emissions. It involves the transition to renewable sources of energy, nuclear energy and the modernization of networks.

- Sale of new zero-emission vehicles only by 2035

The transition to zero-emission vehicles (ZEVs), such as electric vehicles, is a crucial step in reducing emissions from the transport sector. This goal sets a deadline for phasing out conventional internal combustion engine compounds.

- Make all federal buildings net of emissions by 2045

The federal government is an example in reducing emissions from its buildings. The goal is to ensure that all federal facilities are energy efficient and supported by clean energy sources.

- Purchase of zero-emission goods and services only by 2050

Encouraging the federal government to buy goods and services with low or zero emissions will stimulate the clean products and technologies market.

- Reducing greenhouse gas emissions to zero by 2050
- Increase renewable energy share to 80% by 2030
- Doubling energy efficiency by 2030
- Create millions of new clean energy jobs

Sweden

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Sweden is characterized by its ability to generate energy from renewable sources, where hydropower and bioenergy are largely used. Renewable energy could be power generated from water, wind or the sun, or any other source that is replenished through a natural process. The share of renewable energy used in Sweden keeps growing. Already in 2012 the country reached the government's 2020 target of 50 per cent. For the power sector, the target is 100 per cent renewable electricity production by 2040. Sweden's draft integrated national energy and climate plan According to Regulation (EU) 2018/1999 of the European Parliament and of the Council on the Governance of the Energy Union and Climate Action, Ministry of the Environment and Energy. (Kamp, 2013).

Energy Strategy 2030: Sweden aims to achieve 100% of its renewable energy electricity needs by 2040, with a focus on hydropower and bioenergy.

Clean Energy Support Policies: Includes incentives for companies and investors in renewable energy and the development of new energy projects.

Research and Development: Sweden supports research into advanced renewable energy technologies through research centers and government initiatives.

Sweden has a rich supply of water and moving biomass, contributing to the country's high share of renewable energy. Hydropower (water) and bioenergy are Sweden's most important renewable energy sources - hydropower mostly for electricity production and bioenergy for heating.

Green Electricity Certificate.

The Government's energy policies have also promoted the use of renewable energy. The Electricity Certification System - a market-based support system for the production of renewable electricity - is one example. To qualify, electricity must come from wind, solar, geothermal or wavelength; or small hydropower plants.

In 2022, about 19 per cent of Sweden's electricity came from wind power. Shared heat and power plants - mainly powered by biofuels - accounted for about 9 per cent of electricity production

Green Energy Sources: Wind Energy Wind power has been the fastest growing source of renewable energy around the world in recent years, and capacity continues to expand in Sweden.

Bioenergy: The largest source of bioenergy in Sweden is the forest. Sweden has more forest than most other countries – 69 per cent of the land area. Bioenergy is primarily used for heating – both in private homes and in district heating – as well as for electricity production and for industrial processes.

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Solar energy: The Swedish solar cell market is still limited, with solar energy accounting for around 1 per cent of the total energy generated.

Wave power: In the transition to a sustainable society, wave power may be an important technology in the future, but it is still relatively undeveloped – both in Sweden and abroad. It is a challenge to make the technology commercially viable.

Energy declarations: There is a law on energy declarations in Sweden. The declaration shows how much energy a building consumes in comparison with others.

Heat pumps: A heat pump uses renewable energy sources by transferring heat from the ground, lake water or the air. The number of heat pumps in Sweden has increased dramatically since the 1990s, which has contributed to less energy being used for heating and hot water in buildings.

Ethanol: Ethanol research began in the 1980s, and Sweden has been among the world leaders in this field. But the environmental benefits compared with petrol have been much debated since fertile land is used to produce ethanol, which is made from sugar canes, grains, sugar beets or cellulose.

Hydrogen: Using hydrogen is another potential means of decreasing carbon dioxide emissions. Among with many other countries, Sweden is looking into the possibility of using hydrogen as fuel, or for electricity or heating.

Body heat: So-called passive houses are built without conventional heating systems and are kept warm by the heat given off by their occupants and electrical appliances. Sweden's first passive house was completed in 2001. Since then, more buildings have followed.

Denmark

Is a pioneer in the use of wind energy, investing heavily in the development of wind energy technologies. A large proportion of Denmark's electricity is generated by wind energy.

Denmark has a long tradition of developing and using renewable energy. Electricity derived from renewable energy has reached 67 percent of the electricity supply (of which wind energy contributes 46.8 percent while biomass contributes 11.2 percent). Energy savings are being pursued for environmental as well as commercial purposes, as they contribute to growth and business development while increasing security of energy supply. Denmark set a target to reduce greenhouse gas emissions by 70 percent in 2030 (from a 1990 baseline) and climate neutrality by 2050 through the

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passage of the Climate Act by the Danish Parliament in 2020. The reduction targets are legally binding (Pettersson et al., 2010)

Danish Energy Strategy 2030: aims to achieve 100% of electricity needs using renewable energy by 2030, with a special focus on wind energy.

Investments in offshore wind energy: Denmark is a pioneer in offshore wind power, and has major projects to expand this capacity.

Infrastructure improvement: Denmark is investing in the development of the electricity grid to improve renewable energy distribution and enhance energy efficiency.

(RENEWABLE ENERGY AND SWEDEN An overview of how different regions in Sweden (work towards an increase in implementation of renewable energy. ALFRED SJÖLANDER JOEL ESPLING).

Spain

Contributes significantly to the development of solar and wind energy. Spain's large solar projects are known for their sophisticated technologies.

Renewable Energy Plan: aims to achieve a 74% share of renewable energy in electricity by 2030. Plans include the development of large solar and wind projects.

Support for solar projects: The Spanish Government provides incentives for solar projects, including fixed tariffs and tax incentives.

Promoting smart grids: Spain is improving smart grid infrastructure to facilitate the integration of renewable energy.

Norway

Relies heavily on hydropower, providing a large proportion of its renewable energy electricity needs.

Renewable energy strategy: Norway relies on hydropower to meet its electricity needs and promotes renewable energy use in other sectors.

Low carbon initiatives: Norwegian policies include the promotion of carbon capture and storage techniques and the development of clean energy technologies.

Infrastructure expansion: Norway is investing in the development of the electricity grid and facilitating renewable energy integration.

These countries' strategies vary based on their natural resources and political orientation, but they all share the main goal of promoting the use of renewable energy and achieving environmental sustainability goals.

Iceland

Is one of the world's leading leaders in the production of renewable energy, having long developed its natural sources to move a green revolution. This Nordic island nation embraces large.

Geothermal and water energy sources, and has also significantly developed its wind energy sector in recent years. Despite its significant progress in the development of renewable energy, making it significantly ahead of its competitors, the Icelandic government has major plans to develop more clean energy by exploiting volcanic power in a unique project.

Iceland aims to achieve net zero carbon emissions by 2040 and is on track to achieve that goal. 100 percent of homes across the country were warmed by renewable energy, a small achievement from countries that managed to achieve such a milestone. This came with significant support from the rapid development of the country's geothermal resources. Iceland increased its production of geothermal electricity, using the power of its natural resources to stimulate green transition.

Arab countries

Rely about 94 per cent on fossil fuels as a major source of electricity production with a modest contribution from renewable energy sources (depending on solar and wind) - with the exception of Sudan, which relies mainly on the Nile River for electricity to the oil side. Figure (2) shows the proportion of renewable energy (including water) contributing to the energy mix produced in the Arab region.

Increased interest in the use of renewable energy sources (especially solar and wind) in electricity production in Arab energy-producing and energy-importing countries with a view to contributing to the diversification of the national energy mix, but to varying degrees varying according to the State's abundance of natural energy resources, national priorities/objectives, state of the energy market and technology to be localized. The Arab region's total installed capacity for renewable energy (below water)) United Nations, 2019(

Morocco, Egypt, Tunisia and Jordan have come a long way in the field of wind energy exploitation in electricity production. This may be due to inadequate fossil sources of energy to meet rising energy demand and the high cost of energy imports to increase the Government's interest in the development of the use of wind energy with areas characterized by a good wind structure in terms of distribution, frequency and average wind speeds throughout the year in each, In addition to encouraging the local manufacturing of certain components of wind energy equipment, we have undertaken prior technical studies. contributing to improving the economics

of these States' wind farm projects and competitiveness with traditional imported energy, Solar photovoltaic (photovoltaic) systems technology, especially with low prices and suitability for rural and remote areas, is receiving the attention of most countries.)United Nations, 2019(

Its economies and natural resources, whether exporting or importing energy, Algeria, Jordan) and it is anticipated that the implementation of photovoltaic systems projects for lighting, pumping and desalination will continue to expand in most countries. Morocco remains the region's first in the area of concentrated thermal solar power plants with the completion of the planned programme and the involvement of Arab companies in construction work. No new stations have been implemented alongside those in service in the UAE, Algeria and Egypt.

Conclusion and Recommendations

The world finds itself at a critical juncture in the energy world. Increasing the urgent need to achieve sustainable economic, social and environmental development goals and climate change challenges, along with the simultaneous need for energy security and economic stability, a growing global conversation about the future of our energy sources. This focus is on the shift towards renewable energy, which is increasingly seen not only as an alternative to traditional energy sources, but as a central element in fundamentally reshaping our relationship with the environment, our economy and our broader societal values. The role of various forms of renewable energy -- including solar, wind, hydropower, geothermal and biomass -- is crucial in guiding this global shift in energy. These sources represent more than technical alternatives; They symbolize a significant shift in how energy is produced and consumed, reflecting a broader commitment to sustainability, flexibility and balance that is more in line with the natural world. Historically, fossil fuels, i.e. coal, oil and natural gas, have been fundamental to the development and sustainability of global energy infrastructure, which supports much of the modern world's economic and technological progress. According to a report by the National Internal Energy Agency (IEA), as of 2019, 81% of the world's primary energy supply was derived from this fossil fuel. While these non-renewable resources have played a pivotal role in driving economic growth, facilitating technological progress and supporting urban development, their widespread use has brought about the lowest environmental cost. Burning fossil fuels is a major contributor to increasing carbon dioxide emission levels and a major driver of global climate change. In addition, the extraction and consumption of these fuels resulted in a significant loss of biodiversity and the spread of pollution. There is an international vision to move towards renewable energy consumption and sustainable resource management From international

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policymaking and binding on States States must develop several policies and strategies to promote the transition to sustainable renewable energy through climate change mitigation, adaptation and environmental protection. which is likely to expose increasingly relevant ecosystems and complex systems to major shocks, and therefore requires immediate flexible policies.

Regulation is also crucial when dealing with sustainable development goals, and more SDG7. In particular, there is evidence of increased interest in the current international development agenda and in environmental and sustainable practices. Thus, regulation can be relevant and lead to efficient energy use, In this sense, local policies and strategies aim to promote increased corporate accountability and compliance to sustain renewable energy transmission.

Natural events and climate change are unprecedented threats to society, the environment and the economy. Complex ecosystems and related systems are increasingly exposed to significant shocks, and therefore require immediate flexible policies.

The results of this research not only illustrate the current state and course of adoption of renewable energy, but also emphasize the critical importance of policies, investments and cooperation. so we can reach the following recommendations:

-international cooperation: Addressing these and other challenges requires a comprehensive approach involving international cooperation, capacity-building initiatives, technology transfer, financial support and tailored policies that consider the unique circumstances in each developing country. However, reforming the global economic architecture is likely the most important step in alleviating some of the main obstacles to the policy space of developing countries. Governments have a central role in creating inclusive and sustainable economies through policies that go beyond the adoption of renewable energy sources, to include the promotion of value added activities that feed into and from renewable energy value chains. Possible policy actions in this context include green industrial policies, such as appropriate local content incentives, business incubation initiatives, research and development support, the promotion of low-carbon industrial clusters and green skills development programmes, to train the workforce required for decarbonized industries. They also include circular economy policies, to help countries and communities manage scarce resources and trade waste material, to reduce the life cycle of emissions in various industries, thereby improving both resource efficiency and productivity.

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- **Planning:** Productive use needs to be integrated into plans to maximize the development impact of energy access, and GIS-related data and analysis tools can help identify high-potential opportunities.
 - Updating energy and energy sector strategies to reflect increased costs, streamlining systems and clarifying institutional roles and responsibilities for wind and solar development
 - Reform the current market framework to improve enterprises' banking capacity and cluster renewable energy projects to enhance risk mitigation
 - Comprehensive solar and wind measurement campaigns.
 - Develop a master plan to strengthen local manufacturing capacities and create a vital local renewable energy industry
 - Making renewable energy technology a global public good
 - Improved global access to components and raw materials and equal opportunities for renewable energy technologies
 - Investments in renewables and the conversion of energy subsidies from fossil fuels to renewable energy
 - Ensuring the stability and predictability of renewable energy policies
 - Focus on energy system perspective and policy shift to competitive auctions
 - Modify policy design to integrate changing renewable energy sources
 - Addressing technological challenges Facilitating the permission of new projects and updating.
- **Market and business development:** Increasing awareness and marketing of productive use technologies for local leaders, small businesses, savings groups and cooperatives, among others, is essential to accelerating adoption. Once small businesses adopt productive use techniques, it is critical that they can find buyers for their products and services. Collaboration across the energy, water and agriculture sectors is essential to ensure that companies have clear value offers and great access to technical and promotional services
- **Technology and innovation:** Continued investment is needed to enhance the performance of productive use equipment while reducing its cost, as well as quality assurance measures to mitigate technology risks. There is also a need to invest in innovative business models, digitization, workforce skills and stronger capabilities between end users and companies. In particular, innovations should focus on local needs and capacities to absorb and adapt technologies and business

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models to maintain redundancy and rapid expansion. • Access to finance. Funding for the end-user, which is essential to overcoming affordability constraints, can be provided either through productive use technology suppliers, microfinance institutions or local banks. Financial instruments such as initial grants, results-based financing, credit lines and collateral can help attract private debt and equity to the sector, enabling suppliers of productive use equipment to expand.

- **Access to finance:** End-user finance, essential to overcoming affordability constraints, could be provided either through suppliers of productive use technology, microfinance institutions, or local banks. Financial instruments such as up-front grants, results-based financing, credit lines, and guarantees can help to attract private debt and equity into the sector, enabling suppliers of productive use equipment to scale up.
- **Market and business development.:** Raising awareness and marketing productive use technologies to local leaders, small businesses, and savings and cooperative groups, among others, is essential to accelerating adoption. Once small businesses have adopted productive use technologies, it is crucial that they be able to find buyers for their products and services. Collaboration across the energy, water, and agriculture sectors is essential to ensure that businesses have clear value propositions, ample access to technical and promotional information, adequate support to develop their businesses, and access to markets for their products.
- **Policy and regulation.:** Tax exemptions or subsidies are needed to accelerate growth of the market in productive uses of renewable energy. Standards covering both productive use technologies and the services provided by the companies making use of those technologies are vital to protect consumers. Those standards must extend into areas such as consumer financing, repair, and e-waste management. Geospatial mapping exercises, household surveys, agricultural surveys, and market intelligence studies undertaken by governments can all help to inform data-driven decision-making by private sector, governments, and investors.

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GOVERNANCE IN ENERGY MANAGEMENT
OBLIGATORY LEGISLATION OR DYNAMIC
REGULATIONS

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Abstract No doubt that Energy is one of the main pillars for economic development and sustainability and achieving resilience for these resources.

On the other hand, it is clear that the management of the energy resources file is a very technical and specific policy that must be well-directed and implemented specially it is a common ground for governmental and private sectors, and it has many ways , procedures, and competencies to be discussed and considered

It is a must nowadays to achieve forward steps in these fields according to governance and compliance aspects and this will require a certain organization for energy topics and this can be achieved by laws with all their abstract and general features or regulations with all its speedy and dynamic movements and this will be presented as a comparison between these two ways to approach the best tool for achieving governance in the management of energy resources

Keywords: *energy resources, energy management, compliance, energy governance, organizing rules for energy*

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Introduction

Attention has turned to the importance of studies in the fields of renewable and non-renewable energy, given that it was one of the most important pillars of the Industrial Revolution that affected the world economy and world history as well, which is what made the energy source take the lead on the international scene in many international relations and is no longer just a basis for building an economy. The state is strong and competitive, but it now controls the mechanisms of sustainable development in many countries. It is also one of the fundamentals that control alliances of international powers, which may lead to military conflicts at certain times.

Energy is no longer just one of the factors relied upon in building the national economy or dealing in areas of international politics as a pressure or bargaining card. Rather, it has truly become one of the fields and facilities to which the rules of governance, transparency, and principles of modern management apply, and choosing the optimal method for managing that facility and its organization in a way that achieves sustainability, development and preservation of this important economic current resource. (Pascual 2008)

Through the above, this research paper can be presented, which talks about the extent to which the energy field is considered one of the pivotal areas for study and application regarding the governance and management of this facility and which path can be resorted to to implement rational governance mechanisms in the field of energy, as follows.

Research Problem

This research paper raises a point of great importance, which is that the basic criterion in the governance of energy use is to refer to a general and transparent rule that can be applied regarding the use of energy in a sustainable manner that is easy to control and benefit from , and that these rules have ranged in many areas. Countries differ between laws and legislation according to the energy use strategy in each country and the economic outlook for these sources, which requires state intervention in the management of this facility with a large area that amounts to nationalization in some cases, or allows the idea of an open market to manage this sector away from the control of the existing regime in the state. There is no doubt that it affects the regulation and governance of the energy sector .

Policy frameworks established by national and international regulatory bodies are therefore at the heart of energy regulation legislation and regulations. These frameworks pave the way for energy efficiency standards, renewable energy goals, and emissions reduction goals .

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Compliance with energy legislation is not limited to merely adhering to the law; Rather, it often comes with a set of incentives designed to encourage companies to invest in energy-efficient technologies. Tax credits and rebates are considered Grants are a common tool used to promote compliance with these regulations and rules .

(Chen, Wu, Meng, He, Li, Coffman, Liang & Guan 2022)

On the other hand, the effects of energy legislation on management decisions are profound Managers must balance legal compliance, cost-effectiveness, and operational efficiency where strategic investments in energy management systems can lead To achieving savings and sustainability on a longer basis, the legislative regulation of energy sources also occupies a large area regarding the future outlook for these sources and it is important to keep pace with emerging trends.in energy legislation is crucial to forward-thinking management

The shift toward decentralized energy systems and the increasing role of digitalization in energy management are trends that legislatures are beginning to address. The Green New Deal, which has been proposed in different forms in different countries, represents a move towards integrating energy legislation with broader economic and social policies.

By analyzing these previous elements, organizations can formulate a strong strategy Complies with legislative requirements while promoting innovation and sustainability in energy management practices Her own. The interaction between legislation and administration is dynamic, and staying informed is the key to navigating the constantly evolving energy landscape .

The poignant question in this corner remains about the most effective means: whether energy is regulated through legislation with all the characteristics of a general and abstract legal rule associated with a penalty. The deterrent or is the dynamism of the energy sector making it appropriate to use decisions and executive regulations that are most appropriate to the development that appears every day in the energy sector and its connection to sustainable development and the rights of future generations?

Research Methodology

The research focuses on reviewing the difference between the types of legal rules that regulate energy according to the inductive and analytical method of clarifying the policies followed, which results in resorting to legislative means through laws or resorting to the idea of specialized institutions in the state that are capable of taking over the precise details of managing the field of energy, etc. It introduces developments and defines the role of the state and regulates investments in the energy field and takes into

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account the climate, environmental and economic dimensions in the regulations and decisions issued by these bodies. Accordingly, the research provides a comparative aspect to determine the appropriate means of regulating and governing the use of energy through legislation or Regulations and which of the two methods is considered the most effective .

Previous Studies and Literature Review

After two decades of relative neglect, political scientists and international relations scholars have rediscovered energy as a worthy research topic (Hughes and Lipsy, 2013). One reason for the renewed interest is the set of dramatic transitions that are currently underway in the global energy market. Here we discuss three central trends and transformations: climate change, geopolitical change, and increasing volatility in oil and gas markets. It is these transitions that have prompted scholars to examine energy from a global governance perspective, and as these transitions continue to evolve, their impact on the institutional architecture of GEG will require further investigation. (Graaf and Colgan 2016).

A second major transition comes from geopolitical change. The two most significant changes are the collapse of the Soviet Union in the early 1990s and the recent rise of developing countries as energy importers.

A third major transition is the increasing volatility on oil and gas markets, even in the absence of changes linked to climate change. Oil prices have swung markedly over the past few years. The period 2005–2014 witnessed a cycle of high (and volatile) energy prices, after a long cycle of low prices in the period 1985–2005. The revolution in shale gas and tight oil production in North America has largely stymied this debate. There are opposing views of the current situation. Some observers, such as Rex Tillerson (2013), the chairman and CEO of ExxonMobil, avow that “we are now witnessing the transition to a new Era of Abundance”. Others, such as Klare (2009)

A new trend of research depend on key strand in the literature, and still is, concerned with mapping the global energy architecture. As ElBaradei (2008), former director-general of the International Atomic Energy Agency (IAEA), observed in 2008: “We have a World Health Organization, two global food agencies, the Bretton Woods financial institutions and organizations to deal with everything from trade to civil aviation and maritime affairs. Energy, the motor of development and economic growth, is a glaring exception”. Starting from this observation, a large number of scholars have addressed the question: “who governs energy?” (Florini and

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Sovacool, 2009). This is no easy question to answer. Various mapping exercises have ensued and they have all come up with a different set of institutional arrangements.

Some focus exclusively on intergovernmental organizations and summit processes , others also include international NGOs, multilateral financial institutions and hybrid entities, involving everything from transnational networks of advocacy to quasi-regulatory private bodies, global policy networks and public–private partnerships (Sovacool and Florini, 2012).

A group of scholars has started to conceptualize this patchwork of institutions as a single organism, a “regime complex”, and have assessed how it has behaved over time , thus moving from static to dynamic snapshots of the global energy architecture. The concept of a “regime complex” to refer to the “array of partially overlapping and non-hierarchical institutions governing a particular issue area”. The term is akin to Biermann et al.’s (2009) concept of a “global governance architecture”, which they define as “the overarching system of public and private institutions that are valid or active in a given issue area of world politics”.

Confronted with such an alphabet soup, some scholars have judged that “no single account can do justice to the multiplicity of rules and institutions that make up the full energy regime complex” and this circumvented the issue by listing the “types” of energy governors, rather than presenting an exhaustive list. Cherp et al. (2011) take a different approach by listing some actors and organizations within three GEG arenas: energy security, energy access and climate change. This links to broader discussions about the difficulty to map regime complexes in general—a nice illustration is the very different mapping of the climate change regime complex provided by Keohane and Victor (2011), on the one hand, and Abbott (2012), on the other.

A notable number of studies have been concerned with studying individual institutions and their role in GEG. The Paris-based IEA, a daughter organization of the OECD, has received by far the most attention in this regard. It is generally regarded as the “world’s foremost multilateral energy organization” (Van de Graaf, 2015) and “the closest we have to a World Energy Organization” . It should thus not come as a surprise that the IEA’s evolving role and governance functions has received ample attention, both in the 1970s and 1980s and in recent years (Kohl, 2010).

The IEA’s counterpart on the global oil market, OPEC, has probably received more attention. Most of the literature on OPEC has tried to model its behavior as a would-be commodity cartel, and tried to examine the

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influence of the organization on world oil prices. While this literature is marked by a lot of disagreement, recent research demonstrates that OPEC members cheat on their agreed production quotas most of the time and that the organization does not have the capacity at all to set world oil prices, although this belief persists as a “rational myth” (Colgan, 2014).

Another key institution, sometimes missed by the GEG literature because of the agency’s orientation towards security issues, is the IAEA. Set up within the United Nations in 1957, the IAEA’s objective is to promote safe, secure and peaceful nuclear technologies . Its programmed to include three areas: safeguards and verification (to ensure that activities are not used for military purposes); safety and security (to protect people and the environment from radiation); and science and technology (to mobilize peaceful applications of nuclear technology). The role of civilian nuclear energy in international security questions has recently attracted scholarly attention (Fuhrmann, 2012; Brown and Kaplow, 2014).

Private actors and transnational governance

Beyond studying international energy organizations created by states, scholars have also turned their attention to the roles played by non-state actors such as business, civil society and science organizations in GEG. These non-state actors sometimes participate in intergovernmental processes. The December 2015 climate conference in Paris, for instance, was attended by a large number of civil society and business groups, who all tried to influence the negotiation process. Yet, non-state actors have also established networks whose defining characteristic is independent of state approval or support. Where such networks become institutionalized and begin to set broader norms and rules, they become transnational governance networks in their own right.

Given the enormous diversity in such transnational governance networks, it need not come as a surprise that there is equally much divergence in the effectiveness of such networks. found that, so far, the majority of private–public energy partnerships have not been fulfilling the high expectations placed on their effectiveness. Nevertheless, research by (de Coninck et al. 2008) has concluded that international technology-oriented agreements to address climate change can be effective, especially if they set standards and mandates for specific sectors, not for specific technologies.

A minority of scholars has focused not on institutions or on transnational networks, and corporate elite ties in global energy (de Graaff, 2012).

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The description provided in this section focuses on international organizations and networks . The interactions between the actors are complex and characterized by multiple points of contact. For instance, the IEA works with its member states to improve good governance and share best practices of energy policies. In practice, this means that the IEA interacts with multiple branches of the national governance. In the United States, the IEA frequently works with the Department of Energy, Congress and various House and Senate committees, the Federal Energy Regulatory Commission and the State Department. Further, the activity and influence of the international actors depends significantly on the issue at hand. International organizations often have only an indirect influence on issues that lie firmly within national jurisdictions, such as electrical grid infrastructure or taxation policy. Many questions about the nature and efficacy of the international–national interfaces of energy governance remain unanswered.

But specifically from the scope of the effective regulatory system for good governance for the energy field according to rules or regulations outside the role of different institutions and organizations . The transition of different economic and regulatory aspects is key to manage better the diverse processes involved. We can examine three primary keys for the state to impact economic and social well-being: fiscal, monetary policy, and regulations (OECD, 2010). Regulations and regulatory policies are critical for their capacity to boost entrepreneurship and allow a more favorable business environment for firms and economic innovations . In this respect, (Ashford and Hall 2011) repute that the most relevant problem in achieving sustainability is coping with the design and enforcement of policies. This implementation strengthens the co-optimization of social goals aside. The other side also considers the possible entrenchment of economic and political interests that benefit from the status quo. In particular, these interests continue a current, non-optimal situation in terms of growth and social goals.

Efficient regulation is a dynamic process that allows governments to reach their growth and social targets. At the same time, governments can improve their performance over time, assess the results obtained, and eventually modify the incentives' structure. They can improve their regulatory governance in terms of growth and social goals by closing the relevant cycle – namely, designing the regulations' regulatory assessment results in sustainable growth . So the upcoming legal structure will enhance the shift to renewable energy. A well-balanced regulation can have a relevant impact on the diffusion of technologies, boosting different interested actors'

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actions thus enhancing the regulatory system is essential for decision-makers. (Drago and Gatto 2022)

And so we can notice that all previous studies about effective energy policies discussed all effective institutions and international organizations , and also all legislative experiences by law or regulations , all studies agreed that the governance of energy sector needs rules and instructions but they were very pure to discuss which is preferable to organize it according to law or it will be better to be ruled by regulations.

Definition of energy and its governance through the legal rule

Energy is the ability to work and exists in several forms: kinetic, thermal, electrical , chemical , nuclear, or other different forms. Energy also expresses the process of transfer from one body to another, after being transferred, energy is always assigned according to its nature . Therefore, it was difficult to define energy as it is a concept and the definition of energy in physics is somewhat reductive. Energy is always conserved and never destroyed (or transformed into mass) and is incredibly useful for resolving the results of any type of physical or chemical process . Also, there is no physical essence of energy and there is no such thing as pure energy, and it is always carried by something, usually in the form of movement , and energy can be defined However , it is one of the properties of matter, which can be transformed into one of the following forms: work, radiation, or heat. With this definition, it goes beyond the common definition of energy as the ability to accomplish a task (Walker 1996)

Definition of law :

Jurists have traditionally defined a legislative rule or a legal rule as :
a set of abstract general rules that regulate the behavior of individuals in society , and are accompanied by a material penalty that guarantees their respect and is applied to those who violate them .
According to this definition, law is legislation in its general sense, and this meaning is what is derived from the word law when it is used .

However, the term law may not be directed to this general meaning, as it may mean the set of legal rules established by the legislative authority to regulate a specific issue. ; In this case, the term law deviates to a narrower meaning than the previous meaning, as it means the law only , for your information Legislation It is not the law in its broad sense, but it is also one of the Sources of law . (Hridoy 2023)

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As for the characteristics of the legal rule , we can conclude from the previous definition of the law that the legal rule is characterized by :

- A general and abstract rule
- regulates the behavior of individuals in society .
- accompanied by a penalty imposed by the public authority on the violator .

Types of legislation

● Basic legislation or the Constitution

It is the pinnacle of legal legislation in the state and is issued by the constituent authority, which is the highest authority in the state after establishing or changing the legal and political system of the state . It determines the general form of the state and the system of government, and defines the basic freedoms and rights of individuals and the real and legal duties of every authority or individual in society .

It also determines the public authorities in the state and the form of relations between them . The constitution is the supreme legal authority from which all laws are derived, and no law may violate the provisions and principles of the constitution .

The constitution specifies the powers between the state authorities, whether the legislative authority, the executive authority, or the judicial authority, and determines the tasks of each authority and the relationship of each authority with the other authority. The constitution is characterized by relative stability and the difficulty of change or amendment due to the superiority of its rules over the rest of the rules and its connection to the principles that have been established in society . (Liela 1958)

● Ordinary law or legislation

It is a set of legal rules that are established in accordance with certain provisions and procedures. It comes in second place after basic legislation and it proceeds in accordance with the provisions specified by the Constitution .

The legitimate authority or legislative authority represented by Parliament sets these legal rules which regulate social relations between individuals, as well as the relationship between the individual and the state. (Elsadda 1971)

Ordinary legislation includes several branching laws are organized on the basis of what may be regulated and governed by these laws, such as the civil law and the penal law. These laws may come in a separate form, and these laws come in second place behind the regulating laws .

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The constitutions stipulate the possibility of involving the head of state in developing these laws, voting on legislation, and approving or vetoing it in the event of disruption or absence of parliamentary work .

● **Subsidiary legislation or regulations**

It is the legislation that places the executive authority within the limits of jurisdiction specified by the Constitution, and comes in third place behind the law or ordinary legislation, and the executive authority's jurisdiction to legislate these regulations is an original jurisdiction that substitutes for Parliament's jurisdiction to issue this degree of legislation .

These regulations consist of texts arranged in descending order from highest to lowest. These regulations are divided into three types :

Executive regulations : These are the regulations for detailing and explaining legislation and implementing laws issued by the legislative authority. The executive authority issues these regulations in its capacity as the executive authority in the state. In the case of implementation, the executive authority takes the stronger position over the legislative authority, but in setting these rules it is always subject to the legislative authority's oversight. (Eltamawy 1957)

Regulatory regulations : These are the regulations that regulate public facilities and provide everything needed by the state sectors, whether the health sector, planning, industry, , trade , etc., all of which fall within the jurisdiction of the executive authority .

Control regulations : or police regulations, which are the regulations for maintaining public safety and public health, which the executive authority also sets. They include traffic regulations, food control regulations, and the organization of street vendors . From this it becomes clear that ordinary legislation is not permitted to violate the Constitution, nor is it permissible for subsidiary legislation to violate ordinary legislation. The Constitution comes in the highest rank, and no other legislation can violate it. The text of the Constitution can be purified for any other provision, and the legislation issued in the Constitution is then implemented .

As for the advantages of legislation as a means of controlling and organizing society

It is the first means of protection for citizens before the state, as the judge applies the law even if he is facing one of the state authorities .

The work of the law is based primarily on equality among citizens in all rights and working to achieve justice .

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Any law can be issued whenever matters require it, as long as a year has passed between the issuance of one law and another .

The ease of learning about the laws for all citizens, because the new laws are written down and published in the Official Gazette, and the constitution is published immediately after its issuance and all its articles are presented to everyone . (Keira 1971)

However, although legislation has been established in many societies as a means of control and regulation, it still includes some defects in the field of legislation

Constitutional systems tend to be steadfast and stagnate in legislation and to operate for a long period of time, which makes it not keep pace with new events and changes .

There are cases where it is not appropriate to the conditions of society as there are laws that are not voted on by the people.

It is difficult to identify it, as it is often not accessible to everyone at all times. Laws and legislation vary from one place to another and from one region to another and even in the same legal system from time to another .

It takes time to establish its provisions and principles and time to approve it from society.

If we accept that all issues raised in any legal system, whether in the social, economic , political , or cultural field, must be regulated by the legal rule, as this is the basis for the idea of controlling and governing relationships and actions, and the existence of a reference that can be dealt with to return these areas to healthy organization. On an ongoing and sustainable basis, it is indispensable to have a legal or legislative base to regulate these areas, and from here it can be concluded that there is no room for the absence of legislative regulation in the field of energy, as it is an area that any legal system is interested in and is developing at the present time and is waiting for it to pass. With many stages of development, it is no longer sufficient to rely on the existence of a legislative text, but rather the need has become necessary to reach a text that achieves the governance of this sector and its sustainable development . (Verma - UNDP 2022)

On the other hand, governance is among the basic pillars of the sustainable development goals, as it is considered the infrastructure that promotes the achievement of other goals . Therefore, governance has become a subject of academic discussion and government programs all over the world, and governments, policy makers and regulatory bodies have devoted great effort and huge resources to developing legislation. Policies related to governance and their applications are the main tools upon which any legal system depends to achieve sustainable development. Indeed, the

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governance of the legislative and executive process itself is considered one of the pillars of the sustainable development process, and therefore it is not possible to address the ideas of sustainable development and the governance of energy sources and their exploitation apart from the legal aspect . (Tarrad , Masry 2022)

Energy Governance between law and regulations

One of the most important constitutional and legal issues that have always needed regulation is the relationship between the law and the regulation, that is, the relationship between the law and the legislative text issued to implement it, a relationship that has always been ambiguous in our legal and constitutional system. It is known that the regulation or decision The regulatory authority only issues an interpretation of the legal text and does not contradict it or add to it. Otherwise, the decision issued to violate the legal text is non-existent, as in this case it is tainted by the serious defect of lack of jurisdiction . (Fakhry 2024)

It must be said that the regulatory authority given to the administration has a specific scope from an objective and personal standpoint. From an objective standpoint, a regulatory decision may only be within the scope of the text that was issued to regulate it, otherwise it would be non-existent as we indicated. From a personal standpoint, a regulatory text may not be issued. Except from the person or administrative body exclusively specified by law, otherwise it is also invalid. An example of this is the Basic Employees Law, which specifies different administrative figures responsible for issuing executive organizational rules, and it is not permissible for one of them to replace another, under penalty of invalidity .

Therefore, the regulation is always a specialized and innovative legislative level that studies the details in great depth about what Parliament does when it issues laws, as members of Parliament may not have sufficient knowledge of the details of the matter and its specialization, which justifies resorting to executive regulations to regulate it . (Ghandar 2015)

On the other side , the bodies of the executive authority are responsible for implementing the law as intended by the legislative text and within the limits set for it, and therefore the function of the regulations in this regard is to issue it in a way that makes the law applicable in the legal form that falls within the jurisdiction of the executive authority and then The regulation is one of the tools for fine-tuning the work of administrative authorities, as it gives the executive authority sufficient space and flexibility to perform its mission in implementing the law .

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In addition, the procedures by which regulations are issued in the form of administrative decisions only require determining what the administrative authority wants to achieve the public interest and implement the law, and the approval by the competent authority of this decision, which is one of the means of the administration's work on its own initiative, but it carries a lot of ease and speed. In the procedures for issuing the law, which is characterized by being heavy-handed and slow in the procedures when issuing or amending it, in contrast to decisions and regulations that are issued in a simpler manner and with speed and flexibility .

As for governance procedures, the main justification for resorting to governance is the lack of legislation, the lack of legal regulation of some procedures, and the use of a specific framework of rules to review and ensure the proper functioning of public facilities. Likewise, governance procedures are consistent with the nature of regulations in that they are quick procedures that are sometimes intended to confront Some risks are quicker than resorting to legislation. Also, there are many specialized aspects of governance that involve technical, economic and technical procedures that are not included in legal texts . (Kjaer and Vetterlein 2018)

In addition, the law often does not include transparency procedures in issuing decisions or self-monitoring and disclosure mechanisms on which governance procedures are based, and this is often based on strategies developed by state institutions and facilities with the aim of achieving governance and targeting the public interest, which are considered such decisions. And regulations issued by government agencies, even in the presence of a legal text. (Al-Najjar, Sami, Al-Qasabi, Al-Minyawi 2020)

In the field of energy management, the evolving legislative landscape presents challenges and opportunities for companies and entities working in this field. The complex web of regulations, often shaped by environmental concerns and geopolitical shifts, requires a strategic approach to compliance and sustainability . Companies find that proactive adaptation not only mitigates risks, but can also lead to competitive advantages, which depends on decisions and strategies rather than the legislative aspect .

1. Renewable energy portfolio standards : These policies require utilities to ensure that a certain percentage of the electricity they sell comes from renewable sources. For example, a company that operates in a state with a state law may invest Strict in solar panels, not only complying with the law but also reducing long-term energy costs and attracting environmentally conscious customers .

2. Carbon Pricing : Imposing a cost on carbon emissions is a policy tool aimed at encouraging companies to reduce their carbon footprint. A

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notable example is the European Union's emissions trading system, which has pushed companies to innovate in low-carbon technologies, thus driving green business models.

3. Energy efficiency incentives : Governments often offer tax breaks or rebates in exchange for energy saving measures . Businesses can upgrade their facilities with lighting, heating, ventilation and air conditioning systems Energy Savers can benefit from these incentives, which improves their bottom line while contributing to achieving national energy conservation goals .

4. Mandatory Disclosure Policies : Requiring companies to report their energy use and greenhouse gas emissions It promotes transparency and guides consumers to better choices. This policy has prompted companies to adopt management systems Energy . (Pertoldi 2022)

5. Subsidies and tariffs : They can have a dual effect. While subsidizing fossil fuels can reduce operating costs, it may also discourage investment in renewable energy sources . Conversely, tariffs on solar panels Imported solar panels may increase costs in the short term but can stimulate growth of the domestic solar industry .

Through these policies, companies are forced not only to re-evaluate their energy consumption, but also to consider the broader implications of their energy sourcing decisions. It is the intersection between politics and business strategy Creates a dynamic environment in which adaptability and foresight are key to thriving in the new energy economy. Examples abound of companies taking advantage of these policies, decisions or regulations to pave the way towards sustainability, demonstrating that regulatory compliance can go hand in hand with market leadership significantly more so than on the legislative side .

Effectiveness in the field of energy governance

Efficient regulation is a dynamic process that allows governments to reach their growth and social targets. At the same time, governments can improve their performance over time, assess the results obtained, and eventually modify the incentives' structure. They can improve their regulatory governance in terms of growth and social goals by closing the relevant cycle – namely, designing the regulations' regulatory assessment results in sustainable growth (OECD, 2010). So the upcoming legal structure will enhance the shift to renewable energy. A well-balanced regulation can

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have a relevant impact on the diffusion of technologies, boosting different interested actors' actions thus enhancing the regulatory system is essential for decision-makers.

To analyze regulation, it is essential to note that the same compliance is typically not enough: a higher-level ethical culture and an integrity obligation is necessary . For this reason, the law's role is also able to foster positive behaviors in the economic agents.

It is essential to learn about the impossibility of finding superior principles (Asgary and Mitschow, 2002). These principles can promote transparency in an economic and business fashion. Here, the approach toward sustainability is different – the need is to compare the different regulations on their capacity to promote common goals. The possibility of improving the quality of regulation based on some internationally recognized principles allows us to achieve sustainability values better. In this framework, pursuing an “optimal regulation”, promoting transparency and accountability, is necessary. (Drago and Gatto 2022)

In the field of energy management, the maze of legislative measures presents an enormous challenge to professionals charged with ensuring compliance and improving operations. The complex web of regulations inherent to the management and governance of the energy sector , which often varies by jurisdiction, requires a strategic approach to navigate effectively. This calls for a multifaceted understanding not only of the legal texts but also of the fundamental objectives they aim to achieve .

To skillfully maneuver through this complex landscape, consider the following best practices :

1. **Comprehensive research** : Start with a comprehensive analysis of all relevant legislation, including international, federal, state, and local laws. For example, the EU Energy Efficiency Directive sets out binding measures to help the EU reach an energy efficiency target of 20% by 2020. Understanding such directives is crucial for multinational companies operating within the European Union .

2. Stakeholder engagement : Involve all stakeholders, from government agencies to energy suppliers and end-users, in the legislative process. This ensures that the views and needs of all parties are taken into account, leading to more effective energy policies. An example of this is the stakeholder consultations conducted by the Department for Business, Energy and Industrial Strategy In the United Kingdom when developing new energy policies .

3. **Risk assessment** : Assess the potential impacts of energy legislation on your organization. Conduct scenario planning to anticipate

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changes and prepare for different outcomes. For example, imposing a carbon tax could significantly impact operational costs and require a shift towards more sustainable energy sources .

4. Legal expertise : Dealing with legal experts specialized in energy law to interpret complex legislation , technical regulations and regulations and the limits of their application and provide advice on compliance strategies. Their expertise can be invaluable, as we have seen in the case of the US Clean Air Act, where legal interpretation is key to compliance .

5. Use technology : Make use of technology to monitor Legislative changes and compliance management. Energy management systems can Track energy consumption and emissions, which helps ensure compliance with regulations such as the EU Emissions Trading System . (Trischler & Bud 2019)

6. Continuing education : Observing the legislative ceiling for issuing decisions in the same context, by reviewing legislative developments through continuing education and training programs. This is essential to keep pace with the rapidly evolving energy landscape, as evidenced by frequent updates to the International Energy conversation code .

7. Public policy advocacy : It is primarily a strategic process by participating in public policy discussions To advocate for fair and practical energy implementing legislation. Organizations can join industry associations or coalitions, such as the Sustainable Energy Business Council, to influence the making process Policies .

By incorporating these practices into your energy management strategy, you can not only comply with current legislation, but you can also anticipate and adapt to future regulatory changes through plans, strategies and regulations that establish a sound system of governance , which qualifies Institutions For long-term success In the energy sector .

Conclusion and Recommendations

Energy sustainability is a milestone of the international development agenda both at the institutional and industry level. International policymaking is called to design policies fostering the transition towards sustainable technology implementations and strategies promoting climate mitigation and adaptation and environmental protection. Reasonably, it shall be firmly pursued the argument for an initiative moving towards a transition to renewable energy source consumption and sustainable resource governance.

Regulation is also crucial when dealing with Sustainable Development Goals, and more particularly SDG7. In particular, there is

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evidence of increased interest in the current international development agenda and attention to environmental and sustainable practices . Regulation can thus be relevant and lead to effective energy efficiency, as shown by practical government implementation (Rosenow et al., 2018). The case of the United Kingdom can be used as a benchmark of effective energy regulation in promoting SDGs.

In this meaning, domestic policies are meant to promote higher accountability and compliance from the companies to sustain renewable energy transition .

Apropos of these needs, this work built a brand-new interval-based composite indicator to measure the level of institutional transparency between the different countries with the final aim to quantify the institutional settings in energy policy.

Extreme natural events and climate change are unprecedented dangers to society, the environment, and the economy. Ecosystems and related complex systems are increasingly exposed to significant shocks, and vulnerability requires prompt resilience policies. The severity of the threat represents the scale and complexity of the justice challenges it faces – above all referred to as social and energy justice (Sovacool and Dworkin, 2014). Science developments are becoming more critical to society, forcing us to address ethical principles.

In addition, regulatory and legal issues concerning the adaptation and mitigation of climate change challenges are emerging (Gatto and Drago, 2020). In this context, Science is not enough for decision-making because it cannot be considered unrelated to the social environment.

And according to what was mentioned previous through the importance of legislations for the energy field and how the energy sector became a milestone for sustainable development and it needs a very speedy and technical and updated type of rules to access a real governance so we can reach the following recommendations:

- 1- There must be a legislative umbrella of laws covers all the new trends in the field sector to get benefits from the generality, obligation and social features of law
- 2- Energy governance needs a strong network of rules to achieve governance in this sector
- 3- Regulations is the propriate and reasonable type of rules to organize energy sector as it is easily amended and updated according to any evolution happens in the energy field
- 4- Rules of regulations is the nearest rules for governance and its requirements for transparency , self-control and sustainability

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- 5- Governance of Energy and many similar fields which is related to sustainable development is better to be issued through regulations that depending on the heavy body of law to control all of its details beside the general topics of rule of law .

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EXPLORING THE USE OF GREEN MESSAGE FRAMING IN FINTECH MOBILE APPS ON PROMOTING SUSTAINABLE BEHAVIORS IN EGYPT: A QUALITATIVE STUDY

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Abstract Fintech industries have become one of the major factors that influence people's daily life behaviors and interactions in the economic and ecological systems. Globally, financial technologies shaped the way that the world interacts with money transactions along with daily payments and data-driven businesses through mobile applications. It contributes to reducing gas emissions and maintaining the ecosystem's well-being by offering new innovative facilities and limiting the CO2 footprint. However, customers in developing countries such as Egypt resist the adoption of these tools. Fintech applications tend to use other message frames rather than green messages that can trigger lower resistance and leverage sustainable consciousness to encourage using such technologies. This leaves the theoretical gap open, and the influence of the green ad message in such a context remains unaddressed in the previous literature. Thus, this research aims to explore the use of green ad messages as a strategy in Fintech mobile applications and its implementation in order to influence customers' resistance and hence attitude while using financial systems. In- depth interviews with professionals in the field and customers of Fintech applications were conducted with a sample of 25 participants. The analysis was carried out using thematic analysis. The results provide new theoretical perspectives for future research and contribute directly to the professional field by nourishing the Egyptian 2030 vision towards sustainability and green Fintech messages.

Keywords: *Fintech mobile applications, Green Messages, Resource-Based View Theory, Goal-framing Theory, Technology Acceptance Model*

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1. Introduction

Our world is witnessing a significant technological revolution along with large-scale industrial development that influences nearly every aspect of human daily life and ecosystems. The Internet of Things, Big Data, and digital innovations embody a megatrend for all scholars (Hwang et al., 2021). As they can harm the environment with CO2 fingerprints, they can also help improve our ecosystem health (Georges & Quenum, 2024). Financial technology (Fintech) services, as one of the technological developments, have become more distinct from traditional financial services by utilizing the latest technical advancements in infrastructure, big data, data analytics, and mobile devices to improve the customer experience (Chueca Vergara et al., 2021).

Fintech as a business sector is rapidly evolving worldwide with a total investment of 113 billion dollars, according to the Stata international report (Stata, 2024). Despite the challenges that are encountered in the developing countries' economies, the investment in this sector is growing equal to the international growth rate. In Egypt, the total investments have grown by more than 300% from 2017 to 2024 (Stata, 2024). These reports illustrate the significant importance of the fintech sector and its involvement in individuals' daily lives and thus, its environmental impact.

Financial inclusion is one of the main pillars of the Sustainable Development Strategies "Egypt's Vision 2030" due to its potential impact on improving the opportunities for inclusive growth and maintaining financial and social stability within the framework of attaining the objective of a competitive and diversified economy" (CBE, 2023). Furthermore, the Central Bank of Egypt reported a considerable improvement in financial inclusion rates in 2023, with 46.9 million adults possessing transactional accounts, up from 64.8% in December 2022. This growth rate is 174% higher than the same period last year.

“Green industry” is the classification by many scholars to describe the Fintech industry (Singh & Sharma, 2023). It is the solution that is being implemented in traditional financial services to promote sustainability. Green banking projects seek to reduce negative environmental effects while promoting sustainable growth. Fintech solutions facilitate this by providing banks with novel tools and technology for incorporating sustainability into their goods and services (Hwang et al., 2021). The progress of green Fintech solutions is crucial in achieving sustainability objectives and resolving severe environmental issues (Fu & Ullah, 2023; Hussain et al., 2023).

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Mobile payment service via mobile applications, among other Fintech offerings, is the most important as it can quickly and affordably attract new users and is among the first to innovate (Esawe et al., 2024) and implement new payment features (Zhou et al., 2022). Using mobile devices, such as smartphones, tablets, or any other wirelessly enabled device that can securely handle financial transactions over a mobile network or via various wireless technologies, for at least one phase of a transaction is known as mobile payment (Hwang et al., 2021). Digital platforms, such as digital payments and online statements, promote environmentally conscious habits while reducing paper and energy use (Bukola Adeoye et al., 2024).

Despite the importance of Fintech as a sector, which cannot be understated, the research regarding its role in sustainability is in its infancy. Scholars such as Georges & Quenum (2024) and Singh & Sharma (2023) highlight the practical and theoretical gap regarding this area. Thus, the focus of this study is to explore the Fintech industry mobile applications in developing countries and its relationship with sustainable development. Furthermore, it aims to investigate the implementation of green messaging in the scope of Fintech application as a service sector to influence customers' behaviors and attitudes toward sustainability. The contribution of this research will contribute to both theoretical and practical gaps.

2. Literature Review

2.1 Resource-Based View (RBV) Theory and Fintech Industries

Fintech, or financial technology, is the introduction of cutting-edge technologies such as big data, cloud computing, and blockchain to the financial sector in order to readily promote financial services through new applications and business models (Kashif, Naseem, et al., 2024). The intention is to do away with the necessity for in-person interactions by offering digital access to conventional bank-based financial goods and services (Ismael et al., 2021). Because of the advancements in digitalization over the past ten years, financial technology has evolved substantially. These days, the most widely used technology in the financial sector is those that can be used in banks. Alternative payment methods have been made possible by these technologies (Ellili, 2023).

The Resource View is a strategic approach that emphasizes how businesses exploit their unique resources to generate long-term competitive advantages. It separates resources into two categories:

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intangible and tangible. Tangible resources are physical goods, whereas intangible resources like expertise. Resource Based View takes an internal approach, assessing a company's resources and talents before launching projects. It claims that using internal skills to capitalize on market opportunities yields a competitive advantage and improves the value chain processes (Madhani, 2010).

According to the theory, a firm's competitive advantage stems from its specific resources and abilities. To contribute to a business's achievement, these resources must be valuable, novel, and well-planned for exploitation. It also underlines the importance of strategic resources and capabilities that set Fintech platforms apart from conventional banking organizations. Fintech organizations, for example, might employ technology and new business techniques to obtain a competitive edge over traditional enterprises (Ren et al., 2023). Also, in today's business environment identifying and capitalizing on these resources, businesses can adapt to challenges and opportunities, and sustain long-term success (Alkawasbeh et al., 2024). Therefore, this research believes that the employment of RBV in exploring the relationship between Fintech and sustainability will be invaluable.

***Q1:** How can Fintech support maintaining the eco-system and promote sustainable behaviors?*

***Q2:** How does the Fintech industry grow in developing countries, especially Egypt?*

2.2 Goal-framing Theory and Green Ad Message

Green ad message is the final broader part of the green marketing strategy. It aims at highlighting the environmental benefits of products and services (Lima et al., 2024). Research shows that green ads can effectively influence the sense of environmental responsibility and ethical consumption through the advertisement practices that end with the ad message (Ekebas-Turedi et al., 2021). In the Fintech industry, however, the use of green messages remains limited. Although green ad messages can be designed to emphasize the sustainability and eco-friendliness of Fintech applications such as reducing waste, lowering carbon footprints, and promoting financial inclusion, consumers' environmental values remain under question when it comes to making decisions in developing countries (Hunjra et al., 2024).

Lindenberg and Steg (2007) were the first to put the goal-framing theory in position, they illustrate that people's goals are shaped by the information they perceive; hence their decisions rely on these

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motivations. In other words, the goal-framing theory is defined as a well-established framework that explains the motives that influence individuals' decision-making processes through the information presented (do Canto et al., 2023). The theory posits that there are three types of goal frames; first, hedonic motives (pleasure-seeking), gain motives (financial or personal benefit), and normative motives (moral or ethical responsibility) (Ekasari, 2021; Farhat et al., 2022). Those three types are the explanations of human behavior (Wang et al., 2022). In the context of promoting Fintech applications as sustainable solutions, goal-framing theory can be vital in the process of designing the type of message that will motivate customers.

Previous studies explored the connection between goal-framing theory and green advertising in several contexts. For instance, Chang et al. (2015) results indicate that the gain frame for green advertising messages resulted in higher intentions and attitudes towards sustainable behaviors. However, in fintech applications research, and despite the fact that green ad messages can be particularly potent, scars research has been conducted regarding this area (Georges & Quenum, 2024). As innovative solutions, Fintech mobile applications are not only providing convenience and efficiency but also contribute to broader sustainability goals.

Based on this argument, this research assumes that by motivating customers using goal-framing theory, these applications can provoke sustainable behaviors and be an environmentally responsible alternative to traditional banking and financial services. The major question is which type of motivation should be used while framing the green ad message.

***Q3:** Which type of motivation should be used in the green ad message to influence customers to adopt Fintech applications as a sustainable solution?*

2.3 Technology Acceptance Model and Fintech Mobile Application

The proliferation of technical breakthroughs and Fintech services has inspired studies into the variables influencing end-user acceptability. (Davis, 1989) The theory of technology acceptance model (TAM) says that perceived utility and ease of use are crucial components. However, academics have expanded or combined TAM with other models to provide a more complete framework. Perceived benefits, perceived risks, client needs, and a knowledge of the new technology are all important factors of adoption. Perceived risk might reduce trust in Fintech

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services, whilst perceived benefits promote proactive usage (Ngo & Nguyen, 2024). So, TAM and its extensions are useful for studying user acceptability in Fintech (Putri et al., 2023).

Moreover, throughout the literature, several factors have been investigated as motives for the adoption of Fintech services such as User innovativeness and government support (Setiawan et al., 2021). In their study, Setiawan et al. (2021) investigated the presence of users' innovation and regulatory support in order to conclude that both enhance the probability of adopting these services. However, using the TAM model, other factors were detected and proved to weaken the adoption of Fintech such as perceived risk and perceived ease of use (Wijaya et al., 2024). Abed and Alkadi (2024) state in their research that Fintech providers should place a strong emphasis on several elements, such as the assurance of security measures implemented within their innovative platforms, the seamless efficiency that underlies every aspect of their user experience, the ease of use of the application, and the service quality (Abed & Alkadi, 2024).

Despite all these elements that are investigated using the TAM model, several areas remain uncovered regarding the use of green messages that encourage customers toward sustainable practices. Georges and Quenum (2024) illustrate the literature gap that must be covered using solid theories such as the TAM model. Therefore, this research will aim at uncovering factors that should be considered in future studies and/or during the use of green advertising in Fintech mobile applications.

Q4: What are the factors that should be considered while promoting Fintech applications as a sustainable option?

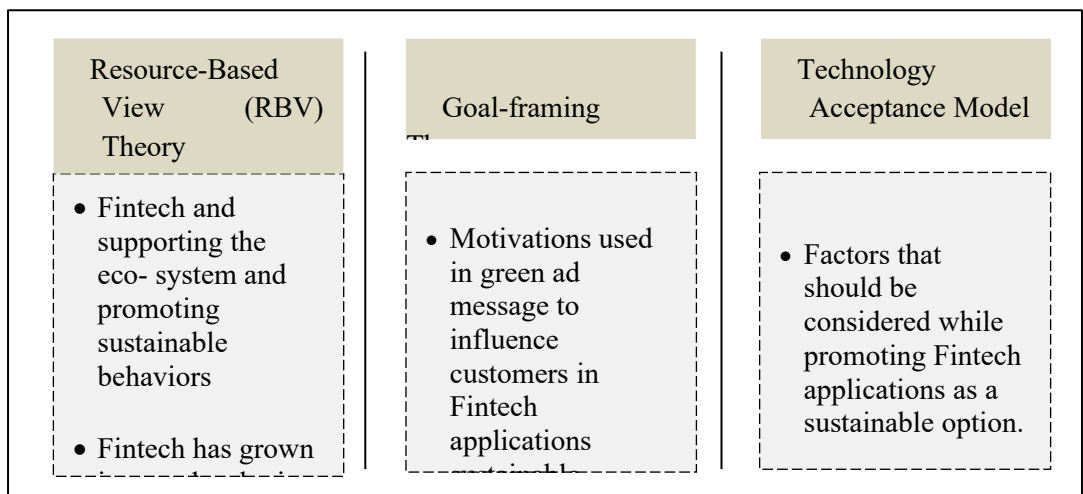


Figure 1. Research questions and related theories.

3. Research Methodology

The current study is a qualitative exploratory study that aims to investigate the phenomenon of green Fintech in developing countries in addition to the efficiency of promoting Fintech as a green solution. Therefore, an in-depth interview strategy was used as the tool of investigation for both customers and service providers.

3.1 Research Population and Sampling

To explicitly answer the research questions, semi-structured interviews were used with both service providers and end-users of Fintech services in Egypt. In this case, there are two populations for this research. First, professionals in the Fintech industry such as marketing managers, general managers and UX/UI designers, banking employees, and development Finance Credit analysts; professionals with relevant experience will be able to fill the practical gap from the service provider's side, therefore, the questions regarding the strategies used, ad messages and other related questions will be efficiently answered. Second, the end-users of Fintech applications and services; those customers will uncover the efficiency of the green Fintech services. Furthermore, interviewing the service receiver will inherently increase the credibility of the service providers.

Busetto et al. (2020) indicate that in qualitative studies any number of participants is considered sufficient according to the research purposes. Due to the difficulty of addressing large numbers of individuals and the time limitation of such a methodology, a total number of twenty-five respondents was collected. Twelve persons were professionals and thirteen were customers of Fintech services. The research employed a non-probability sampling technique using judgmental sampling by choosing participants from the LinkedIn platform and then snowball sampling through those judgmentally chosen participants. Aboalsamh et al. (2023) and Ranchber (2018) interviewed a smaller sample size.

3.2 Interviews Design

To address this knowledge gap, we followed the methods of Malhotra et al. (2017) and Busetto et al. (2020) and derived the interview questions from the study's key questions. To better understand the questions asked in the semi-structured interviews, we can refer to Appendix 1. Regardless, with the participants' consent, we conducted the interviews online and recorded them.

3.3 Data Analysis

Thematic analysis is the main analytical tool used to inspect the research data and questions of the current study. It is a process of six stages namely (Braun & Clarke, 2006; Christou, 2022): 1) Being familiarized with the research data, 2) Concluding initial codes extracted from the interviews 3) Categorizing codes into

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themes, 4) Checking the theme's validity concerning the extracted codes and research data, 5) Labeling themes and defining each theme in order to build the research story, and 6) Writing up the conclusions and the results of the analysis (Braun & Clarke, 2006; Christou, 2022).

4. Results and Discussion

The sample was 40% female (10 participants) and 60% male (15 Participants). The age groups varied between 23 to 55; in fact, the majority of the research sample was between 27 and 35 representing 52% of the total sample. Individuals in the age group of 23 to 26 were 20%, from 36 to 45 were also 20%, and from 46 to 55 represented 8% of the total sample table 1 illustrates the sample sociodemographic characteristics ($N = 25$, $SD = 7.7$).

Table 1. *Sociodemographic Characteristics of Participants*

Baseline characteristic	Professionals		Customers		Full sample	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Gender						
Female	4	33	6	46	10	40
Male	8	67	7	54	15	60
Marital status						
Single	2	16.6	7	54	9	36
Married/partnered	6	50	6	46	12	48
Divorced/widowed	2	16.6	-	-	2	8
Other	2	16.6	-	-	2	8
Highest educational level						
High school/ college student	-	-	3	23	3	12
University degree	5	42	6	46	11	44
Postgraduate degree	7	58	4	31	11	44
Occupation						

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Baseline characteristic	Professionals		Customers		Full sample	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Student	-	-	3	23.1	3	12
UX/UI	3	25	2	15.4	5	20
Marketer	3	25	-	-	3	12
Manager	4	33	2	15.4	6	24
Other	2	17	6	46	8	32
Total	12	100	13	100	25	100

Note. *N* = 25 (*n* = 15 customers & *n* = 10 professionals). Participants were on average 33.5 years old (*SD* = 7.7).

The findings of the thematic analysis of the data are shown in Table 2, which contains several codes and themes that were retrieved from the semi-structured interviews that were conducted with the participants. As a result of the investigation, the three most important motifs were identified. In the first place, the function that fintech applications play in assisting with the upkeep of the ecosystem. Second, the financial technology industry and the promotion of environmentally responsible habits. The third topic is the elements that determine the viability of fintech as an alternative. Specifically, these three primary topics show and enlarge the knowledge gap that exists between the green advertising message and the green sector of fintech.

Table 2. Thematic analysis results

Theme and dimension	Example quote
The role of fintech in sustainability (Professionals)	
Supporting sustainability by the Fintech applications using green marketing and green ad message	<p>“With the collaboration between UX/UI and marketing departments, we will be able to add icons specified to sustainability practices.” (Professional, male, age 43)</p> <p>"All our integrated processes are about moving towards sustainable eco-friendly enterprise. It is already our mission to help preserve the environment. “(Professional, male, age 34)</p>
Supporting sustainability by the Fintech applications that reduce waste and household gas emissions	<p>“The use of Fintech applications reduces waste and lowers gas emissions. People don’t have to make the same effort to pay the pills or have a receipt.” (Professional, female, age 30)</p>

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Theme and dimension	Example quote
Supporting sustainability through the Fintech applications functions and user-green supportive practices	<p>“We encourage sustainability via loyalty credits, green investment portfolios, and environmentally friendly payment methods. Embedding these features aims to improve user experience and hence promote sustainable habits generally” (Professional, male, age 35)</p> <p>“Supporting sustainable behaviors through fintech applications can be easily achieved by including integrations with other applications such as cash-back on the energy savings” (Professional, female, age 45)</p>
Supporting sustainability through the Fintech applications functions of donations and transactions to support green industries	<p>“One thing that may be done, in my opinion, is to provide a function that lets consumers easily transfer money to environmental organizations. Each time a customer pays using our app, a small percentage of the cost goes toward environmental protection and other green causes.” (Professional, female, age 34)</p>
<p>Fintech green message and promoting sustainable behaviors (Professionals and Customers)</p>	
Influencing attitudes towards sustainable green behaviors through green fintech ad message	<p>“If there were green commercials from my banking app, I would be more conscious of how my financial decisions affect the environmentthat kind of marketing motivates individuals to embrace more sustainable practices...Knowing that my bank supports sustainable projects will make me glad and motivated.” (Customer, female, age 33)</p>
The lack of use of green message frame in the fintech industry in the MENA region	<p>“I hardly see any fintech applications in the MENA area endorsing green messages or sustainability.</p>

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Convenience and security take front stage most of the time, while eco-friendly projects or motivating consumers to follow sustainable financial policies get little attention.” (Professional, male, age 27)

Factors That Influence Fintech as a Sustainable Option (Professionals and Customers)	
Materialistic factors (financial) offered by the fintech application	“The app drew me in with its decreased transaction costs and cashback benefits. The key reason one uses the programs is these reasonably priced solutions.” (Customer, male, age 40)
Offers and collaborations with other brand by the fintech industry	“I prefer to use the applications that collaborate with different brands and provide novel payment options.” (Customer, male, age 23)

4.1 The Role of Fintech Applications in Support Maintaining the Eco-System

Financial inclusion promotion is a key concern for developing the economy, especially in the MENA region, which accounts for ninety percent of the unbanked population (Ismael et al., 2021). Yet, the Fintech industry did not grasp the attention of sustainability scholars until recently (Lisha et al., 2023). However, the analysis of the previous interviews revealed the sustainable contributions the Fintech sector can provide to the ecosystem. Professionals indicate that green Fintech applications can help preserve the ecosystem via two different approaches either by the normal daily-basis activities and/or through using the application itself. Those two ways indicate the major themes of how Fintech can contribute to sustainability innovations.

Professionals agree that several strategies in the industry aim at supporting sustainability. Some of those strategies are related to the process of being green and sustainable, which makes the organization classified as environmentally friendly. On the other hand, they illustrate that other supporting features will be added to the applications that encourage sustainable actions, such as loyalty points when going green and donations to other organizations such as "Save the Ocean". Other participants such as number 9 illustrate that the contribution of Fintech applications to the environment is clear by the mere use of the app. It lowers paper use, reduces CO2 gas emissions, and is part of sustainable technologies.

“The use of Fintech applications reduces waste and lowers gas emissions. People don’t have to make the same effort to pay for the pills or have a receipt.” - Professional, female, age 30

In light of this, figure 2 depicts the primary strategies that were derived from the theme analysis in order to contribute to the maintenance of a sustainable ecosystem. Within the context of the execution level, this conclusion was interwoven with the notion of resource-based perception. We may either aid the environment by promoting the environmentally friendly qualities of fintech applications or by employing these apps in sustainable innovations. Both of these options are determined by the resources that are accessible to us.

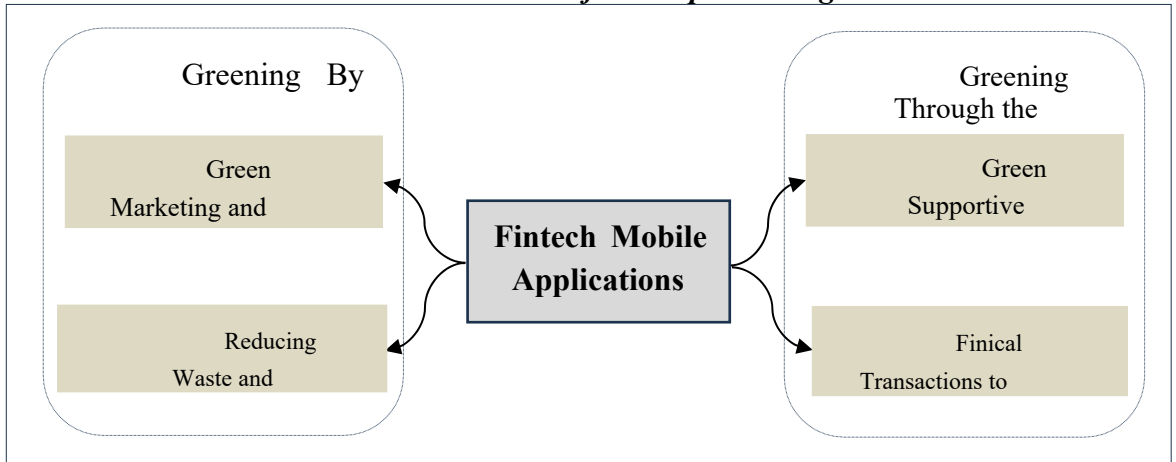


Figure 2. *How Fintech applications can be used in sustainability in Egypt.*

Moreover, financial technologies promote green finance and sustainable development through different means (Sun et al., 2022) also this is possible by utilizing different artificial intelligence and machine learning techniques. It is also used in mobiles and computers to help people, owners, and businesses manage their financial operations (Lisha et al., 2023). Despite the increased acknowledgment and continuing policy discussions regarding the potential role of financial technology development in addressing sustainable finance, the notion of Fintech and sustainable finance is still relatively new. Therefore, this research fills the theoretical gap detected between sustainability and Fintech technology (Kashif, Pinglu, et al., 2024).

4.2 Fintech Industry and Promoting Sustainable Behaviors

In developed countries, it is easier to build assumptions on how Fintech can promote sustainable behaviors, though it is not the same case in the developing world or the MENA region. The results of the interviews indicate that the mere existence of green advertising regarding Fintech applications can trigger sustainable behaviors. Respondent number 3 from customers said that any advertisement of green behaviors motivates her and her friends and colleagues to consider the environmental consequences.

“Whenever I see signs, ads, or any promotions that are related to the environment, I instantly consider the consequences of my behaviors. This also applies to my friends and colleagues.” - Customer 3, male, age 32

North America has led the way in recent years with increases in global Fintech investment, with Europe, Asia, and Latin America coming in last. Since then, the importance of Fintech has resulted in the reorganization of the financial industry, and even during the COVID-19 crisis, Fintech

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adoption increased dramatically to alleviate the impact of the crisis, which affected enterprises that were physically operated ((Naz et al., 2024).

Fintech platforms in the MENA area are fast expanding, accounting for twelve percent of transactions. They provide new solutions for businesses to manage operating expenses while expanding their financial range of products. To promote expansion, the sector requires technology infrastructure as well as laws and regulations (Elouaouri & Ibourk, 2024) The MENA region's young and technologically sophisticated society suggests room for progress. However, the area's diverse cultures and economic dynamics, particularly in clusters such as North Africa, the Gulf, and the Levant, need to address these differences to promote Fintech growth in the region (Dahdal, 2024).

4.3 Factors That Influence Fintech as a Sustainable Option

The vast majority of experts in the area are certain that the future of financial technology is well on its way to flourishing in the Middle East and North Africa region, and more especially in Egypt. On the same level, all customers are in agreement that the services offered by the Fintech business, particularly in mobile apps, are continuously being improved. Customer 5 stated that the application design in money transactions caused all of the individuals in his immediate vicinity to experience discomfort; nonetheless, this challenge was eventually handled after a few months had passed. In Egypt, this demonstrates the sophisticated solutions in user interface and user experience designs, as well as in security mechanisms for financial technology applications.

"I think that I now have a variety of well-trusted applications that I can use daily here in Egypt. And the daily update in these technologies impresses me."- Customer, male, age 28

In addition, expert number 9 referred to the sophisticated security procedures that are applied in Fintech apps, even though he made it very obvious that clients are concerned about more than just privacy and security measure safeguards.

"Privacy and security are the base for Fintech applications; however, the base does not mean that the company will survive relying on this only."- Professional, male, age 40

According to the findings, several elements are connected to a number of theories as well as other independent factors that have the potential to affect the acceptance and use of Fintech apps in Egypt. Since it involves sensitive financial information, the first concern is privacy and security.

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A second consideration is the monetary benefits that will be obtained via the utilization of the application. Third, the simplicity with which the program may be utilized. The fourth place, is the functions that are accessible, such as the number of cooperative brands, the ease of transactions, etc. The attractiveness of the application and the overall designs come in fifth.

5. Conclusion

The term "fintech," which refers to the integration of technology innovation and financial services, has emerged as a significant breakthrough in the realm of finance. The collapse of the economy in 2008, in conjunction with the growth of software companies in the Silicon Valley region, has increased the need for services that are superior, more expedient, and more affordable. Fintech companies compete with traditional intermediaries by offering a wide range of innovations in the financial services industry (Anh et al., 2024). This research, on the other hand, makes it possible for both academics and professionals to employ applications of fintech as an environmentally friendly resource. As a result of this research, it has become clear that eco-innovations that are beneficial to the environment may be accomplished through the utilization of Fintech applications or by the utilization of these technologies.

First, the implementation of the Fintech applications for sustainable development. As a result of this, there will be a reduction in the amount of paper waste created an increase in the amount of financial luxury experience, and a decrease in the amount of gas emissions emitted because everyday transactions can now be completed remotely. According to Elouaourti and Ibourk (2024), the utilization of Fintech apps is also capable of achieving sustainable financial practices through the utilization of big data analysis and secured transactions and transactions. Secondly, the utilization of apps that are based on financial technology might help increase sustainability. According to Kashif, Pinglu, and others (2024), it is possible to incorporate a number of embedded technologies, such as trackers for greenhouse gas emissions, ecosystem points, and contributions to environmental organizations that are run voluntarily.

The use of green messaging in conjunction with the promotion of the considerable benefits that the application offers will undoubtedly affect the overall attitude towards the environment, which will ultimately result in a reduction in the number of undesirable behaviors that occur daily and an increase in awareness regarding the environment. The advancement of technology in the financial technology sector is redefining global competitiveness by providing businesses with the

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opportunity to innovate and gain a competitive edge. Because of this, it is an advantage when it comes to influencing its consumers since technological developments have transformed the business of providing financial services, met customer expectations, and boosted service productivity, so reshaping and touching the lives of people (Naz et al., 2024). Through the use of empirical evidence, this research advises professionals working in the financial technology industry to incorporate environmentally friendly advertising into their entire marketing plan as well as the user experience and user interface design department.

6. Research Limitation and Future Research

This research has certain disadvantages despite its benefits. First, 25 persons is enough for theme analysis, but the results may not apply to a larger sample. Future research should recruit a larger, more diverse sample from different socioeconomic backgrounds to make the results more universally applicable. Second, Egypt's Fintech business is young, making it hard to interview green ad message specialists. Given the sector's continual evolution, industry experts may have lacked sustainability-oriented financial technology competence, resulting in shallow responses. Participant selection bias may have biased the results toward a more positive perspective of green marketing since professionals with a greater love for sustainability were more likely to participate. Finally, because of its subjective interpretation, thematic analysis is good at discovering patterns but biased. This implies it may not completely capture participant viewpoint complexity.

Future research should expand the sample size and recruit a more geographically and socioeconomically diverse population to generalize results. Quantitative methods like surveys or experimental designs can enhance qualitative results to provide more statistically significant proof of the Fintech app's green ad messaging advantages. Research may examine how green marketing affects consumer trust and loyalty to Fintech services over time. To gain a deeper understanding, examine how social, environmental, and economic communication frameworks overcome customer opposition. Finally, a study comparing developing and developed nations' green Fintech messaging may reveal how socio-economic factors affect sustainability-focused communication initiatives. This would increase our knowledge of how to employ green marketing to promote sustainable global financial systems.

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7. Appendix

Interview Questions:

Q1: How can fintech help maintain the ecosystem well-being and promote sustainable behaviors?

Professionals

- Do you consider your business a sustainable and green business? Can you provide examples of fintech companies that are leading the way in green financing?
- What are some successful examples of fintech rewards programs that promote sustainable behavior?
- Do you apply green strategies? Give examples. How does fintech help in reducing pollution?
- What opportunities do you see for fintech to further contribute to environmental sustainability in the next 5-10 years?

Q2: How does the fintech industry grow in developing countries, especially Egypt? **Professionals**

- How has the digital infrastructure in Egypt evolved to support fintech growth?
- What challenges remain in terms of internet connectivity and mobile penetration?
- What initiatives are being taken to promote financial inclusion through fintech in Egypt?
- What barriers do consumers face when using fintech services, and how are companies addressing these issues?
- How are fintech companies ensuring a positive user experience for their customers?

Q3: To what extent does the green ad message influence customers to adopt fintech applications?

Professionals

- Did you apply for green promotions before? Have you observed any changes in consumer behavior following green advertising campaigns?
- How much weight do consumers give to sustainability and green messages compared to other factors (e.g., cost, convenience) when choosing fintech applications?
- Does your future marketing plan include the use of sustainability and green behaviors? **Customers**

- How often do you notice green advertising messages from fintech companies?
- What is your general impression of fintech companies that use green messages in their advertising? How credible do you find these green messages?
- Do you believe fintech companies genuinely contribute to environmental

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sustainability?

- How important is sustainability to you when choosing financial services or products?
- Can you rank the factors (e.g., cost, convenience, sustainability) that influence your choice of fintech services?

Q4: What are the factors that should be considered while promoting fintech as a sustainable option? **Professionals**

- What are the current best practices in promoting fintech as a sustainable option?
- How do you ensure that your sustainability claims are accurate and transparent?
- Other than sustainability what are the other quality factors that you might include in the ad campaign?
- What technological innovations are you leveraging to enhance the sustainability of your fintech services? How do you balance innovation with the need to maintain sustainable practices?

Customers

- What barriers might prevent you from choosing a fintech service based on its sustainability efforts?
- What elements of a green message make you more likely to use a fintech service?
- What can fintech companies do to build trust regarding their green initiatives?
- How does a fintech company's commitment to sustainability affect your overall satisfaction with their services?
- How does the sustainability of a fintech company compare to other factors like cost, convenience, and features in your decision-making process?
- Why do you use fintech applications?
- If you saw ads about the contribution of fintech in the environment? would you believe it sufficient?
- If you gained non-financial benefits, would you still be using fintech?

EMPOWERING LOCAL FASHION: HOW EGYPTIAN GEN Z'S PERCEIVED VALUE DRIVES SUSTAINABLE CHOICES

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Abstract The success of local brands and production is crucial for the sustainability of the economy. This study aims to aid local brands by empirically exploring the effect of the customer perceived value model with its four dimensions: functional, emotional, social and economic on purchase intention applied on fashion brands, while also considering the moderating effects of fashion consciousness, price sensitivity and perceived brand localness. The aim of the study is to understand consumer behavior in poorly studied emerging economies like Egypt. After reviewing relevant literature, a conceptual model was formulated. This model was tested by a survey on a non-probabilistic convenience sample of 276 Egyptians from generation Z and then analyzed by structural equational modelling.

The findings of the study reveal that customer perceived value (CPV) has a significant positive effect on purchase intention, and perceived brand localness has a significant moderating effect on the relationship between CPV and purchase intention. However, there was a lack of evidence supporting the moderating effects of both fashion consciousness and price sensitivity. Very limited papers studied the buying behavior of the young generations from emerging economies towards domestic brands, specifically after the recent trends and events happening globally and in the Middle East. By examining important potential, this study makes a dual contribution through enriching the consumer behavior literature related to local brands and providing local marketers with the consumer knowledge that ensures the sustainability of their businesses.

Keywords: Local Brands, Sustainability, Customer Perceived Value, Purchase Intention, Emerging Economies.

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Introduction

Did the recent wave of political and economic challenges in Egypt change how consumers view local brands? Previous literature has emphasized that typically customers from developing countries like Egypt prefer global brands due to their higher quality and status perception (Zebal & Jackson, 2019). Farouk (2018) brought attention to the **incompetence of local fashion brands in Egypt to compete effectively on the local and global scale**. Given the recent regional and global events, supporting local products has become a necessity rather than an advantage to maintain the sustainability of the economy. Starting with the emergence of covid-19 that encouraged local brands consumption, in fact, a study by PwC (2022) was made to explore Egyptian and Arab consumers' post-pandemic purchasing behavior had discovered a growing tendency to support the local market, as 83% of the region's respondents expressed their readiness to spend more than the average price for a product created or sourced locally, whereas 46% of respondents in Egypt and other GCC countries said they are ready to spend more at local retail locations. Moving through the massive rising in living costs and restrictions on imported goods that have happened in Egypt (Reuters ,2024). Finally, the war on Gaza at the end of 2023 which resulted in Egyptian and Arab consumers boycotting brands from western countries that support the war (Buheji & Ahmed, 2023). All these events resulted in an observable shift in consumers attitudes toward local brands.

The United Nations (UN) had developed the 17 SDGs to be a framework for governments and organizations to implement policies and actions to achieve their 2030 sustainable development goals (SDGs) (United Nations, 2015). Testa et al. (2018) referred to the "The Lazy Person's Guide to Saving the World" (United Nations, 2016) that was launched to help individuals contribute in achieving sustainable development goals as well. The guide emphasizes the importance of shopping local, as shopping local contribute to several SDGs by helping to maintain a sustainable resilient local economy, reducing carbon footprint emissions through reduced distance of transportation and lastly, preserving local culture and heritage. In a highly competitive local and global market, local brands are mostly concerned with understanding local preferences as well as promoting the values of ethics and sustainability (Dat, 2024). PWC (2022) studies revealed that Egyptian consumers' level of awareness on sustainability and social responsibility is on the increase.

Nessim and Bardey (2022) stated "Bye Mainstream, Buy Local", emerging markets are seeing a transformation in consumer behavior and

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consumption patterns, with domestic brands rapidly substituting international brands (Cambefort, 2020). The world seems to have started shifting from globalization to localization (Verma and Naveen, 2021). Many Egyptian local fashion brands have started to gain popularity amongst Egyptians, this is apparent in recent events like local bazaars, “Wear Local” social media trend and Egypt Fashion Week.

Egypt is a country less researched in the existing literature. As a result, there is a lack of knowledge about consumers’ behavior towards local brands in the MENA (Middle East and North Africa) region (Brooksworth et al., 2023). The study was applied on the fashion industry since it is one of the most important and competitive industries in the globe, McKinsey (2017) report stated that if the fashion industry was a country, it would be the 7th world’s largest GDP. Revenues of the Egyptian fashion market is projected to increase with an annual growth rate of 13.50% from 2024 till 2029, resulting in an estimated market volume of US\$2.43bn by 2029 (Statista, 2024). Local brands hold a unique significance as they not only contribute to the domestic economy but also establish a sense of shared identity among the people of a nation (Murshed, 2019).

There are numerous academic papers that had discussed the effect of perceived value on the purchase intention towards fashion products, for example, some are focused on luxurious fashion (Jain, 2019; Salehzadeh & Pool, 2016), eco-friendly fashion (Arora & Manchanda, 2022; Jeong & Ko, 2021; Şener et al. 2023) and online fashion (Escobar-Rodríguez & Bonsón-Fernández, 2017; Salem & Alanadoly, 2022). Despite all the previous studies, there is still a lack of studies that pinpoints indicators for purchasing locally produced retail clothing brands in emerging economies (Zebal & Jackson, 2019); And more precisely in the MENA region. Researchers always attempt to understand the relationship between customer’s perceived value and purchase intention by adding some moderating variables. In this study, the researchers added fashion consciousness, price sensitivity and perceived brand localness as a potentially influencing factors on the relationship between perceived value and purchase intention towards local fashion brands through testing this model, the study is willing to answer the following questions:

- 1- Is there a relationship between perceived value of local fashion brands and purchase intention?
- 2- Does fashion consciousness affect the relationship between perceived value and purchase intention towards local fashion brands?

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- 3- Is there a moderating effect for price sensitivity on the relationship between perceived value and the purchase intention of local fashion brands?
- 4- What influence does perceive brand localness have on the relationship between perceived value and purchase intention?

The subsequent sections of this paper are organized as follows: Section 2 presents the theoretical foundation of the model and a literature review to develop the hypotheses. Section 3 discusses the methodology and variables. Section 4 reports the results. Section 5 offers the conclusion, implications. Finally, section 6 includes the limitations, and areas for further research.

Literature Review & Hypothesis Development

2.1. Theoretical Foundation of Customer-perceived value

Given the fact that understanding customer-perceived value (CPV) in a comprehensive manner is still lacking (Khan et al., 2021), The theory of CPV is becoming a leading area in academic literature and marketing practice (Blut et al., 2023). Research on CPV began in the late 1980s. Zeithaml (1988) proposed that perceived value as the consumers' overall assessment of the utility of a certain product or service based on their interpretation of what they have received against what they have offered. Understanding the dynamics of perceived value is of a vital importance for marketers as it is a direct influencer for customer's willingness to purchase their product (Dodds et al., 1991), they also described perceived value as the cognitive trade-off between both perceived quality and sacrifice. Sacrifice can be referred to by two ways; the monetary prices paid by the consumer (Kumar and Reinartz, 2016), and the nonmonetary prices that they had offered such as time, energy and risk (Leroi-Werelds, 2019).

It is still challenging for researchers to define CPV and to determine which dimensions to include in their models, and practitioners still struggle to find clear policies for improving CPV (Blut et al., 2023). There are many theories that offer conceptualizing models to describe CPV in previous literature; Sheth et al. (1991) theory suggests five values, which are, functional, emotional, epistemic, social, and conditional value. Wang et al. (2004) has also adopted Sheth et al.'s (1991) model, from which they had eliminated both epistemic and conditional values. They later added perceived sacrifice which included energy and time. Finally, Sweeny and Soutar (2001)

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model focused on four main value dimensions: functional, economic, social and emotional, this scale is referred to in literature as The PERVAL model.

Many perceived value models were suggested in different situations of fashion marketing literature such as price, quality, social, emotional, perceived risk, aesthetic, and innovation values (Rachman et al., 2020); Creative value, aesthetic value, educational and cultural value, green value, engineering value, social value, and quality value (Shu, 2022). Functional, economic, social and emotional values (Boseila et al., 2023).

Theory of Planned Behavior

The theory of planned behavior (TPB) remains to be one of the most widely used frameworks for studying individual behaviors (Yuriev et al., 2020). Behavioral intentions are the closest thing that can help marketers predict behavior (Ajzen, 1991). TPB was introduced by Ajzen (1985) and he defined it as that the behavioral intentions, attitudes and control guide the human behaviors. The behavioral beliefs are referred to the advantages and disadvantages perceived of carrying out a particular behavior; normative beliefs are defined as the person's subjective probability that a certain normative referent encourages the person to perform a specific behavior (Ajzen, 2012). On the other hand, TPB has been frequently criticized for its inadequate predictive accuracy. For example, Iran et al. (2019) argued that attitudes can provide stimuli for only a specific 23 behaviors. More specifically, despite having positive attitudes, individuals can be prevented to perform a behavior due to unfavorable external situations, demographic factors, or ethical obligations (Si et al., 2020).

Perceived Value and Purchase Intention

According to Chen et al. (2021), consumers' intention to purchase fashion products has become no longer limited to the garment itself, but rather on consumers' perception of the overall image and value of the product. More than any other factor, perceived value is the primary determinant of purchase intention (Shafiq, 2011). There are two approaches to perceived value:(1) unidimensional focus, where perceived value is the outcome of a general assessment of the consumer's usefulness of a particular product or service (Zeithaml, 1988); (2) multidimensional focus, wherein the consumer evaluation considers factors of price, quality, benefits, Perceived value, trust and purchase intention, compromises and motivations of hedonic nature are also contained within the consumer evaluation. The second

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approach permits a more complex analysis based on the behavioral conception of value in a broad way (Sánchez-Fernández & Iniesta-Bonillo, 2007).

Drucker (2012) points out that customers are not consuming products but value, which explains that the cognitive evaluation of value made by consumers which is an important prerequisite for the actual occurrence of this consumer behavior. Previous research suggests that CPV can be accepted as a reliable predictor of consumer purchase intentions (Dam, 2020; Lim et al., 2014; Ryu et al., 2012).

Sweeney and Soutar (2001) defined functional value as the benefit resulted from the perceived quality and expected performance of a product. Quality can have different meaning depending on the nature of the product or the industry or even the target market. Product quality is a multifaceted concept, including brand performance, reliability, and innovativeness (Nwachukwu, 2019). Mingione et al. (2020) stated that as far back as Levy (1959) observed that consumers' behavior is driven not only by functional product features, but also by the feeling, emotions and meaning that consumers assign to certain products. Emotional value is defined as the benefit derived from the sentiments or affective states that a product creates (Sweeney and Soutar, 2001).

Social value is the ability to boost one's social self-conceptualization or perceived social validation by engaging in a brand (Sweeney and Soutar, 2001). This kind of interpersonal interaction pleases consumers' self-referential needs by expressing who they are and who they aspire to be (Thai et al., 2022). Egypt is considered a collectivist society (Hassan & Wood, 2020). Since collectivists tend to prioritize stability and continuity of their social relations (Shavitt & Barnes, 2020), it can be concluded that social conformity affects the brand choices of Egyptian consumers. Extant literature has revealed that social value is an important predictor for consumer satisfaction and willingness to purchase (Gan & Wang, 2017). Researchers are more and more recognizing that consumers are part of social and economic systems that absorb resources and exchange services (Brodie et al., 2019). Rational and emotional brand building strategies must be developed especially during a recession, brands should highlight their economic value to consumers (Boseila et al., 2023). Economic value is often known as price or value for money, is the benefit that an offering offers against its total costs (output/input ratio) (Zeithaml et al., 2020).

Purchase intention is used to quantify the likelihood of a consumer to buy a product (Putra et al., 2021). Understanding purchase intentions have many benefits like determining target markets, new product development and new distribution channels (Peña-García et al., 2020). Consumer purchase behavior may change from time to time due to factors as social lifestyles, industrialization and globalization which might have effects on their judgment towards the products (Asshidin et al., 2016). To be able to predict consumer behavior, it is necessary to know what attitudes, assessments, and internal factors that ultimately create the purchase intention (Fishbein and Ajzen, 1977). According to literature, purchase intention has many meanings. Firstly, it relates to the likelihood that customers may be “willing” to consider buying a product. Then, it shows what a person “wants” to buy in the future. Lastly, it displays a customer’s decision to “purchase” a particular product “again” (Putra et al., 2021). Hence, the author suggests the following hypothesis.

H1: CPV positively affects Gen Z purchase intention of local fashion brands

The Moderating Role of Fashion Consciousness

People in developing countries are starting to show higher levels of self-consciousness as they value the role of brands in improving one’s image (Talaat, 2020). Previous literature has acknowledged self-consciousness from two perspectives: private self-consciousness and public self-consciousness. While the private element reflects the hidden side of a person, which is not visible to people (Bandura, 1991), the public aspect shows the manner in which a person portrays his/herself to others, or how others perceive him/her (Quoquab et al., 2014). Public self-consciousness has been highly examined from a socio-psychological viewpoint. This paper specifically studies the variable “fashion-consciousness,” which refers to the public self-consciousness in context of the fashion consumption (Casidy et al., 2015). In this study, fashion consciousness is defined as “The extent in which a person involves himself within apparel styles or fashions and implies an interest in someone’s style and appearance” (Koksal, 2014). Previous studies show that fashion-conscious shoppers regard apparels as an extension of their own identity, therefore, they would happily spend more money on them (Kaur and Anand, 2018), several researchers have validated a significant and positive relationship between fashion consciousness and

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purchase behaviors like (Adeola et al. ,2021). The second hypothesis, thus, is stated as follows:

H2: Fashion Consciousness moderates the relationship between CPV and purchase intention

The Moderating Role of Price Sensitivity

A lot of studies demonstrated the significant impact of the moderating role of price sensitivity on consumer intention (Bhutto et al. 2022; Hsu et al. 2017). Price sensitivity is defined as the degree of consciousness and reaction presented by customers when finding differences in prices of products or services (Monroe, 1973). It also refers to the extent to which a consumer accepts a rise in price for a specific product in exchange of economic and psychological gains (Anderson, 1996). Consumers' sensitivity to price changes increases rapidly during a recession like what is Egypt facing right now. They tend to react more positively to any price decrease and negatively to any price increase as brand loyalty decreases (Chou and Chen, 2004). During an economic downturn, strong brands win and weak brands lose (Boseila et al., 2023), pricing is a significant factor of the marketing mix, when setting prices for their goods or services, each marketer has to keep a consumer interest in mind. It is supported by repeated evidence that Egyptian customers use price as an in-depth indicator of quality (Nassar et al., 2021). Price sensitivity can be used to measure the willingness of consumer to spend (Habib & Mohamed, 2023). Some studies emphasize that actually spending should not necessarily be an outcome of fashion consciousness, as customers can be price sensitive and restricted by a certain budget (Talaat, 2020). When it comes to Gen Z, it was found that they value money more than previous generations and, as such, are careful in their consumption choices (Gomes et al., 2023). The next hypothesis discusses the moderating role of price sensitivity:

H3: Price Sensitivity moderates the relationship between CPV and purchase intention

Perceived Brand Localness Moderating Role

Despite the emergence of global culture, local culture continues to have a central influence on individual identity and consumer behavior (Samli, 1995). An alternative route is to become an icon of the local culture

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(Steenkamp et al., 2003), In the context of global production and consumption, local brand managers can achieve competitive success by utilizing local cultural capital and basing targeting and positioning on a deeper understanding of local culture and needs. Competitive success for the local brand establishes a sustainable unique value and offer symbols of authenticity and prestige (Ger, 1999). Beyond local symbolism, brands sturdily adapted to the local market are perceived to be tailored to local needs and preferences (Schuiling & Kapferer, 2004); thus, their consumption induces feelings of exclusivity and is viewed as a unique privilege for local consumers (Sichtmann et al., 2019).

Perceived brand localness (PBL) is the extent to which a brand is being recognized as a local player and a symbol of local culture (Swoboda et al., 2012). In the thinking of underlying economic nationalism, local brands establish a link between the national economy and individual well-being, global brands may be regarded suspiciously as a threat to national economic prosperity (Steenkamp et al., 2003). Literature demonstrates that foreign brands enjoy consumer preference in developing countries because of their globalness (Steenkamp et al., 2003; Han and Won, 2018; Davvetas et al., 2022). Yet, foreign brands and products are still often perceived as an “other”, and this otherness could affect consumer preference, particularly in instances where localness is desired (Han and Won, 2018; Schimidt-Devlin et al., 2022). PBL has been widely studied in the marketing literature (Han et al., 2023), From its various favorable effects is the increased purchase intention (Dong and Yu, 2020; Han et al., 2023; Sichtmann et al., 2019; Steenkamp et al., 2003). Accordingly, the author proposes the next hypothesis.

H4: PBL moderates the relationship between CPV and purchase intention

Methodology and Variables

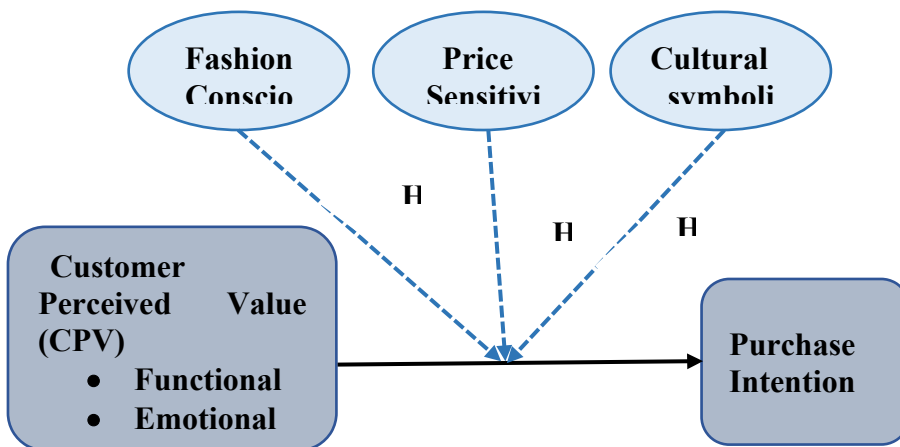
Data Collection and Sampling

The research is conducted in the context of fashion industry as it’s one of the largest industries and it provides a rich context for exploring consumer behavior. This industry is dynamically changing in emerging economies. A study by McKinsey (2019) states that the revenue growth of fashion industry has recently become generated from emerging markets such as Africa, South America, Asia and Eastern Europe. This highlights a great

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opportunity for studying the consumer behavior of customers in those markets (Sestino et al., 2022). Successful traditional marketing strategies applied in mature fashion markets may not well when applied on consumers in emerging markets (Bang et al., 2016). The data collection was applied on Gen Z, Gen Z are the youngest generation of the consumer range. They are born in the period from 1993 to 2012 (Schenarts 2019). From an economic point of view, Gen Z are the potential future consumers of products and services. Generation Z would share 40 percent of the market shortly (Claveria, 2019).

Figure 1. The research framework
Developed by the researchers



3.2. Questionnaire Development

Respondents were first asked whether they have purchased clothes, jewelry or bags and shoes from local brands, then, they will choose their preferred brand from a set of local fashion brands. Questionnaire items were derived from previous literature, Walsh et al. (2014) constructed a shorter 12-item version of Sweeny and Soutar’s (2001) 19-item scale which was used to measure the perceived value, with its four dimensions social, economic, functional and emotional. For measuring purchase intention, we used the 4-item scale that’s developed by Engle (1982) and adopted by Chae et al. (2020). Regarding the moderating variable green consciousness is measured by Kautish and Sharma’s (2018) scale. Price sensitivity is measured by the 4-item scale developed by Kumar et al. (2021), and finally Steenkamp et al. (2003) 4-item scale of brand as an icon of local culture is used to measure perceived brand localness. All questionnaire items are measured on a 5-point Likert scale where (1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5= strongly agree).

Results and Discussions

Cochran (1963) decides the size of the sample used

$$n = \frac{z^2 * p * (1 - p)}{e^2} = \frac{(1.96)^2 * (0.5)(0.5)}{0.1^2} \approx 96.04 \approx 97 < 276$$

Therefore, the sample need to exceed 97 respondents to obtain a margin of error of 0.1.

Descriptive Statistics

Table (1): Frequency tables for demographics in phenomenon

	Sub-category	Frequency	Percentage
Gender	Male	98	35.66%
	Female	178	64.34%
Occupation	Employed	37	13.18%
	Unemployed	1	0.01%
	Student	238	86.21

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Source: Calculations based on sample of 276 respondents using SPSS
26

The majority of the individuals were females representing more than half the sample. Regarding the occupation, the majority were still students representing almost 86.21% of the respondents.

Confirmatory Factor Analysis

Table (2): Reliability and validity analysis for phenomenon

	Items	Loadings	VIF	CA	CR	AVE
CPV	ECOV2	0.618	2.599	0.924	0.936	0.574
	ECOV3	0.756	3.452			
	EV1	0.796	2.96			
	EV2	0.841	3.679			
	EV4	0.841	3.238			
	FV2	0.841	1.453			
	FV3	0.772	2.483			
	SV1	0.747	2.317			
	SV2	0.691	2.205			
	SV3	0.734	1.752			
Fashion Consciousness	FV1	0.659	4.386	0.85	0.894	0.631
	FC1	0.663	2.536			
	FC2	0.868	1.627			
	FC3	0.854	2.214			
	FC4	0.826	1.867			
Perceived brand Localness	FC5	0.74	1.205	0.814	0.89	0.73
	PBL1	0.823	1.227			
	PBL2	0.89	1.27			
Price Sensitivity	PBL3	0.849	1.693	0.831	0.886	0.661
	PS1	0.756	1.876			
	PS2	0.83	2.006			
	PS3	0.849	1.627			
Purchase Intention	PS4	0.815	2.451	0.624	0.798	0.568
	PI1	0.791	2.419			
	PI2	0.729	2.335			
	PI3	0.739	1.953			

Source: Calculations based on sample of 276 respondents using SmartPLS

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Upon evaluating the dependability of the dimensions, it was discovered that all measures of Cronbach’s alpha exceeded 0.7 (Memon et al, 2021), indicating a high level of internal consistency. In contrast, all dimensions demonstrated a composite reliability above 0.7 and an average variance extracted above 0.5 (Memon et al, 2021), confirming their validity. Given that the Variance Inflation Factors (VIFs) are below five, it can be inferred that multicollinearity does not pose a problem in the model (Memon et al, 2021). Furthermore, all item loadings surpassed 0.6, underscoring the significance of the statements (Memon et al, 2021).

Structural Equation Modelling

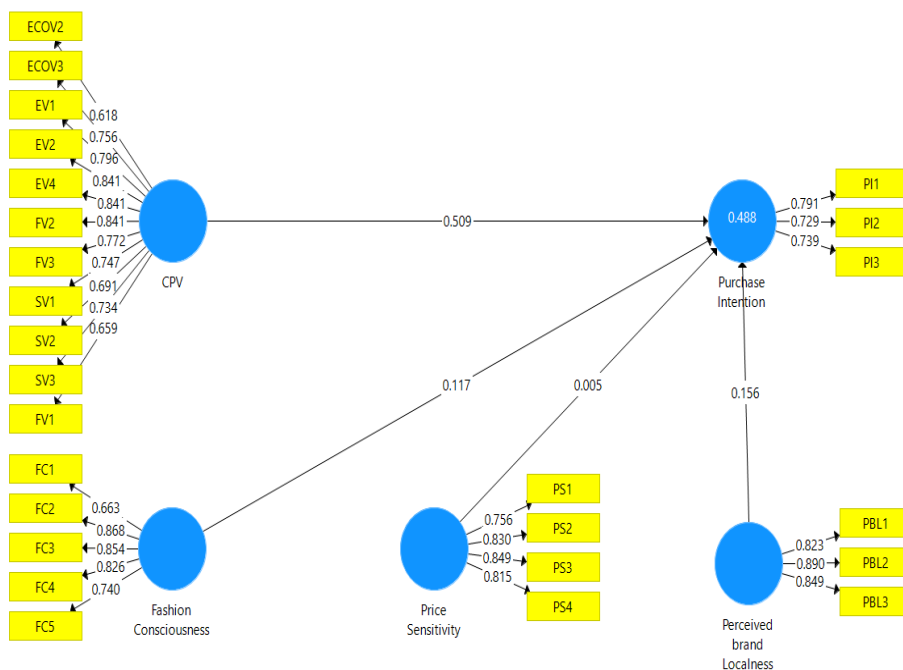


Figure (2): Structural Equation Model of the phenomenon
 Source: Calculations based on sample of 276 respondents using SmartPLS

The model in the graph I is showing the relationships between five latent variables. Each of these latent variables is measured by several observed variables represented as sub-dimensions in the graph each had loading higher than 0.6.

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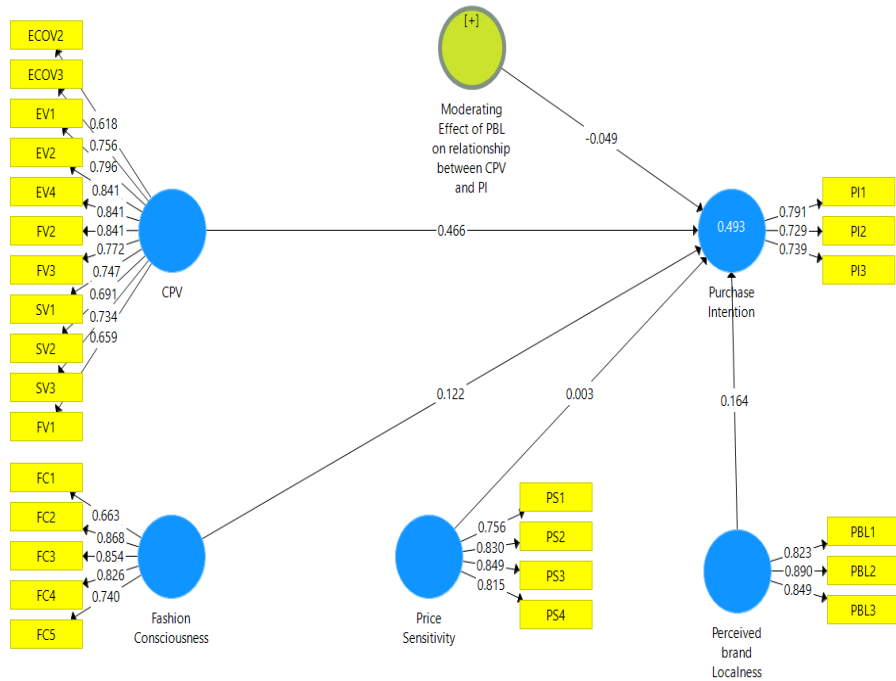


Figure (3): Structural Equation Model of the phenomenon
 Source: Calculations based on sample of 276 respondents using SmartPLS

The model in the graph II is showing the relationships between five latent variables as in figure I. However, the moderator effect on the model. Each of these latent variables is measured by several observed variables represented as sub-dimensions in the graph each had loading higher than 0.6.

Table (3): Path coefficients for the structural Equation Model

	Original Sample	Standard Dev.	T Statistics	P Values
CPV -> Purchase Intention	0.466	0.125	3.71	0
Fashion Consciousness -> Purchase Intention	0.122	0.111	1.102	0.271
Moderating Effect of PBL on relationship between CPV and PI -> Purchase Intention	-0.049	0.024	2.042	0.031
Perceived brand Localness -> Purchase Intention	0.164	0.082	2.003	0.046
Price Sensitivity -> Purchase Intention	0.003	0.093	0.031	0.975

Source: Calculations based on sample of 276 respondents using SmartPLS

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The results of the structural equation model indicate that Customer Perceived Value (CPV) significantly and positively influences Purchase Intention (PI) at 99% confidence level. As CPV increases, purchase intention will also increase. At 0.1 level of significance, there was no enough evidence that price sensitivity and fashion consciousness had a significant influence on purchase intention. On the other hand, Perceived brand Localness (PBL) had positive significant impact on purchase intention at 95% confidence level. Therefore, only PBL can be studied as a moderator in the phenomenon. It was found that it can significantly moderates the relationship between CPV and PI. Therefore, the hypothesis related to it will be accepted as PBL weaken the relationship between CPV and PI at 95% confidence level.

Model evaluation

Table (4): Model evaluation metrics for purchase intention

	SSO	SSE	Q ²	R Square	R Square Adjusted
Purchase Intention	309	233.932	0.243	0.493	0.467

Source: Calculations based on sample of 276 respondents using SmartPLS

The R Square for Purchase intention is 0.493, indicating that 49.3% of the variability in purchase intention can be explained by the model. Q² is a measure of the model's predictive relevance. A Q² value greater than zero indicates the model has predictive relevance, while a value less than zero indicates it does not. The Q² value for purchase intention is 0.243, indicating the model has predictive relevance for this construct (Yahaya et al., 2019).

1. Conclusion, Limitations and Recommendations

From a practical standpoint, the results intend to determine the factors that influence Gen Z's intention to purchase from local fashion brands in an intensively competitive global and local market and aid local brand owners with great customer knowledge to contribute to: 1- the improvement of the Egyptian economy through decreasing unemployment and dependency on importing. 2- understanding Egyptian customers' tastes

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in fashion helps to preserve local culture and heritage. 3- to promote sustainability. This study investigated the effects of several factors on the purchase intention of Egyptian Gen Z consumers towards local fashion brands. Customer perceived value demonstrated a positive effect on purchase intention. Thus, it appears that the higher social, economic, functional and emotional value perceived by Gen Z, the more likely they are to purchase from local brands. Interestingly, there were no evidence supporting the moderating effects of the consumers' fashion consciousness or their price sensitivity despite the current economic hardships in Egypt. On the other hand, PBL appeared to be a significant moderator, indicating that Gen Z's association of a brand with local identity strengthens the relationship between the perceived value and the purchase intention. Hence, marketers of local fashion brands who target consumers from Gen Z are advised to give the greatest attention to the social, economic, functional and emotional values perceived by their customers, and emphasize the local identity and culture of the brand to gain success in the market.

Several limitations have to be considered in this study. Because the research only employed a survey tool, it may have not the sufficient depth of understanding the underlying consumer motivations and how their decision-making process is made. Despite being the most promising customer group, the sample was solely applied on Gen Z living in Cairo and Giza which make it not generalizable to the entire demographics of the country. Forthcoming studies may test other underlying effects on the purchase intention. Moreover, they may extend their research to cover more customer segments, other moderators and employ a mixed method approach with both surveys and interviews to gain richer understanding of the consumer behavior.

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THE ROLE OF SUSTAINABLE SOCIAL MEDIA CONTENT IN ENHANCING CUSTOMER LOYALTY IN THE HOSPITALITY INDUSTRY

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Abstract This study focuses on the impact of sustainable social media content on customer loyalty, exploring how different types of sustainable content influence loyalty across various demographics, including age, gender, occupational status, and marital status. The paper reveals how user-generated and firm-generated sustainable content contributes to building brand loyalty and highlights the role of resilience in customer relationships, particularly within the hospitality industry. For establishing a conceptual model, the authors conducted a thematic review of relevant literature. The testing of the model was done through a quantitative approach with approximately 300 questionnaires filled in by social media specialists and hotel clients in Egypt, using a snowball sample. In addition, 10 qualitative interviews were held with digital marketing experts for explanatory and exploratory purposes.

The study found that both FGC and UGC significantly impact customer loyalty. Education was found to have a moderating effect between UGC and customer loyalty but not between FGC and customer loyalty. Age has no significant effect on customer loyalty regarding the hospitality industry. The present research is confined to the hospitality sector and relies only upon snowball sampling; it further disregards any cultural differences that may make a difference in the way social media content is perceived. Data analyses were conducted with tools of structural equation modeling and descriptive statistics. The following are drivers of customer loyalty on social platforms, with a view of how sustainable content drives loyalty, considering demographic factors like age and education. The study is the first of its kind to ascertain how customer loyalty in the hospitality sector is influenced by both sustainable firm and user-generated content.

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Keywords: Sustainable Social Media Content, Sustainable Firm-Generated Content, Sustainable User-Generated Content, Customer Loyalty, Demographics, Hospitality Industry

Introduction

Traditional marketing methods have evolved significantly with the rapid expansion of the internet and social media networks. Businesses are increasingly leveraging digital channels to achieve their marketing objectives, a trend defined by Chaffey et al. (2019) as digital marketing. Social media, in particular, has become a vital marketing tool, though research on the impact of various forms of marketing content, especially on brands and products, remains ongoing (Bai and Yan, 2020). Gao et al. (2018) highlight the importance of content from the consumer's perspective in digital and social media marketing communication. The evolution of social media content, encompassing videos, images, and text posted by both customers and firms, has significantly impacted the content marketing industry, which saw a market volume of approximately \$145 billion in 2014, with expectations of doubling by 2019 (Schreiner et al., 2019).

The Social Identity Theory (SIT) underpins this research, focusing on the concept of social identity as the awareness of an individual belonging to a particular social group, accompanied by emotions and values associated with that membership (Tajfel, 1974). This theory is crucial for understanding group dynamics, as evidenced by the emergence of in-group favoritism, even under minimal conditions (Abrams & Hogg, 1990; Huddy, 2001). SIT suggests that aspects of an individual's identity are defined by their group membership (Deaux, 2001). This research applies SIT to explore how social media content, whether generated by companies or customers, can influence customer loyalty. The proposed model derived from SIT aims to study the impact of social media content on customer loyalty.

Social media enables businesses to create and share content, facilitating interactions with social media users. Content can be firm-generated or user-generated, each with distinct features that influence customer loyalty (Kim, 2023; Seiler et al., 2020; Colicev et al., 2019). This research focuses on four features of firm-generated content: authenticity, usefulness, consensus, and aesthetic nature (Kwon et al., 2021). Recently, the emphasis has shifted towards the social values embedded in content, which are closely linked to sustainability—a key factor in influencing consumer behavior.

User-generated content (UGC), defined as any digital content voluntarily created by customers on social media or websites (Rajamma et al., 2020), also plays a crucial role in fostering customer loyalty. Features of UGC include credibility, reliability, trustworthiness (Pasi et al., 2019),

cognitive and affective trust, all of which are essential drivers of customer loyalty (Seiler, 2020). Businesses that effectively utilize UGC can strengthen existing customer relationships and build new ones (Schreiner et al., 2021). Achieving customer loyalty is not only a marketing goal but also essential for the firm's economic success (Seiler et al., 2020).

This research is grounded in Stakeholder Theory (Freeman, Harrison, and Wicks, 2007), which emphasizes the importance of considering the interests of all stakeholders, including customers, employees, and the community, in the pursuit of sustainability (Parmar et al., 2010). As digital technology continues to evolve, the ways in which travelers seek information have also changed, increasingly relying on UGC from platforms like TripAdvisor, C-Trip, and Expedia (Zee & Bertocchi, 2018). The hospitality industry faces a complex challenge in balancing firm-generated and user-generated content, making it crucial to understand the distinct contributions of each to customer loyalty. This research explores how socio-demographic variables mediate the impact of social media content on customer loyalty, particularly in the context of service marketing (Manyanga et al., 2022).

This research seeks to answer a critical question: Can sustainable social media content enhance customer loyalty in the hospitality industry, considering the moderating effect of demographic variables? The findings aim to bridge the gap in understanding the impact of social media content on customer loyalty in the hospitality industry, providing insights into how firms can optimize their social media strategies to build and maintain customer loyalty. The paper will proceed as follows: an in-depth literature review will explore the existing body of knowledge on social media content, customer loyalty, and socio-demographic variables. Following this, the research methodology will outline the study's design, data collection methods, and analytical techniques. The results section will present the findings of the study, followed by a discussion that interprets these results in the context of the existing literature. Finally, the paper will conclude with implications for theory and practice, as well as recommendations for future research.

Literature Review

Marketing and Digital Marketing

In reality, digital marketing focuses on managing various online firm presences, including company websites, mobile applications, and social media pages, along with online communication strategies. Much has been

said about the unique character of the social media technologies, the features that unite these seemingly disparate technologies under a single umbrella (Weiser Friedman, 2023). To create a well-established digital strategy recently, this requires understanding a more complex, competitive purchasing environment than ever before, including customer journeys with different shapes of online presence. To help develop a strategy to reach and influence potential customers online, it's common to refer to three main types of digital channels that marketers need to consider, which are paid, owned and earned media (Chaffey, et al., 2019). Paid Media which are purchased media that require payment for search engine traffic, display advertising networks, customers, reach, or conversions. For certain firms, like consumer goods brands, offline media like direct mail and television advertisements are still crucial, owned media which is owned the brand whether online through the blogs, websites, mails, or their social presence as on social media various platforms, or it can be offline as brochures and retail stores, both aim for the idea of being multichannel brand, earned media also refer to as publicity obtained by focusing PR efforts on influencers to raise brand recognition.

According to Olson (2021), there are many digital marketing tactics, but the focus is mainly on the following five tactics which are content marketing, Applied by Content Marketing Institute, it's a strategic marketing approach aimed at creating and disseminating content that is valuable, relevant, and consistent in order to attract and retain an audience, search Engine Optimization: Its goal is to rank as high as possible on search engine sites through the long-term, continuous improvement of content and digital asset design, email Marketing: The process of personally emailing customers and potential customers with current and relevant information, data-driven personalization: Segmenting the audience and making marketing selections based on personal data rather than past behavior, social Media Marketing which is Driving traffic to your websites or business via social media platforms such as Google+, LinkedIn, Pinterest, Instagram, Twitter, Facebook, and so on. As previously stated, engaging content gets shared and liked. This applies to any kind of advertising, whether you use an outside social media management business to create yours, or to establish your own online presence to show your content. More significantly, shifting market dynamics and the quick advancement of technology have contributed to the expansion of digital marketing, Digital content features like accessibility, navigation, and speed are deemed essential for marketing in order for digital marketing to provide results for firms (Verma, 2018).

The topic of sustainability has been approached by several authors using traditional ethical ideas, with a focus on moving towards greater sustainability, is sustainable marketing. This is a more comprehensive management concept that centers on attaining the "triple bottom line" by developing, manufacturing, and delivering sustainable solutions that have a greater net sustainable value while consistently meeting the needs of stakeholders and consumers (Murphy, 2005).

Social Media and Sustainability

Using social media, businesses and customers have developed increasingly complex, varied, and intense connections during the last ten years. Businesses are using social media platforms, on the one hand, to reach more customers geographically (Gao, et al., 2018). Customers are becoming more in control of the marketing communication process and more empowered as a result of social media. They are also starting to create, collaborate, and comment on messages (Li, et al., 2020). Social media is the term used to refer to online communities that are made up of individuals who share interests through their interactions, information sharing, and added value creation, these communities serve as a target market for businesses that intersect where businesses can benefit from other social media users in addition to these interest networks by supporting the company and brand identity, in addition to the help to communicate the company's message to potential business partners (Öztürk, et al., 2019). It has gradually changed from being a single marketing tool to a source of marketing intelligence, as a result, marketers now need to use social media strategically to gain a competitive edge and outperform competitors. People now rely on social media for everything since they are so embedded in our daily lives: from entertainment to every day news and updates on significant events, evaluations and suggestions of products and services, meeting emotional needs, and managing the workplace (Kapoor, et al., 2018).

Social media can be considered as owned media of the digital marketing, owned by the business online as their social presence (Chaffey, et al., 2019). Social media tools/platforms include social networks as Facebook, LinkedIn, Blogs including personal, community blogs, media and corporate blogs, Wikis as Wikipedia, Google Docs, Media sharing as YouTube, Instagram, Daily motion, Virtual worlds: Second Life, FreeRealms, Habbo Hotel, in addition to social bookmarking as Digg and Reddit (Öztürk et al., 2019).

Research is needed to better understand how to effectively inspire sustainable cognition and behavior in light of increased spending and demand for sustainable advertising, particularly in the understudied fields of social media and cross-cultural studies (Minton, et al., 2012). According to earlier study (Du et al., 2016), the benefits of sustainability are not uniform and depend on a firm's practices and capacity to obtain and utilize outside knowledge, however social media use enhances search openness and gives direct access to external constituencies, which might improve exposure to complementary and heterogeneous knowledge, it was also added that using social media can also raise a company's entrepreneurial awareness, which can result in the creation of better insights due to a greater attention given to the customers. An increase in the amount spent on green marketing Compared to internet media like Facebook and Twitter, many consumers prefer to receive green marketing messages through conventional media (such as product labels or magazines), However, study on the use of these new media in green advertising efforts is needed given the sharp rise in the usage of social media by marketers and consumers worldwide where according to Minton (2012), customers who are concerned about sustainability and the environment have spending power of more than \$230 billion.

Content Marketing and Sustainability

A variety of forms can be used to display content, such as blogs, e-books, white papers, case studies, how-to manuals, news and updates, forums, Q&A articles, pictures, banners, info-graphics, podcasts, webinars, videos, and content for social media and micro-blogging websites, and recent modifications to Google's algorithm, including Panda, Penguin, and Hummingbird, indicate that content is the most crucial factor to consider when limiting search results. You have the creativity to write on any subject and can cleverly make an indirect relationship between it and the company (Bala & Verma, 2018).

According to Li et al. (2021), researchers claim that **content marketing** is a customer-focused approach and characterize content's worth as "useful, relevant, captivating, and timely". Thus, this social media marketing strategy offers a two-way dialogue where businesses can make marketing tactics take the lead to provide informative information, and consumers respond favorably to this content. Businesses are investing more and more in the production and sharing of content on social media. Customer engagement is one of the most commonly stated desired outcomes, thus these marketing efforts won't be successful unless marketers know how to

efficiently produce and distribute their content within these platforms to support their goals (Shahbaznezhad, et al., 2023). Social media with its content has gradually changed from being a single marketing tool to a source of marketing intelligence, allowing business to track, examine and forecast consumer behavior. As a result, marketers now need to use social media strategically to gain a competitive edge and outperform competitors (Li, et al., 2021). The communities for content marketing are having the biggest influence on the company's business through the creation and dissemination of interesting content on social media that improves users' everyday lives, relationships where research that has previously been conducted on social media communities has mostly overlooked the important and hidden function that content plays in social media (Dolan, et al., 2019). It is crucial that companies incorporate sustainability and decreased environmental impact into their business models, this recent change has encouraged businesses to incorporate sustainability into many aspects of their operations, such as supply chain management, staff training, and the creation of new products (Du et al., 2016). So, this research suggests incorporating the sustainability practices into content marketing activities on social media and its impact on loyalty and so provides more insights to better understand and encompass such practices.

H1: The sustainable social media content positively impacts customer loyalty

Social media content can be classified into two types according to the source whether it's generated by the firm itself or the professionals, divided into firm generated content (FGC) and user generated content (UGC) (Kim, 2023, Seiler et al., 2020; Colicev, et al., 2019). In marketing research, the usefulness of social media has taken the lead. Studies in this field have looked closely at how UGC affects sales and stock market performance in terms of performance, additional research has compared and contrasted the effects of traditional media; FGC, and UGC on the performance evaluations. Recent marketing research has advocated for greater attention to be given to examining the impact of social media on customer-related indicators, acknowledging that the social media-firm performance link primarily results from its effect on consumer attitudes and behavior, in this regard, research has examined the connections between FGC, UGC (Colicev, et al., 2019).

After analyzing the role of social media, it's essential to explore how sustainability, ethical brands, and green products are communicated, ultimately integrating these aspects into the role of social media for promoting sustainable consumption. Effective communication of corporate

sustainability requires diverse marketing tools, such as CSR reports, sustainability reports, social media, and TV ads, which reflect the values of an organization's culture. It is widely accepted that increasing public environmental and social awareness necessitates a multifaceted approach. Green consumers, in particular, are more engaged with environmental claims and can be supported through a well-coordinated communication strategy (Strähle, 2017).

H1a: The firm generated sustainable social media content positively impacts customer loyalty

2.4. Sustainable Firm Generated Content

By default, the Firm Generated Content (FGC) is professionally designed, posted and managed by the marketing team of the firm (Colicev, et al., 2019). Social media (SM) offers brands an affordable way to disseminate information about their products and brands to a wide online audience. International brands have been using social media (SM) more and more as a branding and advertising strategy since SM users are frequently willing to share information and the networks they belong to often have a high degree of richness and reach (Shang , et al., 2017). Social media posts are any initial written or graphic content created by marketers and posted on a business's Facebook brand page with the intention of interacting, communicating, and informing customers about products, services, or brand-related information (Lu & Miller, 2019).

To provide consumers with the information they need to make informed purchase decisions, it is essential to effectively market green products and sustainable corporations. The media plays a crucial role in building public support for sustainability initiatives due to its ability to quickly educate and inform a large audience. Public support is vital for the success of environmental protection efforts, and information campaigns can be used to engage consumers in the design and implementation of these initiatives (Strähle, 2017). According to Ho et al. (2021), the rapid growth of green products and services in response to consumer demand has made green marketing strategies increasingly relevant. These strategies reshape company values and attitudes to meet consumer needs. Key elements of green marketing include green promotion and green innovation, which influence both customer behavior and company profitability. Green marketing involves embracing environmental protection and technological innovations, such as energy-saving practices, eco-friendly product design, and waste recycling. It

also helps businesses create socially responsible corporate images by promoting products or services that are environmentally friendly, effective green promotion and innovation can significantly enhance business performance.

Firm generated content is measure in multiple aspects including authenticity, consensus among customers, aesthetic and usefulness. Authenticity is defined as the extent to which others believe a message to be true and trustworthy. There has been an attempt to define what authenticity is. Some argued that authenticity is derived from historical facts, attributes, and customs, linking authenticity to objectivity. Others contend that subjective judgments about oneself or an object are just as important as objective characteristics in determining authenticity, consequently, authenticity is strongly associated with genuineness, reality and truth, and being authentic is being original and first hand including three types as objective authenticity, subjective mental associations (symbolic authenticity) and existential motives connected to the object's identity- existential authenticity (Pérez , et al., 2019). Kreling et al. (2022) added that the majority of research on authenticity has focused on the observed consistent between presented and actual reality. In this paper, the objective authenticity will be considered as it argued that there is always an obvious, objective foundation or criteria for evaluating objective authenticity where it is inherent in the item itself (Pérez, et al., 2019). Consensus, often known as the majority opinion, is related to others' perspectives and serves as a cognitive clue for the element (e.g., brand) under examination. Several researches imply that consumers depend on consensus as a kind of informative cue while making product decisions (Kwon, et al., 2021). In an information-overloaded environment, consumers may seek a behavioral trigger such as consensus for easier content search and evaluation. Lo & Yao (2019) stated that people likely believe information when the content is consistent across different sites and sources. Usefulness, given the context of our research, usefulness is defined as the degree to which consumers perceive the content is beneficial in fulfilling their information need where demonstrating that relevant information shared on social media increases consumer trust and purchasing intentions. Similarly, multiple studies agree that relevant online information has a considerable beneficial effect on consumers' perceptions of brands and purchase intentions (Kwon, et al., 2021). Another common reason people feel that content is not useful is that the content feels incomplete whereas If users do not trust your content's completeness, they are also unlikely to feel that it is relevant to their needs (Johnson & Jones, 2022). Aesthetics is referred to as the degree to which one perceives a specific object to be visually appealing or pleasant.

According to [Kwon](#), et al. (2021), a visually appealing stimulus improves consumers' desire to explore more on the website and purchase tendencies. Kirillova & Chan (2018) stated that product's aesthetic influences consumers' opinions in a variety of ways, which in turn affects the product's ability to succeed commercially, greater visual appeal makes a product stand out from those of competitors and attracts attention from consumers, it might also serve a symbolic purpose, such as expressing elegance, masculinity, or creativity, because of the axiomatic belief that “what is beautiful is good,” consumers frequently make judgments about the quality and functional aspects of things based only on how unattractive they appear visually , same applied for online appealing website features where it can raise consumer arousal and trigger cognitive states that result in better evaluations of online service quality and revisit intention, commitment, trust and loyalty, in addition, the study demonstrates how emotional arousal acted as a partial mediating factor in the relationship between the aesthetic evaluation of hotel design and the intention to book, similarly, visual aesthetics, as one aspect of perceived experiential value, has improved consumers’ attitudes toward websites, this has a stronger effect on hotel stays; As a result, the importance of online environment aesthetics is expanding.

H1b: The user generated sustainable social media content positively impacts customer loyalty

User Generated Content

Businesses' interactions with their customers have changed as a result of both users' and businesses' existence on social media platforms, they ask, provide feedback, and are expecting rapid, tailored responses to their unique issues (Aichner, et al., 2021). User generated content (UGC) can be referred to as the content created by customers instead of the firm and professionals (Li, et al., 2020). Since user-generated content (UGC) has the power to influence customer brand perceptions and choice, marketers need to pay careful attention to it when it comes to products and brands. Additionally, instead of traditional media like radio and television, customers now choose to read online reviews to learn about items and businesses (Muda, et al., 2021). [UGC can be in form of uploading videos, pictures, blogs, tweets, and posts \(Rajamma , et al., 2020\)](#). People are likely to trust information shared by other users than an advertisement that a business share (Pasi, et al., 2019).

Users create content on social media by exchanging information within a group. As a result, in addition to disseminating sustainability-related

content, social media may be an effective tool for sustainability communication by involving people in sustainability conversations. It's a result of the digital era that requires value and information sharing online, particularly on social networking sites (Strähl, 2017).

These days, the consumer is in charge of the interactive online media, content, and communication process and feels empowered, the consumer no longer has much trust in the company's message and brand, and the effectiveness of traditional marketing techniques and communication is declining. Technology is transforming the marketing environment and its practices (Bala & Verma, 2018).

Research shows that people consider information offered from customers to have greater credibility than information posted by businesses (Pasi, et al., 2019). Businesses are employing social media platforms to increase their geographic reach to consumers, improve consumer perceptions of their brands and foster tighter relationships with them, however, social media is giving consumers more power and allowing them to take a charge of the marketing communication process, as a result, they are now the message creators and collaborators. The social media as a new marketing communication presents new potential and opportunities for organizations as purchase decisions and in turn loyalty -as repeated purchases-, as a content plays the crucial role for the social media and customer engagement, the businesses allowed for a new strategy of User Generated Content (UGC) as not only a new marketing strategy, but it appears to be a new start (Agarwal, 2020). It can be added that UGC has started to be included by marketers as a word-of-mouth (Ramirez, et al., 2018). Over 3.8 billion active social media users are reportedly browsing user-generated content (UGC) to help them make decisions, throughout the digital platforms, tourists aren't only passive receivers about the information concerning travelling and hotels, where they're empowered to share their own opinion and build with other's tours ([Ukpabi & Karjaluoto, 2018](#)). For example, they are increasingly given ability to comment, modify, and share content, including descriptions, images, and videos of tourist destination as hotels and places (Cheung, et al., 2022).

Trust can be built by the content creation or built on the creator itself, Customers are attracted to social media, since online evaluations and recommendations by travelers are seen to have more reliability than traditional visitor information sources. It was stated that internet content may be trusted as long as it is developed and released by independent real individuals with genuine experiences, With the advancement of consumer-

generated media, which allows internet users to freely provide any content without validating, editing, or fact-checking travelers need to use caution before finding out the information and media as trustworthy or reputable (Berhanu and Sahil, 2020). Since the past, it has been studied the idea of credibility (about the 4th century BC). In the present day, it has been investigated in the social sciences, communication, and psychology research domains. Trust can be subdivided into cognitive and affective trust, the cognitive is the one related to customer experience and knowledge, while the affective is related to the person's emotion towards an object or a person (Seiler, et al., 2020).

Credibility has been defined as trustworthiness, believability, perceived reliability, accuracy, knowledge, and related with various additional connotations depending on the situation, Specifically, the investigation of information trustworthiness and credibility (Pasi, et al., 2019). Moreover, the risk of running into misinformation is not negligible. Because of this, evaluating and analyzing the credibility of information found online is becoming an essential area of study. Believability, also name for credibility, is the attribute that people perceive since they are not always able to distinguish between real and false information using their own cognitive abilities (Pasi, et al., 2020). Credibility can be identified in terms of its dependability which refers to the stability of data over time and varying conditions. Whereas it is concerned with consistency (Kyngäs, et al., 2019). So, in this research credibility definition as accuracy and dependability will be the included dimensions of the user generated content. Berhanu & Raj (2020) also stated that the trustworthiness and credibility are considered dimensions of UGC. Online sources with insufficient author identity and reputation indications are seen as less credible than other sources of information. Identifying sources influences travel decision-making indirectly and has a major direct impact on perceived credibility (Lo & Yao, 2019).

Customer Loyalty and Sustainability

According to Yum, 2023, customer loyalty is an important factor influencing a company's sustainable performance and growth, loyalty can be defined as the willingness to maintain a long-term relationship with a company and recommend its products or services to others as a deep commitment to a brand that facilitates the continuous repurchase of preferred products or services. Customers who are satisfied with a product or service tend to be loyal and make repeated purchases even if situational influences or marketing efforts cause switching behavior.

Loyalty is a basically a promise to rebuy or revisit a specific brand in the future (Saleem, et al., 2018). People's attitudes and social acceptance, these people are influenced by the media atmosphere. The media affects people's perceptions, thoughts, and beliefs. Businesses are finding it harder to attract and retain clients as a result of the growing competition in the service industries. As a result, there is a growing need to encourage customer loyalty. In this context, loyalty turns into a crucial marketing tool that should be directed not only at the consumer but also toward the business, serving as a key indicator of its performance ([Vaitone](#) & [Skackauskiene](#), 2020). Recently, academics and practitioners agree that improving customer loyalty and adopting corporate sustainability principles can have several of significant beneficial impacts on business, and also they have indicated that organizations that develop, put into practice, and spread appropriate sustainability guidelines enhance their perceived and actual corporate sustainability, which helps them attract and retain employees (Moiescu, 2018). Organizations must identify the green target group to effectively reach the right consumers with targeted social media content. The social media audience interested in ethical lifestyles generally consists of younger consumers who are already engaged in sustainability and ethical manufacturing. These consumers are particularly interested in an organization's ethical values. On social media, consumers often group themselves into lifestyle communities, enabling advertisers to create targeted ads that align with their specific needs and interests. As a result, organizations can easily connect with the green target group by focusing on online sustainability communities and related content (Strähle, 2017).

In practice, it shapes people's behavior and relationship; these media have considerable power to shape beliefs, change life habits, and promote media content behaviors. New research shows a significant correlation between the use of social media and its effects on people and society (Bathaiy, 2021). Loyalty is defined as a deeply held commitment to buy or re-support a preferred product or service in the future, despite the possibility of customers switching due to external factors like marketing efforts, settings, and any other influential effort (Yadav, 2018; Gunawan, 2022). Marketers mostly perceive and apply customer loyalty principles as successful retention where several promotions designed to reward consumers for revisiting the same company, recommending the same brand and repurchasing the same product over time (Srivastava & Rai, 2018). Loyalty among consumers has long been a key consideration in marketing strategy. A growing number of businesses have realized in recent years that they must become more customer-focused in light of the intense global competition (Mishra & Prasad, 2014).

H2: The demographics mediates the relationship between sustainable social media content and customer loyalty

2.7. Customer Demographics

Demographics can be defined as selected characteristics from the population in the context of marketing through which customer markets can be identified and segments can be made as gender, age, income, marital status, and education have frequently been employed and researched to segment the consumer base (Naseri & Elliott, 2011; Patel & Bansal, 2018).

Consumer demographics are defined as characteristics of consumer including age, income, gender, literacy and education they are critical in services marketing as they highly impact decision-making and preferences ([Manyanga](#), et al., 2022). Demographics can apparently influence marketing plans and strategies, impact how can the businesses target and interact with various consumer types (Makhmudovich, 2023).

According to Henrique & Matos (2014), the *gender* under empirical researches in the demographic context and loyalty was reflected as crucial moderator, considering the gender of the sample, yielded several significant and reliable findings. Considering the relationships that include consumer loyalty, analyze data in automotive, it was found that, between men and women with the same satisfaction level, the repurchase probability was greater for women. Biedenback and Marell (2010) have found that customer experience is included in ensuring brand loyalty; such experience is resulted from various factors of demographics and culture (Mishra & Prasad, 2014). Based on these researches that stated that demographics can impact loyalty, it's used as mediator in this research between social media content and customer loyalty.

Relationship between sustainable social media content and loyalty

Although brand research studies agree that social media community development leads to increased brand loyalty and trust, there are still differing views on how to achieve this loyalty. Customers are affected by social media when they use it, it can be said that it affects people's attitudes and social acceptance, these people are influenced by the media atmosphere, the media affects people's perceptions, thoughts, and beliefs. In practice, it shapes people's behavior and relationship; these media have considerable power to shape beliefs, change life habits, and promote media content

behaviors. New research shows a significant correlation between the use of social media and its effects on people and society (Bathaiy, 2021). Khan et al. (2021) declared that online customer loyalty has been found to be linked with the level of trust that online consumers have in the service provider. Digital content marketing is an essential and rising vehicle to develop customer awareness, engagement, sales, lead conversion, trust and loyalty (Hollebeek & Keith Macky, 2019). According to Seiler et al. (2020), 63% of the companies recently are relying on the social media to leverage the customer loyalty and added that customers are using the UGC as a main way to make their purchasing decisions whereas the trust can have a positive impact on customer loyalty which in term affects the overall success of the company, the content and the trust are considered the driver of customer loyalty where such trust can be built by the creation of content whether this content is generated by the firm or by the user. In terms of supporting the advancement of environmental sustainability, two viewpoints of behavioral modification were distinguished. According to the first viewpoint, promoting a suitable attitude and expanding public awareness of a problem are the two main ways that behavior changes. According to the second viewpoint, people can behave in their economic self-interest after methodically evaluating their options; they are not required to act with sufficient knowledge or awareness beforehand where it is known that the second perspective is extremely effective at promoting sustainable behavior through programs like community-based social marketing, It has been established by several theoretical and empirical researches that behavioral modification may result from activities of the raising awareness objective (Hamid et al., 2016).

Marketing scholars have increasingly focused on the broader aspects of sustainability. To address macro-marketing challenges, it has been suggested that a combination of micro-marketing techniques and policy interventions is necessary. This paper argues that sustainable development can be achieved through proactive corporate marketing and active government involvement, aligning with the aggregate marketing system (AGMS) concept. Governments also need to translate sustainability priorities into actionable policies, while corporate marketers must adopt transformative strategies to make sustainability central to business practices. This dual effort is essential for achieving sustainable development goals, as consumer awareness alone is not enough to drive market change. Therefore, conscious institutional interventions are crucial (Sheth & Parvatiyar, 2021). So, in this research, the main argue is the impact of the sustainable firm generated content and sustainable customer generated content on the customer loyalty under the mediating effect of demographics.

Hospitality Industry

According to Ali et al. (2021), among several activities that make up the hospitality industry which is a billion-dollar industry are mainly hotel business, tourism services, event planning and transportation, High-quality services and satisfied customers are the key drivers of this rapidly expanding industry, Without a focus on satisfying the wants, expectations, and requirements of its customers, any company in the hospitality sector can't survive and maintain a positive reputation, Recently, tourism and hospitality industries are crucial, where they are considered as an vital source of income for country. As a result, many countries are trying to gather the attention of guests and tourists to their destinations, to be able to grow, it was added that hospitality is a specific type of relationship between the traveler and a host. Hospitality industry is one of the primary driving forces of the global economy including the hotel sector. The extensive and broad adoption of modern technologies in such industry recently has reshaped the way in which services are provided and received where they are enhancing guest experiences and promoting the hospitality service platform (Kansakar, 2019). The tourism and hospitality industry today are developing significantly with the application of information technology in its operations and strategies; social media is becoming an increasingly important tool for pre-trip planning, decision-making, and the sharing of tacit knowledge. (Khatri, 2019).

Ukpabi & Karjaluoto (2018) stated that in the tourism and hospitality services industries, user-generated content (UGC) has become an effective tool tourists use to gather information to make travel decisions, through textual, pictorial, and video sharing of travel experiences, users enhance the free travel information offered to prospective travelers on new markets, concepts, and sensitive topics. The following factors highlight how important user-generated content (UGC) is to tourism and hospitality services: First of all, since traveling is a hedonic experience, travelers want to maximize their time away, so they research their options by reading other travelers' evaluations and comments. Second, since travel cannot be experienced before it is consumed; travelers must rely on the insights and experiences of other people. Lastly, since customer reviews are seen as truthful and reliable, people rely on them as a reliable source of information when making travel-related decisions. People are now depending on the online travelling agencies when booking (Kirillova & Chan, 2018).

One of the most common UGCs that customers use to inform their travel decisions is an online review where customers examine other travelers'

online reviews to get inspiration, narrow down their options, lower risk, and double-check their booking selections. Reviews left by travelers are valued and seen as more reliable than data from for-profit companies (Assaker, et al., 2020). Online reviews have shown to have a significant impact on consumer intent to book, hotel occupancy rate, room revenue, and overall business performance (Lo & Yao, 2019). In order to survive or at least succeed in today's digital environment, the hospitality sectors have a strong interest in guaranteeing their services meet customer expectations, since this is what drives repeat business (Ali, et al., 2021).

According to (Berhanu & Raj, 2020), user-generated content is seen as having greater credibility than advertising in the media, official tourism websites, and tour operators and travel agencies, it was added that the other issue that makes online reviews less reliable or ambiguous is a lack of details regarding the reviewers' sources on the websites, while negative reviews with a hidden source are thought to be less credible than other types of evaluations, reviews with identified sources are perceived as more reliable and can positively impact visitors' initial trust in the services and facilities provided by the tourism industry this can be because that the social media, today, is one of the most effective opportunities for a tourist destination By putting companies or tourist places directly in contact with travelers and providing destination management organizations (DMOs) with limited financial and human resources with an opportunity to reach travelers globally, this approach eliminates the need for traditional intermediaries.

Rather than being a constant commitment to sustainability, definitions of sustainability in the hospitality sector may be understood as being built around business imperatives, second, the industry does not address materiality and external assurance in a comprehensive manner, which damages the sustainability reporting process's credibility, third, the idea of sustainable consumption and any criticism of the sector's dedication to economic expansion are noticeably absent from both the industry's sustainability reporting and the scholarly literature on sustainability (Jones, et al., 2016).

The sustainability in corporate life is an old concept where it was associated along with productivity with the development of private institutions (Ballestar, et al, 2020). However, in recent times, the concept of sustainability has gradually gained popularity on corporate boards, an increasing number of businesses recognize sustainability as one of the new competitive forces and a major source of both long-term competitive advantage opportunities and risks, where Jones et al. (2015) stated that in

business, sustainability has grown in importance, but the hotel industry may have been slightly later to respond, The hospitality industry is experiencing a rapid increase in research output on sustainability. Several research agendas are being addressed, such as the design of green hotels, energy minimization, the role of innovations in technology in achieving sustainability, sustainable tourism, consumer marketing of sustainability, and the contribution of human resource management practices to sustainability. The literature has emerged with a wide range of themes and issues addressing sustainability within the hospitality business.

Hotels should pay attention to the content of online reviews and the expertise level of reviewers, Efforts should be undertaken to provide positive and outstanding experiences for hotel guests which can motivate expert reviewers to write positive reviews, In the dynamic landscape of the hospitality, travel, and tourism industry, hotels are increasingly relying on diverse content strategies to engage and retain customers.

The proliferation of both firm-generated content (FGC) disseminated by the hotel itself and user-generated content (UGC) contributed by guests has created a complex interplay of influences on customer loyalty. Despite the recognized importance of content in shaping customer perceptions, there exists a gap in understanding the distinct impact and interaction of FGC and UGC on customer loyalty within the hotel sector. This gap puts a significant challenge for hotels seeking effective strategies to enhance customer loyalty in the age full of digital interactions. Thus, there is a compelling need to investigate the sustainable hotel-generated and user-generated content consequential effects on customer loyalty. According to this gap, the research aims to contribute with valuable approaches to hotel management, marketing practitioners, and scholars, allowing and helping them to formulate more knowledgeable and targeted strategies encompassing the sustainable practices for building long-term customer loyalty in such high competition between hotels. In the dynamic landscape of the hospitality, travel, and tourism industry, hotels are increasingly relying on diverse content strategies to engage and retain customers.

According to this gap, the research aims to contribute with valuable approaches to hotel management, marketing practitioners, and scholars, allowing and helping them to formulate more knowledgeable and targeted strategies for building long-term customer loyalty in such high competition between hotels", in addition to that, it's noted that negative reviews have higher perceived credibility than positive ones. Hotels should handle such

negative reviews and responds professionally to those reviewers (Lo & Yao, 2019).

Conceptual Model

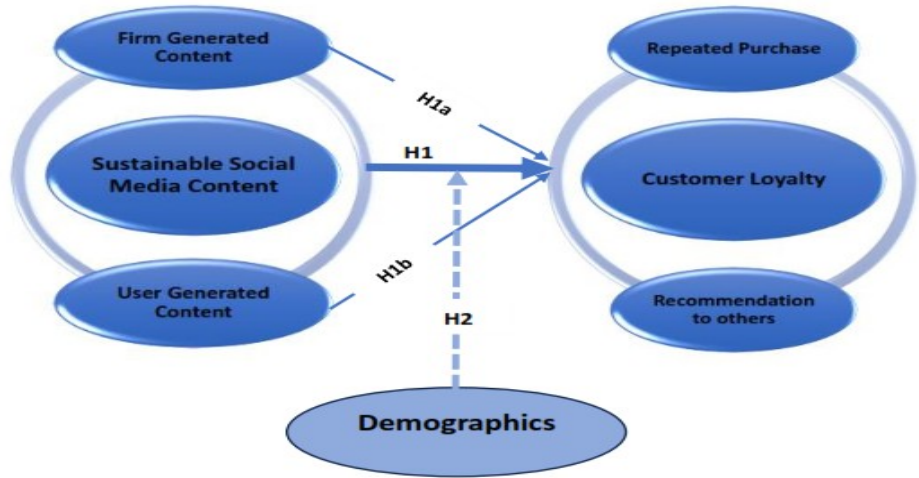


Figure (1): This Model is derived from Social Identity Theory (Abrams & Hogg, 1990; Deaux, 2001; Huddy, 2001; Tajfel, 1974)

Research Methodology

The researcher has purposed a conceptual model (as in figure 1) based on the undertaken thematic review of the related literature. The research model shows the relationship among variables. It was explored and investigated through adopting a mixed method approach. Qualitative approach interviews were made with the industry experts including social media experts and content creators for exploratory purposes. A quantitative questionnaire was carried out to identify the effect of social media content on strengthening customer loyalty. A 24-items questionnaire were developed and tested with on a small sample of academic professionals for clarity. Conceptual definitions about the firm and user generated content were given to the respondents as a reference to interpret the questionnaire. The dependent variable; customer loyalty was measured in term of repeated Purchase, recommendations to others, and customer's feedback (Gunawan, 2022; Pitchayadejanant et al., 2016; Yadav, 2018; Saleem, et al., 2018; Yum, 2023). The independent variables; firm generated content was measured in terms of authenticity, usefulness, aesthetics , consensus & majority opinion (Johnson & Jones, 2022; Kirillova & Chan, 2018; Kreling et al. 2022; Kwon, et al., 2021; Pérez , et al., 2019) and the user generated content is measured in terms of trustworthiness, how much it's relevant and consistent to the customer's beliefs, benefit from content, knowledge that customers gets, its ability to create awareness, being understandable to customers (Daugherty et al., 2008; Kim, et al., 2012; Rajammah , et al., 2020; Pasi , et al., 2019; Shuqai, et al., 2016). Demographics are measured in terms of age, gender,

education and work ([Manyanga](#), et al., 2022; Nasir et al., 2011; Shuqair, et al., 2016). Most variables utilize a five-point Likert scale ranged from Strongly-Agree “5” to Strongly- Disagree “1” and the rest has multiple choice questions. Descriptive Analysis, Confirmatory Factor Analysis and Structural Equation Model were used as statistical techniques to analyze the sample responses and reach the findings of the hypotheses developed. The population for this research is the Egyptian and foreign customers living in Egypt whether existing or potential; who have social media accounts and aware of the online presence of various hotels on social media platforms (as an accommodation business within the Egyptian hospitality industry). The population doesn’t have a frame due to the lack of comprehensive lists that includes all Egyptian and foreign customers in Egypt included in the population, in addition to the dynamic nature of social media users where there’s no definitive and updated list of the needed users in the population. So, the researcher used a non-probability- convenience sampling method and 170 respondents were contacted via an online questionnaire where a total of 170 responses were received. The questionnaire was as a Google form with QR-Code to facilitate the responses as an e-questionnaire. It’s distributed over various social media platforms, sent through e-mails and sent to the area of acquaintances.

The researcher employs the SPSS to conduct a deep analysis for the responses. Each statement of the questionnaire will be evaluated on the basis of its validity and reliability.

Results

Sample description

Cochran (1963) decides the size of the sample used

$$n = \frac{z^2 * p * (1 - p)}{e^2} = \frac{(1.96)^2 * (0.5)(0.5)}{0.1^2} \approx 96.04 \approx 97 < 220$$

Therefore, the sample needs to exceed 97 respondents to obtain a margin of error of 0.1

Validity and reliability

Descriptive Statistics

Table (1): Frequency tables for demographics in phenomenon

	Sub-category	Frequency	Percentage
Gender	Male	140	63.64
	Female	80	36.36
Occupation	Employed	164	74.55
	Unemployed	56	25.45
Education	High school	74	33.64
	Bachelor	96	43.64
	Post-graduates	50	22.73
Age	18-25	164	74.55
	26-34	34	15.45
	35-44	10	4.55
	45-54	12	5.45

Source: Calculations based on sample of 220 respondents using SPSS 26

The majority of the sample were males. Around three quarters of sample are employed. In addition, almost 66% of the sample were undergraduate and post graduate students. Regarding the majority aged below 25 years old representing almost 75% of the sample.

Confirmatory Factor Analysis

Table (2): Reliability and validity analysis for phenomenon

	Items	Loadings	Outer VIF	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
Firm generated	FG1	0.734	1.968	0.848	0.891	0.622
	FG2	0.764	3.322			
	FG3	0.896	2.129			
	FG4	0.749	1.869			
	FG5	0.791	2.088			
Loyalty	L1	0.784	1.47	0.745	0.855	0.662
	L3	0.792	1.891			
	L4	0.863	2.097			
User generated	UG1	0.78	1.808	0.787	0.853	0.541
	UG4	0.584	1.376			

	UG5	0.7	1.531			
	UG8	0.811	1.672			
	UG9	0.78	1.97			

Source: Calculations based on sample of 220 respondents using SmartPLS

Upon evaluating the dependability of the dimensions, it was discovered that all measures of Cronbach’s alpha exceeded 0.7 (Memon et al, 2021), indicating a high level of internal consistency. In contrast, all dimensions demonstrated a composite reliability above 0.7 and an average variance extracted above 0.5 (Memon et al, 2021), confirming their validity. Given that the Variance Inflation Factors (VIFs) are below five, it can be inferred that multicollinearity does not pose a problem in the model (Memon et al, 2021). Furthermore, all item loadings surpassed 0.5, underscoring the significance of the statements (Memon et al, 2021).

4.3 Model testing

Structural Equation Modelling

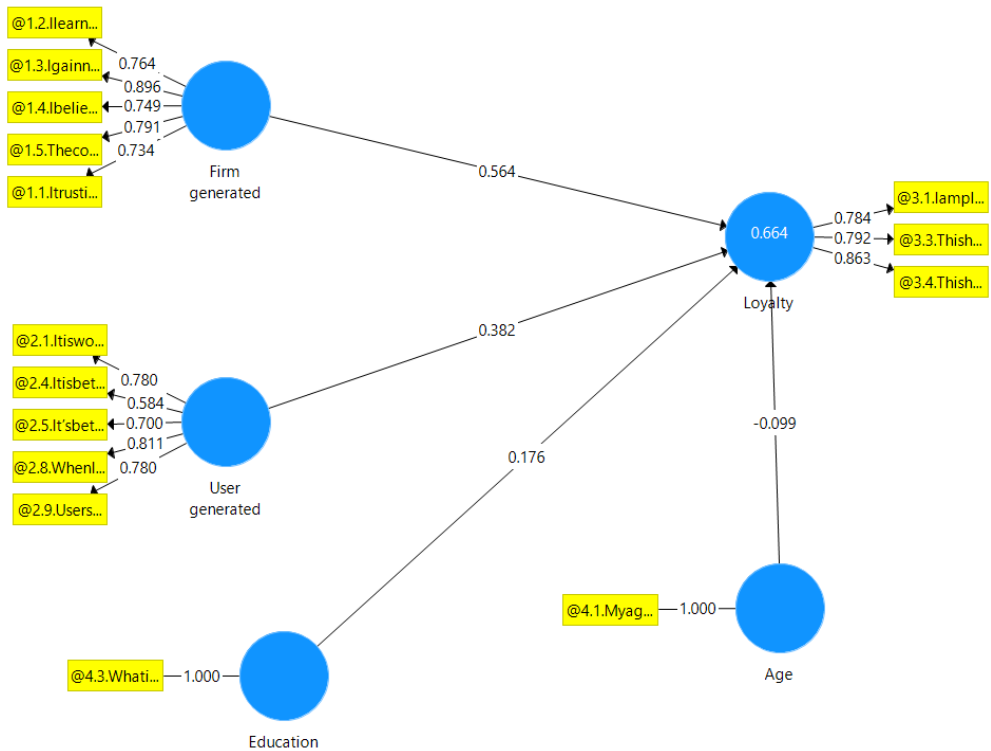


Figure (2): Structural Equation Model of the phenomenon
Source: Calculations based on sample of 220 respondents using SmartPLS

The model in the graph I is showing the relationships between five latent variables. Each of these latent variables is measured by several observed variables represented as sub-dimensions in the graph each had loading higher than 0.5.

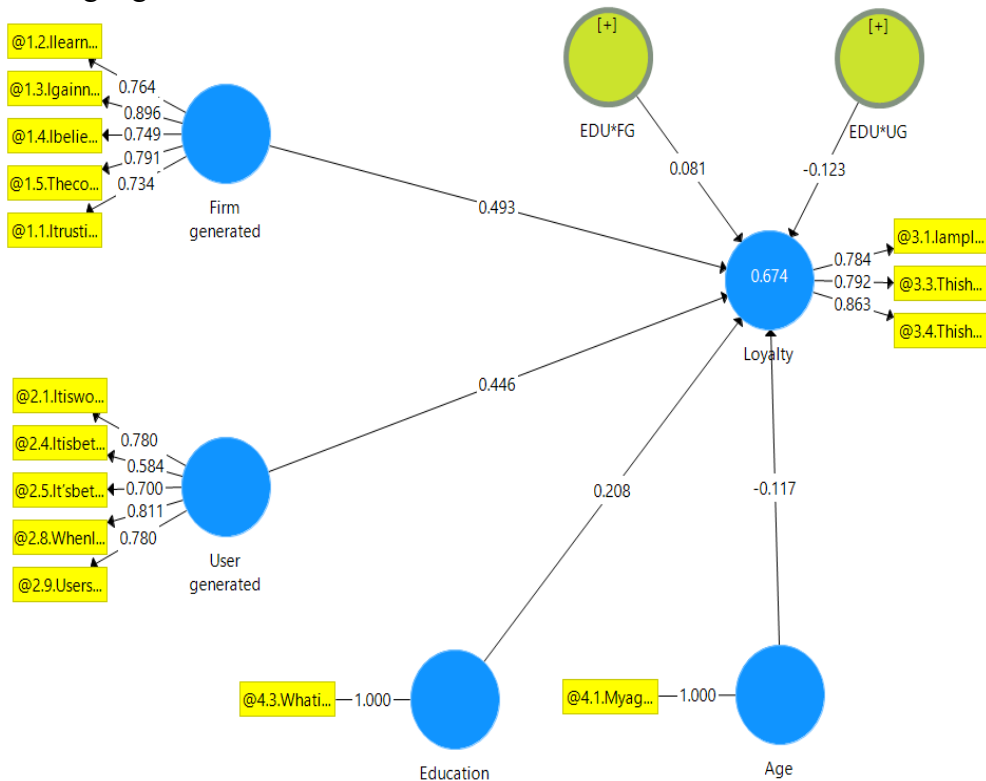


Figure (3): Structural Equation Model of the phenomenon
Source: Calculations based on sample of 220 respondents using SmartPLS

The model in the graph II is showing the relationships between five latent variables as in figure I. However, the moderator effect on the model. Each of these latent variables is measured by several observed variables represented as sub-dimensions in the graph each had loading higher than 0.5.

Table (3): Path coefficients for the structural Equation Model

	Hypotheses	Original Sample	Standard Deviation	T Statistics	P Values
Before adding moderator effect	Age -> Loyalty	-0.099	0.059	1.667	0.096
	Education -> Loyalty	0.176	0.046	3.852	0
	Firm generated -> Loyalty	0.564	0.068	8.309	0
	User generated -> Loyalty	0.382	0.044	8.66	0
After adding moderator effect	Age -> Loyalty	-0.117	0.057	2.059	0.04
	EDU*FG -> Loyalty	0.081	0.049	1.643	0.101
	EDU*UG -> Loyalty	-0.123	0.052	2.358	0.019
	Education -> Loyalty	0.208	0.051	4.094	0
	Firm generated -> Loyalty	0.493	0.072	6.897	0
User generated -> Loyalty	0.446	0.056	8.001	0	

Source: Calculations based on sample of 220 respondents using SmartPLS

Both firm generated and user generated content had positive significant impact on the loyalty of the respondents at 99% confidence level. At 0.05 level of significance, age had no significant impact on loyalty. However, education was found to have a significant impact on loyalty. Therefore, only education as a demographic can be studied as a moderator in the relationship between generated content and loyalty.

After adding moderating effect, education was found to have a significant role as a moderator in the relationship between User generated and loyalty at 95% confidence level. However, there was not enough evidence that it played a moderating role in the relationship between firm generated content and loyalty at 0.05% level of significance. Still education and user generated content had direct significant impact on loyalty at 99% confidence level. In addition, firm generated content still had direct positive significant impact on loyalty at 99% confidence level. The moderation effect helped reveal also the age had a direct significant impact on loyalty at 95% confidence level.

Model evaluation

Table (4): Model evaluation metrics for purchase intention

	R Square	R Square Adjusted	SSO	SSE	Q ²
Before	0.664	0.657	660	376.643	0.429
After	0.674	0.665	660	374.537	0.433

Source: Calculations based on sample of 220 respondents using SmartPLS

The R Square for loyalty is 0.664, indicating that 66.4% of the variability in loyalty can be explained by the model. As moderators are added, the percentage of the variability in loyalty explained by model increase to 67.4% showing the importance of the moderator. Q² is a measure of the model's predictive relevance. A Q² value greater than zero indicates the model has predictive relevance, while a value less than zero indicates it does not. The Q² value for loyalty is 0.443, indicating the model has predictive relevance for this construct (Yahaya et al., 2019).

Conclusion

Current research explores the impact of social media content on the customer loyalty under the moderating effect of demographics in hospitality industry. The conclusions resulted from such study imply that the firm generated content (FG) and user generated content (UG) significantly and positively impacts the customer loyalty, it was also found that the demographics specifically the Education significantly moderates the relationship between UG and loyalty. In this discussion section, we will explore these results and relate them with the results of prior studies. The first hypothesis of the current research suggests that the FGC positively impacts the customer loyalty. The hypothesis was accepted which is relatively consistent with the results of other related previous researches, for example; according to Abdallah & Jumaa (2022), (FGC) positively affect how consumers make purchasing decisions, however they concluded that FGC influences buying decisions more than UGC does for telecom products and services which can in turn influence their repurchase. Other researches confirmed the results of the current research as well; the authors found that FGC usually has a strong effect on brand loyalty. Additionally, how these attributes affect loyalty can vary depending on the context (Tyrväinen, et al., 2023). Wei, et al. (2023) stated after analysis that the FGC has a strong positive impact on perceived quality and brand trust were brand trust and perceived quality, in turn, boost brand loyalty.

The second hypothesis stated the User Generated Content (UGC) positively impacts the customer loyalty the main results supported the second hypothesis and showed its correctness, which is consistent with Seiler et al. (2020), where this study looked at how user-generated affects how loyal customers are to retailers in Europe and findings showed that when customers trust the UGC, they are more loyal both emotionally and in terms rebuying the products. The study also found that millennials are particularly influenced by user-generated content, especially in terms of emotional loyalty. Overall, user-generated content helps build customer loyalty and encourages repeat business. From another perspective, the researchers showed a similar relationship between the UGC, purchase intention and customer loyalty, where findings included that user-generated content (UGC) directly influences four aspects of brand value. Specifically, how people perceive the quality of the brand and their loyalty to it affect how UGC influences their intention to buy. In other words, UGC impacts purchase intentions through how it shapes brand quality and customer loyalty (Yousry & Fahmy, 2024). Another research also assured the findings where according to Tyrväinen et al. (2023), UGC impacts the customer loyalty towards the brands.

The third hypothesis of the research stated that the demographics in terms of age and education moderates the relationship between both the FGC and customer loyalty and between UGC and customer loyalty, the results indicated that the education has a positive significant impact on the loyalty indicating that education has a meaningful impact on the relationship between being an undergraduate student and exhibiting loyalty. This could mean that the level or type of education an individual has received influences how strongly their undergraduate status affects their loyalty. For instance, individuals with higher educational attainment or those engaged in more advanced studies might show stronger or different patterns of loyalty compared to those with less education. It was also resulted that education significantly moderates the relationship between UGC and loyalty, so the hypothesis is accepted in terms of education. Among other researches that supported similar results, Mishra et al. (2014) indicated that education has a significant correlation with customer loyalty. The acceptance of this hypothesis suggests that education plays a crucial role in shaping or altering the relationship between education status and loyalty. It might imply that education helps in developing traits or perspectives that enhance or modify how loyalty is expressed or experienced.

On other hand, the results illustrated a rejection to the hypothesis that included education significantly moderates the relationship between FG and

loyalty. Education affects how people respond to user-generated content (UGC) because educated people might judge it differently. However, education doesn't change how people react to firm-generated content (FGC) since it's generally seen as promotional and doesn't vary much with education. In result, it can be concluded that the Education significantly moderates the relationship between UG and loyalty but Education doesn't moderate the relationship between FG and loyalty.

However, the hypothesis that reflects that age has a positive significant impact on the loyalty was rejected which frustrate the relationship between the age as a demographic factor and the customer loyalty. This matches what earlier studies found, Adekiya (2015) reached that age as a demographical characteristic considered as not having any significant effect on customer loyalty. In relatively corresponding context, this result was in contrast to other researches as it was in contrast with Manyanga, et al. (2022) who concluded that age moderates the effect of customer satisfaction on loyalty and gender, education and income don't. This can be attributed to the context of the research, where the current research is relative to social media and applied to hospitality industry, while others got other different variables, applications and even samples which lead to different results.

Implications

Both user-generated content and firm-generated content significantly boost customer loyalty. Marketers should invest in strategies that encourage and utilize both types of content. This could involve creating campaigns that inspire customers to share their experiences and actively managing brand-generated content to reinforce positive brand associations, Education significantly enhances the relationship between user-generated content and customer loyalty. This suggests that more educated consumers are likely to be more responsive to user-generated content. Marketers should consider tailoring content and messages to cater to this demographic, potentially incorporating more in-depth or sophisticated content for educated audiences. Since age did not significantly impact customer loyalty in this study, marketers might focus less on age-specific strategies and instead concentrate on other factors like content type and educational background that more strongly influence loyalty. So practically, the practitioners can benefit from this research to integrate Content Strategies and develop integrated marketing strategies that leverage both user-generated and firm-generated content to maximize their positive impact on customer loyalty in addition to tailoring marketing efforts to address the needs and preferences of customers with varying educational backgrounds, particularly in how firm and user-

generated content is presented and utilized and finally focusing on content quality through ensuring high standards for firm-generated content to consistently engage and retain customers, regardless of their educational background.

Limitations and future research

This study was conducted in the hospitality industry of Egypt; Thus, the empirical findings of the study could be more applicable to further industries as mobile phones, automotive or telecommunication. The research can be implemented in countries rather than Egypt. Further studies should consider using longitudinal data to measure loyalty behaviorally. Moreover, the impact of education as a moderator between FC and loyalty was found not significant, which could be due to the perception of the customer to the FGC as a promotion. One of the limitations is that the research used snowballing sampling method, where further researches can use other methods. More dimensions of the research variable can be utilized in additional researches, for example customer loyalty can be considered in terms of cognitive, emotional and conative. Other studies may consider this factor carefully in the hospitality industry. Among the limitation is that demographics have been included with two factors which are age and education, so in the further researches, more aspects can be added as gender, family life cycle and occupation so developing more moderating effects on loyalty. Including additional moderating variables and testing the model in different service industries and countries could lead to more comprehensive results with broader implications.

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Appendix

Questionnaire

Dear Participants,

We are carrying out research under the title “The Role of Sustainable Social Media Content in Enhancing Customer Loyalty in the Hospitality Industry”. We need your kind cooperation for the fulfillment of this research. Kindly note that all information that you will provide will be kept strictly confidential and you will remain completely anonymous throughout. The information you give will only be used for this research and not shared with anyone else. Thank you in advance for your contribution and support.

Do you use social media?

- Yes**
- No**

Do you see posts about hotels on social media?

- Yes**
- No**

If yes, kindly pass to the next section.

Statements	Strongly disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly agree (5)	Reference
1. Firm Generated Content						
1.1. I trust information posted by hotels on their social media about their services.						(Frimpong & McLean, 2018)
1.2. I learn more about the hotel when reading posts by the hotel itself.						
1.3. I gain new perspective on things when reading posts by hotels.						

1.4. I believe in hotels if its posts truly reflect their real services.						
1.5. The content of videos, graphics and audios makes the hotel content attractive.						
1.6. I get affected by customer's reviews on hotel's posts,						
2. User Generated Content						
2.1. It is worthwhile to see user generated about hotels on social media.						(Muda & Hmazah, 2021)
2.2. When I reserve in a hotel the impact of negative reviews on social media affects my loyalty						(Shuqair, et al., 2016)
2.3. Reviewer's expertise with a hotel influences my loyalty towards this hotel.						(Shuqair, et al., 2016)
2.4. It is better if the hotel user generated content is consistent with my most basic beliefs						(Shuqair, et al., 2016)
2.5. It's better if the content generated by hotel guests is relevant for me.						
2.6. It's easy to understand the user generated content of hotels						(Kim, et al., 2012)
2.7. The user generated content helps me to get the						(Daugherty, et al., 2008)

information I want.						
2.8. I gain a new perspective on hotels when creating UGC.						(Daugherty, et al., 2008)
2.9. Users' posts on social media increase awareness about the hotel.						(Shuqair, et al., 2016)
3. Customer Loyalty						
3.1 I am pleased to recommend the hotel I stay to other people.						Pitchayadej anant et al. (2016)
3.2. Next time I stay at a hotel, I intend to visit the same one.						Pitchayadej anant et al. (2016)
3.3 This hotel I stay is my first choice.						Pitchayadej anant et al. (2016)
3.4. This hotel I stay is very attractive.						Pitchayadej anant et al. (2016)

Demographics

My age is

- Below than 18 years
- 18-25
- 26-34
- 35-44
- 45-54
- 55 or above

What is your highest level of education?

- Less than high school
- Completed high school
- Bachelor degree
- Advanced degree

What is your current work?

- High School Student
- University Student
- Unemployed
- Retired
- Other (please specify)

THE INFLUENCE OF GENDER DIVERSITY ON
DIVIDEND DISTRIBUTION: INSIGHTS FROM EUROPEAN
CORPORATE BOARDS

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Abstract This study examines the impact of board gender diversity on dividend payments. Numerous studies have explored the relationship between board gender diversity and dividend payments across various regions. This research focuses on a sample of 495 large public companies in the European Union, excluding the financial and utility services sectors, over a 20-year period (2003-2022). Data on board diversity were obtained from the Thomson Reuters DataStream. Linear regression was applied to explore the relationship between gender diversity and dividend payments.

The study finds that board gender diversity does not significantly affect dividend payments for companies listed in the STOXX Europe 600 Index. This finding contributes to the ongoing debate regarding the role of women on corporate boards and their impact on corporate governance and dividend policy.

Key Words: J16 Economics of Gender, G34 Corporate Governance, G35 Payout Policy

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Introduction

Numerous international studies have examined factors influencing the composition of corporate boards of directors (Dalton et al., 1998) and the extent to which female directors impact board dynamics (Terjesen et al., 2009). More recently, the influence of diversity on corporate board composition has attracted considerable interest from researchers (Higgs, 2003; Tyson, 2003). Board diversity can be assessed across various dimensions, including gender, age, ethnicity, citizenship, education, and professional experience.

This research specifically focuses on gender diversity, which is one of the most debated aspects of board composition. This focus is not only due to its implications for board diversity but also because of its broader significance for women's participation in the economy and society.

Over the past decade, several European Union countries have adopted or have considered gender quotas to enhance diversity on corporate boards (Wiersema & Mors, 2016) as result the average representation of female directors on European corporate boards has risen from 13.9% in 2011 to 25% in 2016. Countries such as Norway (46.7%), France (34.0%), and Sweden (33.6%) have some of the highest inclusion of female directors, followed by Italy (30.8%), Finland (29.2%), Denmark (28.5%), and Belgium (27.9%) (Credit Suisse, 2016). Despite these evidence, women's representation on corporate boards across Europe remains below parity, with less than half of board positions occupied by women (Konigsburg et al., 2015). In 2012, the European Union proposed a directive aimed at addressing the gender gap by advocating for at least 40% of non-executive board positions to be held by women by 2020 (European Commission, 2012).

To address these concerns, the purpose of this study is to examine the influence of gender diversity on dividend payments, specifically exploring how the proportion of female directors on boards of publicly listed companies in the EU affects dividend distributions.

Literature Review

An extensive research body indicates that the presence of women on corporate boards is associated with enhanced company performance (Carter et al., 2003; Carter & Wagner, 2011; Erhardt et al., 2003; Francoeur et al., 2008; Higgs, 2003; Tyson, 2003). Evidence suggests that female directors contribute to higher productivity and more effective problem-solving, owing to the diverse perspectives, skills, knowledge, and experiences they bring to the boards (Higgs, 2003; Tyson, 2003). In addition, Adams and Ferreira (2009) argue that female directors are often more actively engaged in board activities, which enhances the quality of corporate governance (Campbell & Mínguez-Vera, 2008; Carter et al., 2003; Fama & Jensen, 1983; Stulz, 1990). It has also been concluded that a greater representation of women on boards can increase firm's value (Adams & Ferreira, 2009).

Some studies provide evidence that gender diversity can mitigate free cash flow management issues by enhancing oversight and effectively reducing management costs (Jensen, 1986; Stulz, 1990). According to Jensen (1986), free cash flow refers to the excess cash that remains within the company, which, if returned to shareholders, would not impair the company's operations. However, retaining this cash can encourage managers to engage in value-destroying activities, such as pursuing takeovers. Therefore, returning free cash flow to shareholders is advisable (Baker & Wurgler, 2004; Fuller & Goldstein, 2011; Shefrin & Statman, 1984; Turner et al., 2013). Free cash flow can be returned to shareholders through mechanisms such as dividend payments and share buybacks.

Black (1976) provides four reasons why dividend payments are significant. Firstly, dividends help reduce the excess cash under managerial control (Jensen, 1986; Stulz, 1990). Secondly, dividends signal a company's financial health, indicating strong performance and positive future earnings prospects, which makes the company's stocks more attractive. Thirdly, shareholders are more inclined to invest in companies that pay dividends (Fuller & Goldstein, 2011; Shefrin & Statman, 1984). Lastly, higher dividend payments compel managers to seek additional capital from external markets, promoting financial discipline (Easterbrook, 1984).

Research suggests that female directors are more likely to advocate for higher dividend payouts. Moreover, studies have found that companies with a higher proportion of women on their boards tend to have larger

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dividend payouts and experience a significant increase in firm value (Chen et al., 2017).

To address the research question, two primary concepts were analyzed: gender diversity and dividend payout policy. Gender diversity was measured as the proportion of female directors on the board, calculated by dividing the number of female directors by the total number of board members, while the dividend payout policy was measured using the net dividend yield.

Few studies have specifically examined the impact of gender diversity on a firm's dividend payout policy (Chen et al., 2017; Pucheta-Martínez et al., 2016). The influence of board gender diversity on dividend payouts can vary depending on factors such as time and a country's legal and institutional frameworks (Campbell & Mínguez-Vera, 2008). Countries with less stringent regulations tend to lag behind those with stricter laws (Winters & Jacobs-Sharma, 2016). In contrast, countries with mandatory gender quotas have successfully met their targets within a two-year transition period, highlighting the effectiveness of rigorous gender balance policies (Winters & Jacobs-Sharma, 2016).

Dividend Payment

Recent literature explores the role of women in corporate governance and investigates whether board gender diversity influences companies' dividend payout policies. Dividends are defined as the portion of profit after tax that is distributed among shareholders, serving as a return on their investment (Brav et al., 2005). Dividend policy refers to the approach a company's management takes when deciding on dividend distributions, encompassing the size and timing of cash payments to shareholders (Lease et al., 2000), and it essentially determines the balance between dividend payouts and retained earnings.

According to the Signaling theory (Lipson et al., 1998; Morris, 1987), dividends are paid when sufficient cash is available, with future earnings and growth opportunities being critical determinants of a company's payout policy. Dividend theory (Jensen & Meckling, 1976; Rozeff, 1982; Stulz, 1990) suggests that excess cash within a firm increases managerial power, leading to potential overinvestment in non-value-adding projects and unnecessary capital expenditures. In this respect, Jensen (1986) recommends that excess cash be returned to shareholders to reduce managerial control and minimize wasteful spending.

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This study primarily draws on traditional governance and signaling theories, emphasizing the board's role in monitoring and control. Consistent with findings from Chen et al. (2017) and Pucheta-Martínez and Bel-Oms (2016), it is anticipated that a significant positive relationship exists between board diversity and the level of dividends paid to investors.

Methodology

To test the hypothesis, H_0 : Higher share of female directors on the board positively affects dividend payments, relevant data on board diversity was sourced from the Thomson Reuters Datastream database (Lückerath-Rovers, 2017). The sample consists of companies listed in the Euro STOXX 600 index, which includes the 600 largest publicly traded companies in the Eurozone. Country fixed effects were used to control for variations in legal systems, governance models, and cultural differences (Campbell & Mínguez-Vera, 2008; Lückerath-Rovers, 2017). This yielded an initial sample of 600 companies over the period from 2003 to 2022, resulting in 12,000 observations. Although the most reliable director-level data begins in 2009, earlier years were included for comparison given the ability to control for differences. The year 2022 was selected as the final year to incorporate the most recent official data. Following previous research (Chen et al., 2017; Pucheta-Martínez & Bel-Oms, 2016), companies in the financial sector (SIC codes 6000-6999) were excluded due to their distinct accounting practices and regulatory requirements, which pose challenges for comparison with non-financial firms (Chen et al., 2017; Fama & French, 2002), resulting in a final dataset of 495 companies, covering 20 years and totaling 9,900 observations.

3.1 Gender Diversity

The independent variable for gender diversity is quantified as the share of female directors on the board. This is measured by dividing the number of female directors by the total number of directors on the board, see (1)

Equation 1. Gender Diversity

$$\text{Share of female directors} = \frac{\text{Number of female board directors}}{\text{Board Size}}$$

This study sources data on the *share of female directors* on corporate boards and the *dividend payout ratio* from Thomson Reuters Datastream (Lückerath-Rovers, 2017). The assumption is that companies with a higher proportion of female directors are more likely to initiate and pay higher

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dividends compared to companies with fewer or no female directors. According to literature, female CEOs tend to be less risk-averse, take on less debt, and are less likely to make value-diminishing investment decisions (Adams & Funk, 2012; Levi et al., 2014; Powell & Ansic, 1997). This study also identifies that companies with more female directors exhibit stronger monitoring, supported by findings from Adams and Ferreira (2009), Fama and Jensen (1983), and Carter et al. (2003). A positive correlation is expected between the number of female directors and dividend payments. The dependent variable is the amount of dividend paid, measured using the dividend payout ratio, which estimates the proportion of earnings paid to investors as dividends (Chen et al., 2017), see (2)

Equation 2. Dividend Payout Ratio

$$\text{Dividend Payout Ratio} = \frac{\text{Dividend per share}}{\text{Earnings per share}} * 100$$

A comprehensive list of variables, definitions, and sources is provided in Appendix 1. The primary regression model to test the hypothesis is adapted from Chen et al. (2017), see (3)

Equation 3. Dividends

$$+ 1 \times \text{Percentage of women directors } i, t + i \times \text{Control Variables} + \text{ind} \times \text{Industry}_i + \beta \times \text{Year}_t + \epsilon_i, t$$

In this model, *Dividends* is the dependent variable, representing the dividend payout of company *i* in year *t+1*. The main variable of interest is the percentage of female directors. The independent variable captures this percentage for company *i* at time *t*. *Industry_i* represents industry-specific effects, and *Years_t* captures year-specific effects. Here, *i* denotes the company, *t* the time period, and β is an estimated parameter. The model assumes that the presence of female directors in year *t* of the company *i* influences dividend payouts in year *t+1*. The model uses a one-year lag for dividend payments, reflecting typical distribution timing after earnings realization (Eriotis, 2005).

Several control variables are included to enhance the reliability and validity of the analysis, aligning with theoretical and empirical findings. Besides gender diversity, other factors such as firm size, board size,

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leverage, return on assets, and cash holdings are considered to impact dividend payout (Chen et al., 2017). These control variables are sourced from Thomson Reuters Datastream and embedded in the regression model to improve internal validity. However, external validity is limited due to the study's focus on the largest European listed companies, which may not generalize to smaller firms or other regions.

3.2 Descriptive Statistics

To reduce data asymmetry, variable transformations are applied where necessary. The company size (TA) variable, being scaled, could introduce heteroskedasticity into the model. Therefore, it is transformed using a logarithmic function to enhance suitability for regression analysis. The descriptive statistics for the dependent, independent, and control variables are incorporated into the regression model, which help identify potential issues in the data that might distort the regression results. Descriptive statistics on dividend payouts and company observations are shown in Table 1 below.

Table 1. Percentage of women's participation on company boards

Year	Number of companies with no women on board	Percentage of companies with no women on board	Number of companies with women on board	Percentage of companies with women on board	Total Number of Companies
2003	78	15,8%	417	84,2%	495
2004	110	22,2%	385	77,8%	495
2005	106	21,4%	389	78,6%	495
2006	104	21,0%	391	79,0%	495
2007	114	23,0%	381	77,0%	495
2008	95	19,2%	400	80,8%	495
2009	88	17,8%	407	82,2%	495
2010	78	15,8%	417	84,2%	495
2011	66	13,3%	429	86,7%	495
2012	52	10,5%	443	89,5%	495
2013	43	8,7%	452	91,3%	495

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2014	29	5,9%	466	94,1%	495
2015	29	5,9%	466	94,1%	495
2016	13	2,6%	482	97,4%	495
2017	11	2,2%	484	97,8%	495
2018	9	1,8%	486	98,2%	495
2019	6	1,2%	489	98,8%	495
2020	5	1,0%	490	99,0%	495
2021	3	0,6%	492	99,4%	495
2022	1	0,2%	494	99,8%	495

Specifically, it details the number and percentage of companies in the sample with at least one female director, more than one female director, and no female directors. It also shows a year-by-year breakdown, indicating a steady increase in the percentage of companies with female directors on their boards in the European Union, from 84.2% in 2003 to 99.8% in 2022. This upward trend aligns with findings from Adams and Ferreira (2009) and Chen et al. (2017).

Table 2. Descriptive Statistics

Variables	Number of observations (company-years)	Mean	Standard Deviation	Min.	Max.
Dividends	7,671	42.52	23.92	6.15	85.21
Gender	7,130	22.14	14.04	0.00	42.86
Diversity					
Board Size	7,227	10.92	3.01	7.00	16.00
Capex	8,830	0.03	0.02	0.01	0.08
Logarithm of firm assets	8,996	15.86	1.46	13.56	18.10
Cash (liquidity)	8,850	0.07	0.06	0.01	0.19
Leverage	8,988	76.51	60.36	5.08	196.80
Profitability	8,757	15.90	10.21	0.82	34.21
Tobin's Q	8,269	2.76	1.73	0.89	6.270

Table 2 provides summary statistics for the dependent and independent variables used in this study. The first column lists the variable names, followed by the number of company-year observations in the sample. Subsequent columns display the mean, standard deviation, minimum, and

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maximum values for each variable. The selected companies are associated with significant dividend payouts, with an average payout of approximately 42%. These companies typically have large boards, with an average of 11 members. The sample also shows an average leverage ratio of 76% and a profitability rate of around 16%.

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Table 3. Correlation Matrix

	Dividends	Gender Diversity	Logarithm of total assets	Leverage	Profitability	Cash (liquidity)	Board Size	Tobin's Q	Capex
Dividends	1								
Gender Diversity	0.1490	1							
Logarithm of total assets	0.1303	0.2073	1						
Leverage	0.1425	0.0194	0.2606	1					
Profitability	-0.0233	0.0258	-0.1796	0.0219	1				
Cash (liquidity)	-0.1167	0.0917	-0.2367	0.2022	0.1694	1			
Board Size	0.0559	0.0283	0.4752	0.1851	-0.1648	0.0955	1		
Tobin's Q	0.0235	0.1164	-0.2721	0.0324	0.5796	0.2942	0.2166	1	
Capex	0.0609	-0.1062	0.0901	0.0944	0.0059	-0.1464	0.0669	0.0666	1

Table 3 presents the Pearson correlations between the variables used in this study. Consistent with Chen et al. (2017), and Pucheta-Martínez et al. (2016), gender diversity shows a positive correlation with dividend payouts, suggesting that a higher representation of female directors may lead to increased dividends. However, the coefficients for variables such as the logarithm of total assets, profitability, cash, Tobin's Q, and board size do not always align with expected signs. In line with Stulz (1990), excess cash is negatively correlated with dividend payouts, suggesting it leads to overinvestment and higher capital expenditures. Tobin's Q shows a positive correlation with dividends, indicating greater future growth opportunities, and encouraging increased dividend payouts. Finally, as expected, larger board sizes are positively associated with dividend payouts, likely due to enhanced internal monitoring (Fama & Jensen, 1983).

Results

The correlations in the used statistical model indicate relationship, but do not establish causality. Therefore, a categorical time variable is added to the model, and the relationship is further examined through regression analysis. A fixed effects model with robust standard errors is used to examine the impact of board gender diversity on dividend payouts. Consistent with Chen et al. (2017), various activities are pooled in this regression, resulting in 6,177, 6,001, and 5,915 observations for each model, respectively.

The first two models show the Hausman's test for determining the fixed versus random effects estimator, while the follow up models show modified Wald test for groupwise heteroskedasticity in fixed effect regression model, (4).

Equation 4. Hauman Tests

Model 1 - Hausman's test for determining the fixed versus random effects estimator

DIVp_win L.logTA_win L.DE_win L.ROE_win L.cash_win
L.Board_Size_win L.MTB_win L.CAPex_win i.year

Test: H.: difference in coefficients not systematic

$$\text{chi2}(25) = (b-B)'[(V_b-V_B)^{-1}](b-B) = 127.42$$

$$\text{Prob}>\text{chi2} = 0.0000$$

(V_b-V_B is not positive definite)

Model 2 - Hausman's test for determining the fixed versus random effects estimator
DIVp_win L.Board_Diversity_win L.logTA_win L.DE_win
L.ROE_win L.cash_win L.Board_Size_win L.MTB_win L.CAPex_win
i.year

Test: H.: difference in coefficients not systematic

$$\text{chi2}(26) = (b-B)'[(V_b-V_B)^{-1}](b-B) = 158.99$$

$$\text{Prob}>\text{chi2} = 0.0000$$

(V_b-V_B is not positive definite)

Model 3 - Modified Wald test for groupwise heteroskedasticity in fixed effect regression model

Test: H.: $\sigma(i)^2 = \sigma^2$ for all i

$$\text{chi2}(467) = 56100.56$$

$$\text{Prob}>\text{chi2} = 0.0000$$

Model 4 - Modified Wald test for groupwise heteroskedasticity in fixed effect regression model

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Test: H₀: $\sigma(i)^2 = \sigma^2$ for all i
 chi2 (467) = 52642.63
 Prob>chi2 = 0.0000

The Hausman tests for the fixed effects model rejects the null hypothesis of non-significant differences between the random and fixed effects models, favoring the fixed effects model ($\text{Chi}^2(25) = 127.42$ and $\text{Chi}^2(25) = 158.99$). All models in this research use robust and clustered standard errors due to evidence of heteroscedasticity among groups (entities).

Table 4. Linear Regression Models

Fixed Effects Model			
Dependent Variable: Dividend Payouts			
	1	2	3
Control Variables	Dividend	Dividend	Dividend
Logarithm of total assets _{i,t}		-4.695*** (1.663)	-4.749*** (1.696)
Leverage _{i,t}		0.0320** (0.0146)	0.0328** (0.0147)
Profitability _{i,t}		-0.671*** (0.0601)	-0.651*** (0.0605)
Cash _{i,t}		-2.739 (9.666)	-4.027 (9.726)
Board Size _{i,t}		0.629** (0.252)	0.609** (0.259)
Tobin's Q _{i,t}		0.976** (0.461)	0.897* (0.457)
Capex _{i,t}		40.38 (28.07)	39.87 (28.46)
Board Diversity _{i,t}	-0,0541 (0,0517)		-0.0830 (0.0552)
Intercept	35,55*** (1.730)	106.8*** (25.86)	107.1*** (26.32)
Time fixed effects	Да	Да	Да
Observations	6.177	6.001	5.915
Coefficient of determination	0,081	0,167	0,167
Number of companies	479	441	441

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Note: Statistical significance is based on heteroscedastic, robust, and clustered standard errors shown in parentheses. (), (**), (***) indicate significance levels of 10%, 5% and 1% respectively.*

In addition, Table 4 displays the regression results exploring the relationship between board gender diversity and dividend payouts. The three regressions differ in how the fraction of female directors is measured and in the control variables included. The analysis starts with a regression of (1 Dividend) dividend payments against the proportion of female directors, with year-specific examples. The results indicate that the coefficient for the percentage of female directors is positive but not statistically significant at any conventional significance level across all regressions. Regression (1 Dividend) is a basic model without control variables and shows no significant evidence that the percentage of female directors is associated with dividend payouts. This relationship does not appear to be synchronous but rather shows a lag.

Regarding control variables, regressions (2 Dividend) and (3 Dividend) provide evidence contrary to Morris (1987), showing that higher profitability leads to increased free cash flow and a greater capacity to pay dividends. Profitability is statistically significant at the 1% level in both regressions, with a 1% increase in profitability leading to a 0.613% increase in dividend payout. Both regressions also show a positive relationship between board size and dividend payouts. In regression (3), which includes all controls, profitability and Tobin's Q significantly affect dividend payouts. Tobin's Q is significant at the 10% level, suggesting that a 1% increase in investment opportunities results in a 0.897% increase in dividend payouts. Additionally, firm size and leverage significantly impact dividend payouts.

The low coefficient of determination for all regressions, 8% for regression (1), 13.9% for regression (2), and 14% for regression (3) accordingly indicates a modest model fit. These values are lower than those reported in similar studies by Byoun et al. (2016), and Chen et al. (2017). Overall, none of the regressions show evidence that dividend payout increases with the number of female directors on the board. These results do not support the hypothesis that the proportion of female directors is positively related to dividend payments. The final regression demonstrates that size, leverage, profitability, and Tobin's Q are positively correlated with dividend payouts.

Robustness checks using the same and similar regression models show consistent results. However, when evaluated using the OLS estimator, the gender diversity coefficient is positive and significant. This model, though,

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does not satisfy several assumptions of the classical linear regression model and fails to account for unobserved heterogeneity. Therefore, its results are not interpreted or used for further analysis.

To summarize, the findings support Hypothesis₁, indicating that the higher percentage of female directors has no statistically significant relationship with dividend payout.

Discussion

According to Adams and Ferreira (2009) and Srinidhi et al. (2011), gender diversity is positively related to audit activity and earnings quality, contributing to better corporate governance. Assuming a higher dividend payout ratio indicates improved governance, these studies suggest that female directors positively influence dividend payouts. The insignificant effect of the percentage of female directors on dividend payout aligns with these findings.

The regression analysis results show no significant relationship between board gender composition and dividend payments. This finding remains consistent across different model specifications, except when using OLS. These results contradict previous studies by Chen et al. (2017), and Pucheta-Martínez et al. (2016), which found a positive association between the presence of women on boards and higher dividend payouts. According to Adams and Ferreira (2009) and Srinidhi et al. (2011), gender diversity correlates positively with audit activity and earnings quality, leading to better corporate governance. Higher payout ratios benefit shareholders by reducing the resources under managerial control, thereby limiting the potential for managers to misuse free cash flow for personal gain.

Although some legislative initiatives assume that increasing female board participation can enhance corporate governance, this study does not confirm that board diversity effectively curbs undesirable behavior or leads to higher dividend payouts. The findings do not support the hypothesis that female directors improve monitoring effectiveness and increase shareholder wealth. Furthermore, the availability of free cash flow does not necessarily lead to value-diminishing investments; it can also be used for positive net present value projects, which could benefit shareholders.

The literature is divided on this issue, and these results add to the ongoing debate. Differences in study findings may stem from sample limitations. For example, Chen et al. (2017) and Byoun et al. (2016) focused on U.S. and UK

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companies, whereas this study focuses on European firms, where data availability on corporate governance is more restricted. Consequently, this research could not control for variables such as the number of independent directors, board tenure, women directors' shareholding, and managerial ownership.

Studies like Pucheta-Martínez et al. (2016), which examined Spanish firms, found that female board members generally correlate positively with dividend payouts, although the presence of institutional female directors negatively impacts dividend policy. Due to data constraints, these aspects could not be measured in this study. The regression results indicate a significant negative association between profitability and dividend payout ($p < 0.05$). This suggests that higher profitability is linked to lower dividend payouts, which contrasts with findings from Lipson et al. (1998), Litner (1956), and Morris (1987). These studies argue that profitable firms typically pay higher dividends to signal strong performance and growth potential. A lower dividend payout might signal underperformance to investors.

Additionally, the results might have been influenced by the European Union's gender legislation introduced in 2012, which set a voluntary target of 40% female non-executive directors on boards by 2020. This may have pressured European boards to increase female representation over time.

Conclusion

Overall, these findings show that the presence of female directors on the board does not significantly impact a company's dividend payout ratio. This study adds to the limited but growing research on the role of women directors in enhancing corporate governance. The study concludes that boards with gender diversity do not necessarily correlate with higher audit activity or earnings quality as measured by dividend policy. This research extends the corporate governance literature, focusing on the influence of female board members.

Recent studies (Byoun et al., 2016; Chen et al., 2017; Pucheta-Martínez & Bel-Oms, 2016) suggest that dividend payouts increase with more female directors. This study explores whether a similar relationship exists in the European market but finds no empirical evidence that the percentage of female directors positively impacts dividend payments. These findings do not support the hypothesis that board diversity is positively associated with higher dividend payouts.

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Limitations

This study has several limitations. The limited sample size may not fully represent the entire European market whereas the findings could also be influenced by the EU's 2012 gender quota, which may have pressured boards to increase female representation. Longer-term studies could better assess the effects beyond this transitional period.

Future research should consider factors like demographic changes, shareholder pressure, increased scrutiny, and women's higher education levels, which are increasingly relevant to gender diversity studies (Pucheta-Martínez et al., 2016). Additionally, it would be useful to take into consideration the impact of the global health crisis by excluding companies with negative returns during the 2019-2022 period.

Lastly, since this study focuses on companies listed on Euronext from 2003-2022, its findings should not be generalized to other regions or time periods.

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Appendix 1

Control Variables	Definition	Relationship	Explained by
Firm size	Defined as logarithm of total firm assets	Positive	Redding (1997)
Board size	Total number of directors on the board	Positive	Hu & Kumar (2004)
Leverage	LeverageThe sum of short-term and long-term debt divided by equity	Negative	Benito & Young (2003)
Profitability (ROE)	Return on equity is used to measure a firm's profitability. ROE is calculated as net earnings divided by shareholders' equity.	Positive	Adams & Ferreira (2009)
Cash (liquidity)	The cash ratio is used to measure the company's liquidity. The cash ratio is defined as cash and marketable securities divided by total assets.	Negative	Jensen (1986), Rozeff (1982), & Stulz (1990)
Tobin's Q	To measure the set of investment opportunities, the Tobinov Q ratio is used. It is calculated as a ratio of market to book price per share.	Positive/Negative	Amor & Bokpin (2010) & Aivazian & Booth (2003)
Capex	To measure capital expenditures as a substitute for dividend payments, Capex is taken against total assets.	Negative	Adams & Ferreira (2009)

DEVELOPING A FINANCIAL MODEL FOR SUSTAINABLE ENERGY: A CASE STUDY ON SOLAR POWER INVESTMENTS

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Abstract With a history extending from ancient civilizations to modern advancements catalyzed by notable scientists, solar power has emerged as a pivotal renewable energy source. This research aims to construct a comprehensive financial model that not only gauges the profitability of solar energy projects but also integrates environmental, social, and governance (ESG) considerations, enhancing the sustainability of these ventures. The primary objective of this research is to assess the financial allure of solar power projects across various scales and regions, identifying potential investment risks and crafting strategies to mitigate them. This model is expected to offer insightful risk assessments covering market, regulatory, and technological aspects, with proposed strategies for risk mitigation including government incentives, advanced storage solutions, and innovative financial instruments like green bonds and power purchase agreements (PPAs). It contributes significantly to the discourse on sustainable energy solutions, embedding ESG factors within financial models for solar power investments. This integration ensures that investment decisions are not only financially sound but also align with broader sustainability objectives, enriching the traditional financial assessment models with a focus on environmental and social impacts. Through a meticulous analysis of economic indicators and a nuanced understanding of the associated risks, the study illuminates pathways for rendering solar investments not only feasible but also appealing to investors. This holistic approach is poised to foster the growth of solar power investments, advocating for stable government policies and market strategies that support the renewable energy transition.

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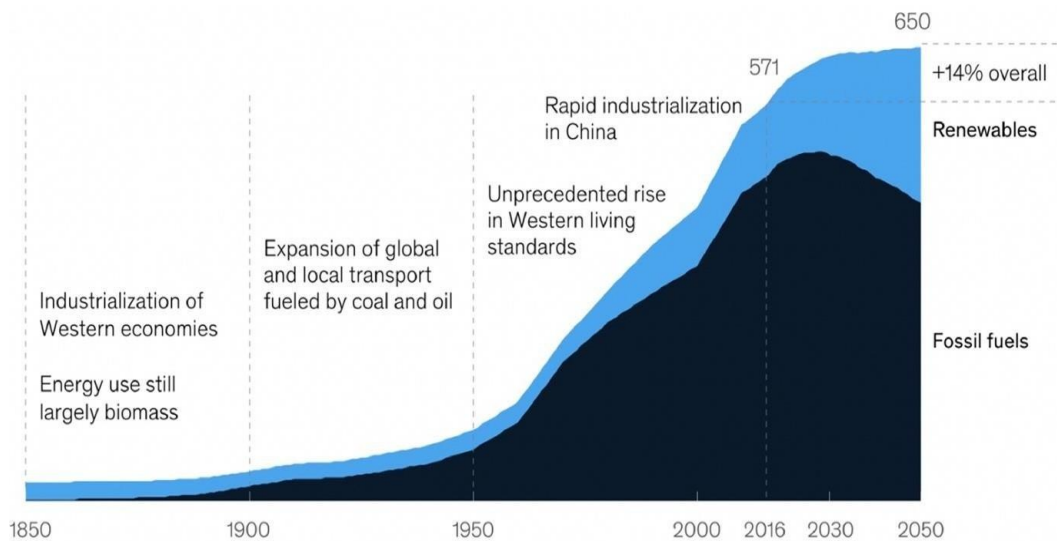
INTRODUCTION

The people who harnessed the energy from the sun for cooking and heating were the first who invent solar power equipment. The understanding of the photoelectric effect could be attributed to the endeavors of scientists including Albert Einstein and Alexandre Edmond Becquerel which brought enhancements in the 19th and 20th centuries (See Fig. 1). Solar cells were first put into widespread use in the fifties, the primary application of which was in the aerospace industry. Subsequently, solar photovoltaic technology has become one of the most essential sources of energy in the global energy mix today (Ari and Koc, 2021). In this project, we aim to develop a financial model for integrating solar power as an investment that will cater for environmental concerns and at the same time generate good returns. Supporting government policies and cost reduction in photovoltaic systems, which plays a critical role in the advancement of solar technology, have witnessed rapid growth. However, some challenges persist such as fluctuating energy prices, ambiguous trends in energy legislation, and steep initial costs of the project.

Other barriers are also present including the nature of solar power being intermittent and the need for proper storage systems. To avoid these deficiencies, more work is needed to design dependable methods for financial modeling that would enable proper investment decisions and would ensure both environmental and economic benefits. The model will provide a foundation for the forecast of future growth in the sector as it will incorporate features such as emerging community solar projects and issues related to technological advancement in the installation of solar systems. The purpose of the current project is to contribute to the progress of sustainable development in the power generation industry by aiding stakeholders in their decision-making process by providing an insightful tool for reviewing solar power ventures along with reducing carbon emissions.

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Figure 1: Global primary energy demand in million terajoules



(Source: Khaled Obaideen et al.,2021)

However, at the moment solar energy is regarded as one of the key sources of renewable energy. According to the IRENA's report 2020, the global solar PV capacity shall surpass about 770GW by the end of 2020. Factors behind this include affordable prices resulting from economic scale, supportive government policies, and technological advancements. Additionally, favorable policies such as net metering, tax credits, and feed-in tariffs have further encouraged its usage (Shahbaz et al., 2021). The financial model will provide a foundation to forecast the future growth in the sector as it will incorporate features such as emerging community solar projects and issues related to technology advancement in the installation of solar systems. Thus, the goal of our research is to relate solar investments to other sustainability objectives that consider environmental and sales-related effects in addition to applying financial elements incorporating ESG factors into the financial model. This will increase the attempts to combat climate change and reduce carbon emissions as the planet turns towards renewable resources.

The solar sector has faced some challenges in spite of these developments. There is one issue though, solar energy tends to be unpredictable and thus requires efficient methods of storage in order to provide a constant flow of energy (Usman et al., 2024). In addition, there are some concerns that massive additional investments are also required in upgrading present electricity systems to accommodate solar energy. The objective of our study is to offer a comprehensive understanding of developing a financial model for solar power investments along with the

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benefit to the environment by reduction of carbon emissions. The second performance index would include key economic variables such as the net present value, internal rate of return, and return on investment of the solar projects. It includes Environmental, Social, and Governance (ESG) factors to ensure that it aligns with broader sustainable investment goals (Agyekum, Velkin, and Hossain, 2020). Based on the study, and the observations made from a critical evaluation of the economic and environmental context, our study aims to provide useful information regarding solar power investment to help in decision-making among the stakeholders. In addition, our project will also seek to find out if there are any new trends for the feasibility of the model, for example, exploring community solar projects and advanced solar technologies. Conclusively, our research will contribute to limiting climate change and reducing the emission of carbon by advancing the globalization of renewable energy. The study aims to contribute to the further development of acceptance and incorporation of solar energy as an essential source of energy across the world by advancing investment in clean solar energy.

LITERATURE REVIEW

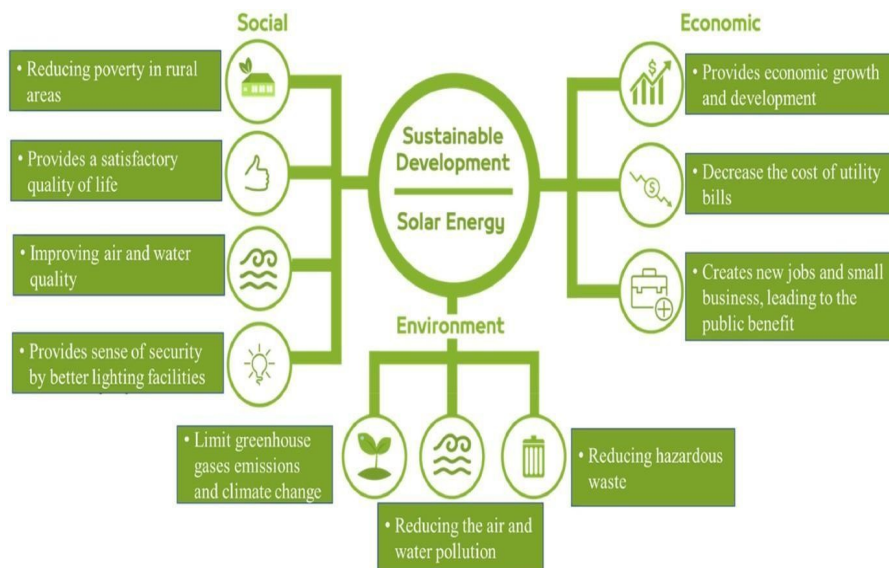
According to Nolden et al (2020), the present time energy systems are transforming very strongly, and for this solar power system is one of the best energy systems in the current time and will be more effective in the future. This system is very helpful which can use renewable resources and manage the current energy resources such as fuel, coal, etc. Authors also provide critical insights of the community energy business models, which will help to solar photovoltaic projects with cornerstone technology. In this era science and technologies have been developed hugely (Nolden et al. 2020). So many companies are using solar power energy for traditional energy alternative. That is why many companies have started projects for their solar power for which they require investment. To get better investment they need to develop a suitable financial model to get better investment. So, for this TCE (central theory model) is beneficial for the business strategy.

On the other side, according to Rasoulinezhad and Taghizadeh-Hesary (2022), in the present time, people are more concerned about the environmental, social, and governmental impact of business. And energy consumption is creating huge CO₂ emissions, which is not ethically correct for the environment. So many companies have taken a step ahead in CSR in their organization to provide a moral view on ESG (See Fig: 2) this helps them to build a good brand image in the market. For this ESG criteria, social power is one of the best solutions of the energy consumption resources alternative (Rasoulinezhad and Taghizadeh-Hesary, 2022). This author has suggested some financial models such as capital investment projects which

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will help to calculate NPV, IRR, and ROI. In this process the research needs to make an estimated initial investor and cash flows condition to identify their project NPV, IRR, and ROI which outcomes help to attract investors and help them in their investment decision-making process.

Figure 2: Contribution of solar energy on the three pillars of sustainable development



(Source: Khaled Obaideen et al.,2021)

One of the key challenges in solar power investment is the high initial cost, which includes the installation of photovoltaic (PV) panels, inverters, and other infrastructure. However, technological advancements and economies of scale have significantly reduced the cost of solar power in recent years. According to the International Renewable Energy Agency (IRENA), the cost of solar PV electricity has fallen by 89% since 2010 (IRENA, 2020). This trend is expected to continue, making solar power increasingly competitive with traditional energy sources. Additionally, innovative financial models such as power purchase agreements (PPAs) and green bonds have emerged as effective tools for financing solar projects. These models allow for the distribution of financial risk and provide investors with stable, long-term returns (Mendelsohn & Feldman, 2013). By integrating these financial instruments into solar power projects, developers can attract a broader range of investors and facilitate the expansion of solar energy.

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The development of solar power as a sustainable energy source will require continued innovation in technology, policy, and financial models. Advances in PV technology, such as the development of more efficient solar cells and the integration of solar panels into building materials, will further reduce costs and expand the applicability of solar power (Wang et al., 2021). Furthermore, the integration of solar power with other renewable energy sources, such as wind and hydroelectric power, presents opportunities for creating more resilient and diversified energy systems. Hybrid energy systems that combine solar with other renewables can mitigate the intermittency challenges and provide a more stable energy supply (Dawoud et al., 2020).

The rationale for this study is to employ renewable energy as a source of power to reduce the effects of global warming and also the use of fossil energy sources. One of the best sources of sustainable energy is sunlight, as it is free of cost and easily accessible. Nonetheless, the crucial question that investors want to answer is whether the solar project that they are contemplating is going to generate a profit. The purpose of this project is to design an overall instrument to evaluate and promote solar power as a sustainable investment, by developing a solid economic foundation coupled with economic and environmental considerations (Obaideen et al., 2021). In addition, analyzing the impact of the integration of ESG factors into investment decisions has become more crucial as the global community becomes increasingly environmentally conscious (Anam et al., 2022). This project aims to develop a comprehensive tool to evaluate a sustainable solar power investment by developing financially sound arguments and a logical model for evaluating economic and environmental components. This research also aims to build upon the existing models as well because in doing so we can accommodate the current changes in technology and regulation within the solar business (Nolden, Barnes, and Nicholls, 2020). As the awareness of people around the globe intensifies towards climate change and the materialization of a sustainable future, the need for understanding the impact of integrating ESG factors in the investment management process is vital.

Renewable energy especially solar power has the potential of deeper returns on investment and most investors are inclined to invest in such systems. Tied to the efficiency of producing solar technology, the output of energy and potential profits for the firm can be improved. Thus, solving the issues with intermittency, and energy storage technologies could enhance the efficiency and reliability of solar power. It is noted that many enterprises generate large scale, which enables economies of scale and ultimately generates revenues. Integrating solar with other forms of renewable energy

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sources can enhance on system profitability as well as system reliability. Due to this, emphasis has to be placed on the fact that it is steady, long-term profits that one is likely to make from investments in solar projects. Focusing on the advantages to the environment can be aligned with the trends of increasing focus on ESG investing. It is notable that the number of investors can be enlarged by using creative financial techniques such as crowdfunding and green bonds. It can be stated, that solar projects can be increased in financial appeal several folds, with the assistance of government incentives and favorable legislation. The way of earning investors' trust is getting them to trust the process of competent companies, case in point, track records. Last, of all, the demonstration of the biochemical reactor, new technologies in general, and the potential for future modification can draw the attention of visionary investors interested in the opportunities for the expansion of the use of renewable energy sources.

METHODOLOGY

In the Developed projection of financial statement based on the historical financial statement of the IRENA, the case study for our project, we use a secondary quantitative method where in, key economic indicators such as Net Present Value (NPV), Internal Rate of Return (IRR), and Return on Investment (ROI) were calculated to assess the profitability and feasibility of the solar projects. These metrics provided a framework for evaluating investment decisions and understanding potential financial outcomes (Shahbaz et al., 2021). The research involves analyzing historical data and current market trends to understand the factors influencing the financial performance of solar investments. This included examining the costs of solar panels, market shifts, and the impact of government policies on solar technology adoption. The analysis helped in modelling the financial performance and resilience of solar projects under various market conditions (Nolden, Barnes, and Nicholls, 2020). For this project we will use other sources and take data from different sources like articles, journals, web sites, data analysis, data from the IRENA, etc. This will help to build a better knowledge about the development process of a financial model for the solar power investment. For these ESG factors benefits will be also discussed with the secondary data and then identify why Environmental factor is more volatile than social and governmental factors and its reason (Taghizadeh-Hesary and Yoshino, 2020).

IRENA helps identify gaps in investment and directs funds to regions with high potential for solar energy deployment. These efforts not only promote the adoption of solar power but also contribute to significant

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reductions in CO₂ emissions by displacing fossil fuel-based energy generation (IRENA, 2023). The concerns of climate change and energy transition emerging as necessity has underpinned the topic of financial modelling sustainable energy, particularly solar power investment. Sustainable power systems, such as solar power systems, have become valued due to the need to transition from the conventional systems that rely on fossil fuels and address greenhouse gas emissions in the global effort to come up with enhanced energy systems. A plethora of stakes associated with financial modelling in the RE context has been explored by scholars and practitioners, particularly in the case of solar energy investment. Our study includes a wide spectrum of topics like assessment of financial performance, implications of risk in business operations, analysis of project funding models and investment management plans. Several themes that emerged from literature are discussed in this paper, one of which is the importance of generating accurate financial models for the solar power plants in order to capture key characteristics of those plants. The conceptual explanation of why platform features like the availability of solar resources, costs of technology, regulatory environment, policy support, and markets have to be considered in the evaluation of financial infrastructure and related decisions. Many governments worldwide are promoting solar energy through subsidies, tax incentives, and favorable regulatory frameworks. This support is vital for the growth of the solar sector, as it makes investments more attractive (Green, et al., 2020)

Technological advancements in the solar energy sector are significantly improving in the efficiency of solar panels and substantial reductions in costs, making solar power more competitive with traditional energy sources. Solar panel efficiency has been steadily increasing due to advancements in photovoltaic technology. The average efficiency of commercial solar panels has increased from around 15% a decade ago to over 20% today, with some cutting- edge technologies achieving efficiencies above 25% (Green et al., 2020). Through the analysis of historical patterns and an exploration of the current activities, the study provides important insights into the details of the conceptualization of community energy business models, and thus its effects on the transition of local and global energy systems. Such information can assist policymakers, implementation agents, and community members in devising the appropriate strategies for supporting the sustainable engagement of communities in the energy transition process. These models incorporate detailed cost analysis, including capital expenditure (CapEx) for installation and equipment, and operational expenditure (OpEx) for maintenance and operations. By accurately

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estimating these costs, financial models help in determining the overall financial feasibility (NREL, 2021).

RESULTS & DISCUSSION

The International Renewable Energy Agency (IRENA) is a leading global authority on renewable energy. It provides comprehensive and credible data, analysis, and insights into the renewable energy sector. IRENA's publications and databases are widely respected and used by policymakers, researchers, and industry professionals worldwide. By leveraging IRENA's extensive and reliable data, solar power investment advisory services can ensure that their analyses and recommendations are based on the most accurate and up-to-date information available. This enhances the credibility of their financial models and investment advice. IRENA provides detailed market insights, including trends in renewable energy adoption, cost trajectories, and policy developments. These insights are crucial for understanding the broader market context and positioning solar power investments to take advantage of emerging opportunities (IRENA, 2023).

We Provide projections of the financial statements for 5 years start from 2023 to 2027 as follows:

Income (P/L) Statement

With the help of the historical data of the company, some assumptions are taken into consideration and model has been developed. A snapshot is provided regarding the Major insights are provided with the help of the income statement into the operational performance of the company over time on how well the company is performing over the years. This shows the revenue has shown a positive growth. Apart from the year 2020 to 2021 due to the COVID there was a slight decline of approximately 6.73% however, with overcoming the growth rate from the next year. the way effectively it generates revenue, and manages expenses for the profit production. The organization has been successful in expanding its income which is seen by 2027 the revenue is expected to be 107.28 million USD showing positive growth over the years.

There has been a significant upward trend in revenue from year 2023 to 2027, in which the revenue has increased by approximately 60% from \$66,240.15 to \$105,784.14¹ over these five years. There has been substantial increase of 51% in the expenses which is slightly less than the revenue growth.

¹ Note that the taxes were excluded for Renewable Energy (IRENA Report 2023)

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We can predict that the Organization is growing with a positive indicator of operational efficiency.

The surplus has been fluctuating over the years indicating that the organization is growing in a sustainable manner. The given trend shows how well the company is doing when it is able to invest in the future projects which are quite important in order to make more profit and reinvest in different projects. For instance, IRENA's Investment in Crosser Border Power Distribution to its investment in smart grid projects which will give both profit for the organization and a step towards a better environment.

The robust growth rate in revenue indicates many positive factors, and these factors are expansion of the market, success of service or product, power of pricing, and tailwinds of the economy. The company might be entering successfully into new markets, or expanding its base of customers. There could be strong demand for the offerings from the company because of the quality, effective marketing, or innovation. But the company has been able to increase prices by majorly impacting demand. The prices have been able to increase by the company by majorly impacting the demand, and the growth which could be attributed partially to unfavorable conditions of the economy in the sector of the company.

In terms of the management of expenses, the observations are done depending on three aspects, and these aspects are economies of scale, cost control, and operating leverage. *[Referred to appendix 1]*

Statement of Financial Position (Balance Sheet)

The position of finance of the company with the help of the balance sheet at a specific point in time, which shows its assets, liabilities, and equity. In this regard, the examination is done regarding the balance sheet over a period of five years, which allows to observe changes, and trends in the structure of finance of the company.

The demonstration is done through the balance sheet regarding the steady increase in assets, which is increasing from \$59096 in year 0 which is the year 2022 to \$105,802 in year 5 which is the predicted year 2027. Liabilities have increased considerably by \$23,749.40 USD over the period, showing that while the organization is growing its asset base, it is also taking on more liabilities, possibly to finance the growth. The fund balance and reserves show an increase of \$15,832.93 USD, consistent with the increase in net assets, indicating that the organization has been able to maintain a positive and growing equity position. As per the estimation, there is a rise in equity consistently, which demonstrates that the company is good in retaining, and generating profits.

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The rise of assets that is noticed, in this regard, can be indicative of many positive factors. These factors are successful expansion, increase in liquidity, with account receivable which has remained constant. The Cash and cash equivalents are the money which the company has readily available which sounds like a wallet that is easily accessible when required which is quite high. The increase in net assets and fund balances reflects healthy financials, with the organization expanding its operations while still managing to grow its equity base. However, the significant rise in liabilities suggests a need to monitor debt levels to ensure that the organization's financial leverage remains sustainable. Overall, the trend shows financially healthy organization which is a positive sign for the stakeholders for the stability and growth. *[Referred to appendix 2]*

Cash Flow Statement

The importance of the statement of the flow of cash is noticed for understanding the liquidity of the company, with flexibility in finance, and earnings quantity. It provides insights into the way cash is used, and generated by the company, which is important for its health of finance, and sustainability assessment. In this section, a deeper evaluation is done regarding the statement of the flow of cash. There is a gradual decrease from \$167.28 in 2023 to \$120.87 in 2027. This is typical as assets age and their book value reduces. Similarly, amortization decreases from \$71.52 in 2023 to \$52.60 in 2027, reflecting the amortization of intangible assets over time. the cash and cash equivalents at the end of the year have increased by 75.75%, showing strong financial management and liquidity.

Significant changes in PP&E purchases and increases in non-current liabilities show a strategic shift in investment activities, with a 98.33% decrease in PP&E purchases indicating cost control. The organization expects to see a positive cash flow in each of the upcoming years which means that the excess in cash inflow and expected cash outflow might result in net increase in cash reserves. Cash flow projections are positive if followed this trend and it is utmost important to consider that the potential risk would be responsible for its outcome. *[Referred to appendix 3]*

As result of the projection of the financial statements, we explain now the key economic indicators (NPV, IRR, and ROI) as follows:

NPV, IRR and ROI Profile:

Table.1: NPV, IRR, and ROI Indicators

Values * 1000		Cash flows	Net Cash
T0	Investment Cost year 0 (2023)	\$ 28,134.40	\$(28,134.40)

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T1	Cash flow 1 (2023)	\$	2,649.45	\$	2,523.29
T2	Cash flow 2 (2024)	\$	8,340.39	\$	7,564.98
T3	Cash flow 3 (2025)	\$	9,656.54	\$	8,341.68
T4	Cash flow 4 (2026)	\$	10,620.39	\$	8,737.42
T5	Cash flow 5 (2027)	\$	11,716.28	\$	9,180.01
WACC Ratio	5% ²		NPV	\$	8,212.99
Net Profit year 0 (2023)	\$	4,110.65	IRR		7.976%
			ROI		14.611%

Source: (Self- created in Ms- Excel)

Based on the results shown in Table 1, our calculations indicate that the investment cost for Year 0 (the end of 2022 and the expected cost at the beginning of 2023)—considered as time zero—is \$28,134.40. This amount includes the sum of Consultants and Contractual Services, Specialized Staff Costs, Project Research Costs, Travel Costs, Meeting Costs, Sponsorship Costs, Purchase of PP&E, and Purchase of Intangible Assets. Additionally, to calculate the NPV, we used the cash flows derived from the cash flow statements presented above, following this equation:

$$\text{NPV} = - \text{Initial Investments} + \sum \text{PV of all expected Cash flows}$$

The positive NPV indicates that this project will generate more cash than cost investment. Which means that this project will create value and contribute to the wealth of the investors and the shareholders. At \$8,212.99 the value of the net present value is noticed. This provided a positive flow of cash with a relatively high IRR (7.976%, next key economic indicator). The rate of discount used for the determination of NPV is 5% which is assumed as it represents a reasonable return on its investment which could be achieved for a long-term goal. Discounted rate of 5% serves as a balance between being sufficient to account for risk and uncertainty for this sector.

The discount rate often includes a risk premium, reflecting the uncertainty of the investment's future returns.

² We used the WACC as an median of all the ratios applied to IRENA companies worldwide (2.5%, 5%, and 10%). Therefore, we decided to use only the 5% ratio (IRENA Report, 2023)

A 5% discount rate might indicate a relatively low-risk investment, as solar power projects often benefit from long-term contracts, government incentives, and stable revenue streams. The project starts with a substantial initial investment of \$28,134.40, which is expected in capital-intensive projects like solar power installations. there's a substantial cash inflow of \$36,347.39 (PV of all expected cash flows using discount rate 5%). This

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represents the culmination of various factors like increased efficiency, full operational capacity, or the realization of additional financial benefits. This NPV indicates that the company can generate profits and it is better to invest in it. More shareholders and investors are attracted to it. In terms of the stakeholders this can give a greater dividend for them. This NPV enhances the company's future cash flow, which involves overall liquidity and financial stability of the company. This indicates that the developed financial model will attract more investors. This dual impact of financial gain and environmental benefit positions the company favorably in both the financial markets and in the broader context of sustainability.

To determine the IRR, we created an NPV profile by analyzing different discount rates. The IRR is the discount rate at which the NPV equals zero (no gain, no loss). We can also use the following equation to calculate the IRR:

$$0 = NPV = \sum_{t=1}^T \frac{C_t}{(1 + IRR)^t} - C_0$$

Where,

C_t =Net cash inflow during the period t

C_0 =Total initial investment costs IRR =The internal rate of return

t =The number of times periods

Based on the positive NPV results, the IRR must exceed the WACC ratio of 5%. Our calculations indicate that the IRR is 7.976%. At this rate, the NPV equals zero. When the discount rate (r) is below the IRR, the NPV is positive (a gain). Conversely, when the rate exceeds the IRR, the NPV becomes negative (a loss). Refer to Table 2 and Chart 3 for further illustrations.

Table.2: NPV Profile

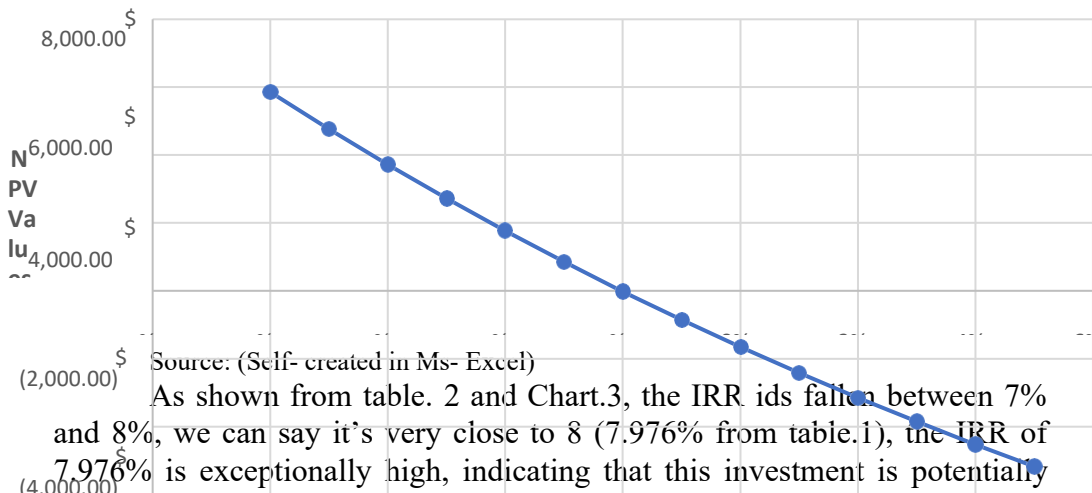
r	NPV
2%	\$ 5,857.84
3%	\$ 4,761.78
4%	\$ 3,715.90
5%	\$ 2,717.33
6%	\$ 1,763.40
7%	\$ 851.62
8%	\$ (20.34)
9%	\$ (854.67)
10%	\$ (1,653.38)

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11%	\$	(2,418.39)
12%	\$	(3,151.49)
13%	\$	(3,854.34)
14%	\$	(4,528.52)
15%	\$	(5,175.49)

Source: (Self- created in Ms- Excel)

Figure. 3: NPV Profile



As shown from table. 2 and Chart.3, the IRR falls between 7% and 8%, we can say it's very close to 8 (7.976% from table.1), the IRR of 7.976% is exceptionally high, indicating that this investment is potentially profitable. However, such an IRR should be scrutinized carefully, as it might indicate optimistic projections or low risk. There are many positive implications that are noticed in this regard. A 7.976%IRR indicates that the investment is profitable majorly, which is leading majorly returning far more than the initial invested capital in a slow pace. However, due to the time zone projection the IRR is slightly high. In the actual case scenario, each project takes a lot of time involving approximately 20 to 25 years.

Over the actual time zone in the facts, the IRR would within the ranges still indicating a positive trend to invest. Such a high IRR indicates a rapid period of payback, which is the initial investment that could be quickly recovered. In reality the payback period shall take a long time. Moreover, renewable energy projects aim for an IRR that exceeds the general market basically the government bounds. This results in the attraction of the investors which promises good returns and also leading to substantial reduction in CO2 emission, which contributes directly in combatting the climate change.

The final economic indicator we discussed for IRENA is ROI. The net profit for Year 1 (2023) is \$4,110.65, as shown in the Income Statement

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(P/L statement). The cost of investment, \$28,134.40, is detailed above in Table 1. Therefore, the ROI ratio is calculated as the return (net profit) on the investment (initial investment). Therefore, the ROI is 14.611% this generally encourages the investors to consider the similar projects or investments in assumption of having a similar risk. ROI of 14.611% indicates good investment. This suggests that the company is generating profits. This indicates that over every dollar spent within the analyzed time frame the return shall be 14.611 cents profit. ROI of 14.611% demonstrates, that the project has not only recovered the initial investment of \$28,134.40 but has generated a substantial profit on top of that. This is particularly important in capital-intensive projects like solar power, where the upfront costs are high, and the payback period is typically longer.

As more solar projects are developed due to the financial success demonstrated by this ROI, the cumulative impact on CO₂ emissions could be substantial. Each additional solar project contributes further to reducing global greenhouse gas emissions, helping combat climate change on a larger scale. With the global shift towards green energy, the company is positioning itself well for long-term growth. A 14.611% ROI can contribute to sustainable increases in shareholder value as the company gains a stronger foothold in the renewable energy market. However, lower ROI might be less attractive but still a hope of positive gain. We need to keep in mind that for it takes a minimum of 20 to 25 years to gain profit in these companies. This ROI with significant NPV predicts that it not only covers the cost in a slow pace but shall provide additional value which will definitely be attractive.

CONCLUSION

This project provides the complexities of financial viability in the solar power sector, aiming to bridge the gap between environmental sustainability and economic profitability. Solar power is a clean, renewable energy source that generates electricity without producing greenhouse gas emissions during its operation. By investing in solar power, with the NPV is \$8,212.99, IRR of 7.976% and ROI of 14.611%, the company directly contributes to reducing its carbon footprint. The transition from fossil fuels to solar energy significantly decreases CO₂ emissions, which is crucial in the fight against climate change. The successful implementation of this project will likely result in a substantial reduction in the company's overall emissions. Through meticulous analysis of key economic indicators like Net Present Value (NPV), Internal Rate of Return (IRR), and Return on Investment (ROI), the research illuminate's pathways for making solar investments not just feasible but also attractive to investors (Shahbaz et al., 2021).

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One of the significant findings of this project is the identification and stratification of risks associated with solar power investments especially in market, regulatory, and technological. The strategies proposed to mitigate these risks, such as leveraging government incentives, advancing storage technologies, and innovative financing instruments like green bonds and Power Purchase Agreements (PPAs), demonstrate a deep understanding of the intricate balance which are required to manage financial and environmental priorities effectively (Nolden, Barnes, & Nicholls, 2020). The investment offers a rare combination of high financial returns and environmental benefits. It is not only profitable but also helps in addressing climate change and resource sustainability. The investments predicted gives a win- win situation by being positively financially feasible and providing environmental benefits. This is one of the best choices for making a positive impact on the world.

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APPENDICES:

Appendix 1:

2019		2020		2021		2022		2023		2024		2025		2026		2027	
USD'000		USD'000		USD'000		USD'000		USD'000		USD'000		USD'000		USD'000		USD'000	
ASSETS																	
Current assets																	
Cash and cash equivalents	\$45,567.00	\$51,006.00	\$50,939.00	\$50,609.00	\$53,258.45	\$61,598.84	\$71,255.38	\$81,875.78	\$93,592.06								
Contributions receivable	\$1,354.00	\$3,395.00	\$2,768.00	\$2,057.00	\$2,057.00	\$2,057.00	\$2,057.00	\$2,057.00	\$2,057.00								
Other assets	\$3,392.00	\$3,089.00	\$3,140.00	\$4,145.00	\$4,145.00	\$4,145.00	\$4,145.00	\$4,145.00	\$4,145.00								
Total current assets	\$50,313.00	\$57,490.00	\$56,847.00	\$56,811.00	\$59,460.45	\$67,800.84	\$77,457.38	\$88,077.78	\$99,794.06								
Non-current assets																	
Property, plant and equipment	\$1,482.00	\$1,515.00	\$1,739.00	\$1,591.00	\$2,923.72	\$2,769.82	\$2,634.68	\$2,503.90	\$2,390.03								
Intangible assets	\$646.00	\$551.00	\$555.00	\$694.00	\$822.48	\$756.68	\$696.15	\$651.50	\$604.90								
Total non-current assets	\$2,128.00	\$2,066.00	\$2,294.00	\$2,285.00	\$3,746.20	\$3,526.50	\$3,330.82	\$3,155.40	\$2,994.93								
Total assets	\$52,441.00	\$59,556.00	\$59,141.00	\$59,096.00	\$63,206.65	\$71,327.35	\$80,788.21	\$91,233.17	\$102,788.98								
LIABILITIES																	
Current liabilities																	
Payables and accruals	\$3,155.00	\$4,038.00	\$2,889.00	\$4,620.00	\$4,620.00	\$4,620.00	\$4,620.00	\$4,620.00	\$4,620.00								
Employee benefits	\$2,860.00	\$4,031.00	\$4,485.00	\$4,785.00	\$5,607.13	\$7,231.27	\$9,123.44	\$11,212.43	\$13,523.60								
Total current liabilities	\$6,015.00	\$8,069.00	\$7,374.00	\$9,405.00	\$10,227.13	\$11,851.27	\$13,743.44	\$15,832.43	\$18,143.60								
Non-current liabilities																	
Payables and accruals	\$2,920.00	\$1,110.00	\$2,634.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00								
Employee benefits	\$959.00	\$888.00	\$796.00	\$1,041.00	\$1,863.13	\$3,487.27	\$5,379.44	\$7,468.43	\$9,779.60								
Housing advance fund	\$817.00	\$817.00	\$817.00	\$817.00	\$1,639.13	\$3,263.27	\$5,155.44	\$7,244.43	\$9,555.60								
Total non-current liabilities	\$4,696.00	\$2,815.00	\$4,247.00	\$1,933.00	\$3,577.26	\$6,825.54	\$10,609.88	\$14,787.87	\$19,410.19								
Total liabilities	\$10,711.00	\$10,884.00	\$11,621.00	\$11,338.00	\$13,804.39	\$18,676.81	\$24,353.32	\$30,620.30	\$37,553.79								
Net assets	\$41,730.00	\$48,672.00	\$47,520.00	\$47,758.00	\$49,402.26	\$52,650.54	\$56,434.88	\$60,612.87	\$65,235.19								
FUND BALANCES																	
Capitalisation reserve	\$2,128.00	\$2,066.00	\$2,294.00	\$2,285.00	\$3,107.13	\$4,731.27	\$6,623.44	\$8,712.43	\$11,023.60								
Working capital fund	\$1,600.00	\$1,600.00	\$1,600.00	\$1,600.00	\$1,600.00	\$1,600.00	\$1,600.00	\$1,600.00	\$1,600.00								
Accumulated surplus	\$38,002.00	\$45,006.00	\$43,626.00	\$43,873.00	\$44,695.13	\$46,319.27	\$48,211.44	\$50,300.43	\$52,611.60								
Total Fund Balance and Reserves	\$41,730.00	\$48,672.00	\$47,520.00	\$47,758.00	\$49,402.26	\$52,650.54	\$56,434.88	\$60,612.87	\$65,235.19								

Analysis of Income Statement.

(Source: Self- created in Ms- Excel)

Appendix 2:

	2019	2020	2021	2022	2023	2024	2025	2026	2027
	USD'000	USD'000	USD'000	USD'000	USD'000	USD'000	USD'000	USD'000	USD'000
ASSETS									
Current assets									
Cash and cash equivalents	\$45,567.00	\$51,006.00	\$50,939.00	\$50,609.00	\$53,258.45	\$61,598.84	\$71,255.38	\$81,875.78	\$93,592.06
Contributions receivable	\$1,354.00	\$3,395.00	\$2,768.00	\$2,057.00	\$2,057.00	\$2,057.00	\$2,057.00	\$2,057.00	\$2,057.00
Other assets	\$3,392.00	\$3,089.00	\$3,140.00	\$4,145.00	\$4,145.00	\$4,145.00	\$4,145.00	\$4,145.00	\$4,145.00
Total current assets	\$50,313.00	\$57,490.00	\$56,847.00	\$56,811.00	\$59,460.45	\$67,800.84	\$77,457.38	\$88,077.78	\$99,794.06
Non-current assets									
Property, plant and equipment	\$1,482.00	\$1,515.00	\$1,739.00	\$1,591.00	\$2,923.72	\$2,769.82	\$2,634.68	\$2,503.90	\$2,390.03
Intangible assets	\$646.00	\$551.00	\$555.00	\$694.00	\$822.48	\$756.68	\$696.15	\$651.50	\$604.90
Total non-current assets	\$2,128.00	\$2,066.00	\$2,294.00	\$2,285.00	\$3,746.20	\$3,526.50	\$3,330.82	\$3,155.40	\$2,994.93
Total assets	\$52,441.00	\$59,556.00	\$59,141.00	\$59,096.00	\$63,206.65	\$71,327.35	\$80,788.21	\$91,233.17	\$102,788.98
LIABILITIES									
Current liabilities									
Payables and accruals	\$3,155.00	\$4,038.00	\$2,889.00	\$4,620.00	\$4,620.00	\$4,620.00	\$4,620.00	\$4,620.00	\$4,620.00
Employee benefits	\$2,860.00	\$4,031.00	\$4,485.00	\$4,785.00	\$5,607.13	\$7,231.27	\$9,123.44	\$11,212.43	\$13,523.60
Total current liabilities	\$6,015.00	\$8,069.00	\$7,374.00	\$9,405.00	\$10,227.13	\$11,851.27	\$13,743.44	\$15,832.43	\$18,143.60
Non-current liabilities									
Payables and accruals	\$2,920.00	\$1,110.00	\$2,634.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00
Employee benefits	\$959.00	\$888.00	\$796.00	\$1,041.00	\$1,863.13	\$3,487.27	\$5,379.44	\$7,468.43	\$9,779.60
Housing advance fund	\$817.00	\$817.00	\$817.00	\$817.00	\$1,639.13	\$3,263.27	\$5,155.44	\$7,244.43	\$9,555.60
Total non-current liabilities	\$4,696.00	\$2,815.00	\$4,247.00	\$1,933.00	\$3,577.26	\$6,825.54	\$10,609.88	\$14,787.87	\$19,410.19
Total liabilities	\$10,711.00	\$10,884.00	\$11,621.00	\$11,338.00	\$13,804.39	\$18,676.81	\$24,353.32	\$30,620.30	\$37,553.79
Net assets	\$41,730.00	\$48,672.00	\$47,520.00	\$47,758.00	\$49,402.26	\$52,650.54	\$56,434.88	\$60,612.87	\$65,235.19
FUND BALANCES									
Capitalisation reserve	\$2,128.00	\$2,066.00	\$2,294.00	\$2,285.00	\$3,107.13	\$4,731.27	\$6,623.44	\$8,712.43	\$11,023.60
Working capital fund	\$1,600.00	\$1,600.00	\$1,600.00	\$1,600.00	\$1,600.00	\$1,600.00	\$1,600.00	\$1,600.00	\$1,600.00
Accumulated surplus	\$38,002.00	\$45,006.00	\$43,626.00	\$43,873.00	\$44,695.13	\$46,319.27	\$48,211.44	\$50,300.43	\$52,611.60
Total Fund Balance and Reserves	\$41,730.00	\$48,672.00	\$47,520.00	\$47,758.00	\$49,402.26	\$52,650.54	\$56,434.88	\$60,612.87	\$65,235.19

Analysis of Balance sheet

(Source: Self- created in Ms- Excel)

Building a Sustainable Future: Age-Driven Service Quality at Telda Financial Services for Boosting User Satisfaction

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Abstract: This study explores the moderating effect of age on the relationship between service quality and user satisfaction within Telda Financial Services, a rapidly evolving fintech company. By linking these findings to the United Nations' Sustainable Development Goals (SDGs), particularly SDG 8 (Decent Work and Economic Growth) and SDG 9 (Industry, Innovation, and Infrastructure), the research emphasizes the role of high-quality financial services in promoting sustainable and inclusive economic growth.

The research utilizes both primary and secondary data sources. Primary data will be gathered through surveys administered to a diverse age range of Telda

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Financial Services users. Secondary data will be derived from existing literature on service quality and user satisfaction. The study will specifically analyze how age impacts the relationship between various service quality dimensions—reliability, responsiveness, assurance, empathy, and tangibility—and user satisfaction. Regression analysis will be applied to quantify the moderating effect of age.

Findings – By examining age as a moderating variable, the research aims to reveal variations in the relationship between service quality and user satisfaction across different age groups. The insights gained will aid in customizing Telda's services to better align with the expectations and preferences of its diverse user base, contributing to the sustainability of the financial services sector by enhancing user satisfaction and loyalty.

Originality/value – The study's findings will offer Telda and similar financial service organizations actionable strategies for enhancing service quality to boost user satisfaction. This research contributes to the broader understanding of how demographic factors like age influence customer perceptions, thus supporting the development of more inclusive and customer-centric digital financial services. By aligning with the SDGs, the study underscores the importance of sustainable practices in the financial sector, promoting economic stability and inclusive growth.

Keywords: *Service quality, user satisfaction, age, Telda Financial Services, financial industry.*

Introduction

Financial services encompass a wide array of offerings provided by financial institutions to businesses, individuals, and other organizations, playing a crucial role in modern economies by enabling effective financial management, investment, and risk protection (Raza et al., 2020). The industry's responsibilities include fund transfers, bill payments, balance inquiries, and advisory services, all of which are continuously evolving to maintain competitive advantages (Karjaluoto et al., 2019).

The rapid advancement of technology, particularly in the financial sector, has led to the emergence of financial technology, or Fintech, which combines innovative financial services with technological enhancements to provide reliable, fast, and user-friendly experiences (Pejkovska, 2018; Rahmayati, 2021). Fintech firms like Telda, which offers accessible banking services via a mobile app, exemplify this trend by delivering convenient financial solutions such as money transfers, bill payments, online purchases,

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and ATM withdrawals, coupled with budgeting tools and advanced security measures.

In today's dynamic market, financial services significantly impact modern economies, influencing daily transactions and individual financial well-being. The intense competition in the sector necessitates that companies deliver high-quality services to gain a competitive edge. Understanding the factors that affect customer satisfaction is crucial for financial service providers to enhance client experiences and build loyalty (Pejkovska, 2018). Service quality, defined as the overall impression customers have about the level of service they receive, is measured using dimensions such as reliability, tangibility, assurance, empathy, and responsiveness (Abror et al., 2019; Pakurár et al., 2019). Given the rising customer expectations for service quality, firms must prioritize delivering exceptional services to enhance satisfaction and sustain competitiveness (Joudeh & Dandis, 2018).

Customer satisfaction, which is the pleasure or fulfillment derived from a product or service meeting customer needs, desires, or goals, is subjective and influenced by various factors, including customer feelings (Suchanek & Kralova, 2018). Therefore, maintaining high customer satisfaction levels is paramount for businesses to thrive and build loyal customer bases.

Previous research indicates that demographics, including age, can influence customer expectations and perceptions of service quality (Jalagat & Sayari, 2021). Despite extensive studies on service quality dimensions and their relationship with customer satisfaction, there is a notable gap in the literature regarding the moderating role of age in the financial services sector. This research aims to address this gap by examining how age moderates the relationship between service quality and user satisfaction within Telda Financial Services.

Specifically, this research aims to answer the following questions:

- Does service quality impact user satisfaction?
- Does responsiveness impact user satisfaction?
- Does reliability impact user satisfaction?
- Does tangibility impact user satisfaction?
- Does assurance impact user satisfaction?
- Does empathy impact user satisfaction?
- Does age moderate the relationship between service quality and user satisfaction?

Moreover, linking this research to the broader framework of sustainability and the United Nations' Sustainable Development Goals (SDGs), particularly SDG 8 (Decent Work and Economic Growth) and SDG

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9 (Industry, Innovation, and Infrastructure), emphasizes the importance of fostering inclusive and sustainable economic growth through improved financial services. By enhancing service quality and addressing the diverse needs of different age groups, Telda Financial Services can contribute to building resilient infrastructure, promoting sustainable industrialization, and fostering innovation. This alignment with the SDGs underscores the relevance of this study in promoting economic stability and inclusive growth in the financial sector.

This paper is structured as follows. First, it presents a comprehensive review of existing literature on service quality, customer satisfaction, and demographic influences. Second, it details the methodology employed, including data collection through surveys and secondary sources, and the application of statistical tools such as regression analysis. Third, the results section analyzes the data to reveal the moderating effects of age on the service quality-user satisfaction relationship. Finally, the discussion and conclusion sections provide actionable insights and recommendations for Telda Financial Services, highlighting the implications of the findings for enhancing customer satisfaction across different age groups.

Literature review

Service quality

Service quality was known as “the global evaluation or attitude of overall excellence of services” (Afthanorhan, 2019). The model was developed to be a tool of a qualitative measurement of service excellence (Qawasmeh, 2021). There are 5 dimensions for service quality that was proposed by Parasuraman in 1988 (SERVQUAL model). First one is reliability, which is the dependability of the product or service provided. Second one is tangibility, which is the appearance of the product or service provided physically. Third one is responsiveness, which is the company’s ability to help customers. Fourth one is assurance, which is the credibility, security and trust. Fifth one is empathy, which refers also to good communication (Gong, Yi, 2018). According to Abdu (2019) the model is divided into two parts: expectations and perceptions; if the customer's expectations are met in terms of service quality, the model is said to be successful. If the expectation is not met, it means customers’ dissatisfaction. Therefore, it is a crucial mission in any industry to develop and evaluate service quality, as users are more aware of the level of service they receive. Organizations must prioritize providing high-quality services to enhance customer satisfaction, loyalty, and overall business performance (Joudeh & Dandis, 2018).

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Reliability

Reliability means the dependability of the service, or it can also mean that when the organization perform a service in a correct way. Additionally, it makes the organization compete to fulfill their promises and evaluate the results, since it reflects the capacity of the staff to provide services in a consistent and precise manner. Reliability is the top dimension in the SERVQUAL model regarding the importance (Pakurár, et al., 2019). Reliability dimension is a vital component in the service quality model, it supports the idea of providing the service with three main aspects which are credibility, in time and correctly. Studies indicated that reliability is the most important indicator to customer satisfaction. Reliability is also defined as the ability to deliver the promised product features or service in an accurate way and to make the customer rely on the product independently. Additionally, researchers agreed that companies that provide information accurately on their websites and social media platforms are most likely to make their customers experience reliability (Sumi, Kabir, 2021).

Responsiveness

Pakurár, et al. (2019) said that the responsiveness is to give the customers attention and respond to them according to the request, also giving some answers for their questions would help. Responsiveness is defined as the ability to give responses to the customers and provide them with fast support. It also means the ability to provide customers with solutions for their problems in a fast way. Giving customers the full response, attention and required information are the vital factors of successful responsiveness. Responsiveness is a crucial aspect of the service quality model that evaluates the standard of services offered by a company. It refers to the capacity of a service provider to swiftly and effectively address customer requirements, concerns, and issues. responsiveness includes elements such as informing customers of the specific timeframe for service delivery, promptly attending to customer needs, showing a willingness to assist, and always being available to respond to customer requests (Abdu, 2019). To achieve customer satisfaction, responsiveness must be implemented and trained to the organization employees, since customers always need proper responses for their issues (Sumi, Kabir, 2021).

Tangibility

Pakurár, et al. (2019) find tangibles as the physical appearance of a particular facility or equipment. It is associated with most used physical tools, machines, cards, and efficiency of transactions. It is also defined as the image

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of the product or the facility that the customer use to evaluate the quality received. Regarding financial services, tangibility can be in the tools, machines, debit or credit cards, financial statements and efficiency of the facilities used. Tangibility is a significant aspect of the service quality model that evaluates the standard of services provided by an organization. Customers rely on tangible cues to assess the quality of a service provider's offerings, which provide visible proof of the service provider's dedication to quality. Tangibility is crucial as it impacts customers' perceptions of the service provider and their readiness to use their services (Abdu, 2019).

Assurance

The assurance dimension is defined as the knowledge of the workforces, and their ability to give trust, belief and confidence to the customer. Some researchers said that this dimension must be in the first place concerning the importance, but some others said that it is in the fourth place (Pakurár, et al., 2019). Assurance is a significant dimension in the service quality model that gauges the quality of services rendered by an organization. Clients expect service providers to possess expertise and proficiency in their respective domains (Abdu, 2019). Customers feelings of confidence and trust while using the organization facilities is the reflection of achieving the assurance dimension in a proper way. Assurance is also considered the knowledge and expertise of the employees and their ability to deliver the confidence and trust. Assurance plays a vital role in the customer satisfaction almost in all of the industries, especially, the financial service industries, since financial services must acquire security, transparency and privacy (Sumi, Kabir, 2021).

Empathy

Any customer loves to feel that they are important to the company. So, empathy means delivering attention and providing service in a regular way. The main idea of empathy is that making the customer have the feeling of uniqueness (Pakurár, et al., 2019). Petr Suchánek & Maria Králová (2018) identified two key elements in their evaluation of empathy, which are individual attention and convenient operating hours. Individual attention involves the service provider understanding and addressing the unique needs and concerns of each customer, while convenient operating hours refer to the ability of the organization to provide services at times that are convenient for their customers. Customers expect to receive services in a proper way is a priority for the organization. So, caring, providing attention and help is

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important factors to achieve empathy. Therefore, Empathy clearly plays an important role to achieve customer satisfaction (Sumi, Kabir, 2021).

Customer satisfaction

Customer satisfaction is the judgement of the buyer about a particular product or service post consumption (Otto, et al., 2019). Customer satisfaction is known as “the level of a person feeling state resulting from evaluating a product’s perceived performance” (Afthanorhan, 2019). Khairawatia (2020) defines satisfaction as an evaluation process in selecting alternative or exceeding expectation. Also, it is the performance of a service or product in the post-purchase stage. The customer satisfaction has a clear and strong influence on customers’ decision in the future. According to Suchánek and Králová (2018) It's important to note that customers with repeated experiences may value different variables or aspects of satisfaction than new customers. Customer satisfaction is a crucial aspect of any service provider's success, as it reflects the extent to which the provider has met or exceeded customer expectations. Therefore, Reaching the customer satisfaction is one of the main objectives of most of the organizations, since the satisfaction results in many benefits for the organization such as positive WOM and profitability (El-Adly, 2019).

The moderating role of age

Age plays important moderating role in the connection between service quality and user satisfaction. Various demographic characteristics, such as gender, age, education, and income, can affect the way individuals perceive and evaluate service quality. For instance, younger customers may have different service expectations compared to older customers. Similarly, women may perceive service quality differently than men, and highly educated individuals may have higher expectations of service quality. Additionally, income can affect a customer's level of satisfaction, as those with higher incomes may expect more personalized and attentive services (Ojekalu et al.,2019).

Therefore, businesses must consider the role of age when evaluating service quality and user satisfaction. By understanding the moderating effect of age, companies service quality, financial service providers can tailor their services to meet the specific requirements of their users, thereby improving customer satisfaction and overall business. Age is a critical demographic factor that plays an important role in affecting consumer behavior, perception and satisfaction. It is generally known that younger ages tend to be more adventurous and imaginative than older ages. Moreover, younger ages are more exposed to technological devices and have better ability to learn new

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and innovative functions. Hwang, et al., (2019) studied age differences using 960 mobile bank customers. The results showed that younger aged customers are more interested in using financial services technologically, while older aged customers are more interested to use the traditional methods of banking. Older aged customers have gained more experience and familiarity in the products or services purchased and consumed by them. Higher expertise may lead to a higher set of expectations and perceptions, leading to harder requirements to reach satisfaction. On the other hand, customers with less experience may not have enough knowledge to differentiate important aspects such as assurance, and employee behavior. In fact, younger aged customers tend to be more concerned about the quality of the physical service environment compared to older aged customers (Jaffar et al., 2023).

Relationship between service quality and customer satisfaction

Engriani et al. (2019) examined the linking between the service quality dimensions and customers' satisfaction. They found that every dimension in the service quality model has a direct influence on customers' satisfaction. Customer satisfaction can be considered as an outcome or consequences of the service quality provided. According to Jalagat R. C & Sayari K (2021) which demonstrated that service quality has a positive influence on customer satisfaction. Customer satisfaction is founded on the variance among the actual performance and the predictable performance. If the perceived performance falls below the customer's expectations, they will feel dissatisfied. Meeting the customer's expectations results in satisfaction. However, if the perceived performance exceeds the customer's prospects, it leads to a higher level of satisfaction. The service delivery process involves the contact among individuals, the effectiveness of the service, and the customer's overall experience. It's through this interaction that customers evaluate the quality of service provided. Service quality dimensions and the customer satisfaction are direct proportional, which can result in perceiving loyalty and maximizing profits. Employees' satisfaction is usually the indicator of the service quality (Yas, et al., 2020).

Relationship between reliability and customer satisfaction

According to a study conducted by (Johnson, Karlay, 2021) it was found that there is a clear link between service reliability, service quality, performance (both financial and non-financial), and customer satisfaction. This correlation is attributed to the interaction between employees and customers, which is facilitated by the human aspect of service quality. When employees provide reliable and high-quality service, it positively affects the performance of the organization. As mentioned before, reliability is the

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dependability of the service, or when the organization perform a service in a correct way (Pakurár, et al., 2019). Haddad, et al. (2019) believed that reliability is the most important factor to retain customers in the banking and financial sectors, since it will involve maintenance, accuracy, fulfilling expectations and completing the orders given. Additionally, satisfied customers are more likely to remain loyal to the organization and recommend it to others, leading to an increase in revenue and market share.

Relationship between responsiveness and customer satisfaction

Responsiveness of an organization is the ability of the employees to help customers, provide quick services and answer their questions. The level of responsiveness in service firms is primarily determined by how their personnel respond to customer needs. When employees pay individual attention to customers and address their problems promptly, it leads to a significant improvement in their satisfaction levels. The ability of the organization to achieve these aspects will result in higher rate of customer satisfaction. Giving attention and care for customers will definitely increase customers' satisfaction (Pakurár, et al., 2019).

Relationship between tangibility and customer satisfaction

Tangibility is an essential component of service quality that plays a critical role in shaping customer satisfaction. Tangibility is the appearance of an organization's facilities such as management, equipment and facilities. Since customers definitely likes to find accessibility of the facilities customers use tangible cues to assess the quality of services provided by organizations. For example, the cleanliness and modernity of facilities, the quality of equipment, and the professionalism of communication materials can influence customers' perceptions of service quality. By providing positive tangible cues, organizations can enhance customers' confidence in the service provider, increase their satisfaction levels, and contribute to their overall experience.

Additionally, many researches stated that there is an influence from tangibility towards customer satisfaction in the financial services sector. Attractiveness and the visual appeal that customer feels when using a particular product or service, is a result of tangibility, that finally leads to customer satisfaction (Pakurár, et al., 2019).

Relationship between assurance and customer satisfaction

Assurance is the behavior and knowledge of employees to give confidence and trust to the customer (Alabboodi, 2019). According to Johnson

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and Karlay (2021), one of the fundamental dimensions of service quality that significantly affects customer satisfaction is assurance. This is because it creates a positive perception of the organization in the customer's mind, which can lead to word-of-mouth activity, especially in the context of financial institutions. Reliable financial service providers instill a high level of confidence in their customers. The interactions between employees and customers are crucial in creating a sense of assurance and confidence in the quality of the service provided. Organizations that prioritize assurance and invest in the people aspect of service quality are more likely to instill confidence in their customers and encourage positive word-of-mouth activity. Financial and banking sectors provide sensitive services to customers, so it must be provided with ease, transparency, convenience and comfort. Applying these aspects, assurance will highly effect customer satisfaction.

Relationship between empathy and customer satisfaction

Empathy is giving attention and providing service in a regular way, since customers love the feeling of priority given by a company (Pakurár, et al., 2019). Alaboodi (2019) defined empathy as the capability of the organization to provide attention and support to customers. According to Johnson and Karlay (2021), there is a direct link between empathy and customer satisfaction. They found that if service providers lack empathy, customers are likely to be dissatisfied with the quality of service they receive. Thus, empathy plays a crucial role in determining customer satisfaction and can have a significant impact on the long-term relationship between customers and the company. Additionally, better communication between the organization and customers influences the satisfaction positively.

From the previous discussion we can hypothesize the following:

H1: There is a relationship between service quality and user satisfaction. H1a: There is a relationship between responsiveness and satisfaction. H1b: There is a relationship between reliability and satisfaction. H1c: There is a relationship between tangibility and satisfaction. H1d: There is a relationship between assurance and satisfaction. H1e: There is a relationship between empathy and satisfaction.

H2: Age is a moderating the relationship between service quality and user satisfaction.

Conclusion

From all of the above, we can conclude that service quality model and its dimensions has a clear impact on customer satisfaction. The service quality regarding a financial services firm must be well developed and evaluated so the departments can measure their succession. Financial services firms are in a

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strong competition due to the innovation and binding technological materials and facilities. So, financial companies that are seeking to survive and be profitable, they must apply Fintech and the service quality model.

If the 5 service quality model dimensions are implemented the firm will have a highly competitive advantage due to the customers' satisfaction. The 5 dimensions of service quality, known as the service quality model, which are reliability, responsiveness, tangibility, assurance and empathy, each of them is affected by the employees and organization behavior, leading to a strong influence in the customer experience with the product or service used.

Customer satisfaction is a critical measure of success for any organization, and service quality plays a significant role in influencing customer satisfaction. However, the relationship between service quality and customer satisfaction is not straightforward, as it can be influenced by various demographic factors, such as age, gender, income, and education level.

Demographics plays important part in shaping the association between service quality and user satisfaction. The demographic characteristics of customers influence their perceptions and evaluations of service quality. It is essential for businesses to acknowledge the impact of age when devising strategies to enhance customer satisfaction. By accounting for the moderating effect of age, companies can customize their services to meet the specific expectations of different customer segments. This targeted approach can foster higher levels of satisfaction, resulting in improved customer loyalty and ultimately contributing to the long-term success of the business.

In summary, the moderating role of age highlights the importance of considering the unique characteristics and preferences of different customer segments when delivering services. Service providers that can effectively address the specific needs of their diverse customer base are likely to achieve higher levels of customer satisfaction, loyalty, and retention. The banking and financial industries are working and competing every day to increase the service quality, administrations are giving many efforts to deliver high quality services in order to reach the satisfaction of their customers (Pakurár, et al., 2019).

Exploratory research

Exploratory research is an essential part of the research process as it assists researchers in obtaining a preliminary understanding of a phenomenon, creating innovative ideas, and recognizing research questions. An important advantage of exploratory research is that it offers new insights into a subject that may have been previously unknown or not yet explored. Exploratory research aims to understand the relationship between two variables, namely

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the independent variable and the dependent variable, by gathering as much information as possible. The specific nature of the dependent variable may not be clearly defined or understood prior to the research, and therefore it is observed and recorded more broadly. (Ajit Singh, 2021).

Qualitative research often involves collecting data through interviews with participants, which provides a direct and effective way of obtaining detailed and comprehensive information about a particular phenomenon (Haven & Grootel, 2017). Researchers can customize the type of interview to fit the research question, participant characteristics, and their own preferred method. While face-to-face interviews are the most common, telephone interviews are increasingly being used to overcome geographical limitations in participant recruitment. Overall, interviews are a valuable tool for gathering rich and nuanced data that can shed light on complex research questions. Different types of interviews can vary in their level of structure. Unstructured interviews, also known as open interviews, typically begin with a single question and allow for more free-flowing conversation between the interviewer and participant, rather than following a set script. This approach is often effective when participants are encouraged to share their personal experiences (Barrett, Twycross, 2018). The used method was in depth Interviews with two financial service experts and 10 Telda users.

In summary, exploratory research is our initial exploration of complex topics when we lack sufficient information. We use methods like reading, interviews, and observations to uncover clues and understand patterns. It sparks creativity, questions assumptions, and fuels our curiosity to learn more. While it provides a starting point, it also reveals there's much more to discover. Exploratory research keeps us investigating and learning as we strive for deeper understanding.

Sample characteristic

We interviewed 10 Telda users, males and females. The ages ranged from 16-25. The majority of the sample lived in Sheikh Zayed city while the others lived in different locations such as 6 October city and the 5th Settlement.

We interviewed 2 experts. First expert is a bank employee, working at the customer service sector in Al Ahly bank. Second expert is an employee in Telda's marketing team.

Findings of interview with customers

All 10 customers interviewed were familiar with Telda's services, with 6 of them (A, B, C, D, E, F) discovering it through various social media

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platforms and 2 (G, H) through recommendations from family and friends. Regarding the duration of Telda usage, 5 customers (A, B, C, D, E) have been using Telda for over a year (1-1.5 years), 3 (F, G, H) for the past six months, and 2 (I, J) within the last three months. When asked about Telda's suitability for different age groups, 4 customers (A, B, C, D) felt that the financial services are suitable for all ages due to the user-friendly interface and features like instant money transfers and bill payments. However, 6 customers (E, F, G, H, I, J) believed that Telda's services are more suited for younger users, stating that most features can typically be handled through traditional banks.

Customer satisfaction was primarily driven by the convenience and speed of transactions, which all customers (A-J) appreciated, along with the app's transparent and simple design. Additionally, 2 customers (A, B) highlighted the global use of Telda's card without restrictions, and 4 others (C, D, E, F) praised the spending tracking feature, which categorizes expenses into groceries, shopping, restaurants, and other categories. On the assurance of Telda's employees, 9 customers (A-I) found the staff to be helpful and knowledgeable about the services offered, appreciating their professionalism. However, 1 customer (J) had a negative experience, citing unresponsiveness and inadequate information from an employee.

When discussing employee responsiveness, 3 customers (A, B, C) mentioned facing issues like login problems but were satisfied with the swift resolution and noted that these problems occurred only at the beginning of their use of Telda. The remaining 7 customers (D-J) did not face any issues. On empathy, 3 customers (A, B, C) who needed help from Telda's employees found them to be attentive and efficient in resolving issues, feeling prioritized. The other 7 customers (D-J) did not encounter problems but noted that their friends appreciated Telda's customer care.

All customers (A-J) valued the safety measures provided by Telda, such as two-factor authentication and in-app notifications for every transaction. One customer (A) suggested further enhancements in safety measures, particularly in fraud prevention. Nine customers (B-J) praised the quick and easy card locking feature in case of loss or fraud. Finally, all 10 customers (A-J) agreed that Telda's services saved them time and effort, especially with immediate transactions and online bill payments. They appreciated the app's convenience, which eliminated the need to visit a bank for simple transactions, and highlighted the ease of setting up new accounts and transferring money compared to traditional methods.

Findings of interviews with experts

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Concerning the first question, Expert 1 stated that Telda's financial services are outstanding, mentioning, "the services are secure, user-friendly, and innovative." He highlighted that Telda allows users to perform fast transactions without hidden fees, offers a user-friendly interface, and provides options like saving money and spendings tracking, making it a perfect choice for handling finances securely and hassle-free. Similarly, Expert 2 described Telda's financial services as a modern and efficient financial experience, offering a comprehensive range of services, including savings accounts and spendings tracking. He emphasized that Telda's user-friendly mobile app and innovative features ensure a seamless and efficient banking experience, positioning Telda as superior to its competitors.

Regarding the second question, Expert 1 noted that customers are generally satisfied with Telda due to its user-friendly interface, fast and secure transactions, and no hidden fees. He also praised Telda's excellent customer support, which addresses issues quickly and effectively. In alignment, Expert 2 stated that Telda's services are designed to meet customer needs, leading to high satisfaction. He emphasized the ease of accessing services through the mobile app and the company's excellent customer support, which keeps customers informed about service changes and updates.

On the third question, Expert 1 suggested that financial services companies could improve employee training by providing regular sessions covering the latest industry trends and technologies, and offering tools like advanced chat support systems. He also recommended incentivizing employees who consistently deliver excellent customer service. Expert 2 echoed these points, stressing the importance of regular training sessions and providing comprehensive training manuals and customer data access. He also suggested establishing key performance indicators to motivate employees to maintain high service standards.

For the fourth question, both Expert 1 and Expert 2 agreed that the best way to ensure a well-trained technical support team is through periodic training and analyzing past complex inquiries to integrate solutions into updated training programs. This approach prepares the support team to handle a variety of inquiries efficiently.

Regarding the fifth question, Expert 1 recommended that financial services companies use customer feedback to improve their products and services by regularly collecting and analyzing feedback to identify areas of improvement. He also suggested offering rewards or discounts to encourage feedback. Expert 2 agreed, emphasizing the importance of customer feedback in refining services. He highlighted the need to establish or enhance

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departments focused on analyzing customer feedback and implementing suitable actions.

On the sixth question, Expert 1 stated that companies should prioritize customer satisfaction by providing fast, reliable, and personalized service, ensuring employees are well-trained and equipped with necessary tools. He also recommended regular monitoring of customer satisfaction levels to make necessary improvements. Expert 2 added that providing quality service involves prioritizing safe and secure transactions, followed by reliability and responsiveness to issues. He emphasized the importance of regularly monitoring customer satisfaction and making improvements accordingly.

For the seventh question, Expert 1 highlighted that Telda takes customer safety seriously, using the latest encryption technology and two-factor authentication to protect transactions. He mentioned that Telda conducts regular security audits and risk assessments to address potential threats. Similarly, Expert 2 noted that Telda uses biometric technology and two-factor authentication for transaction security and performs regular security audits and risk assessments to ensure customer safety.

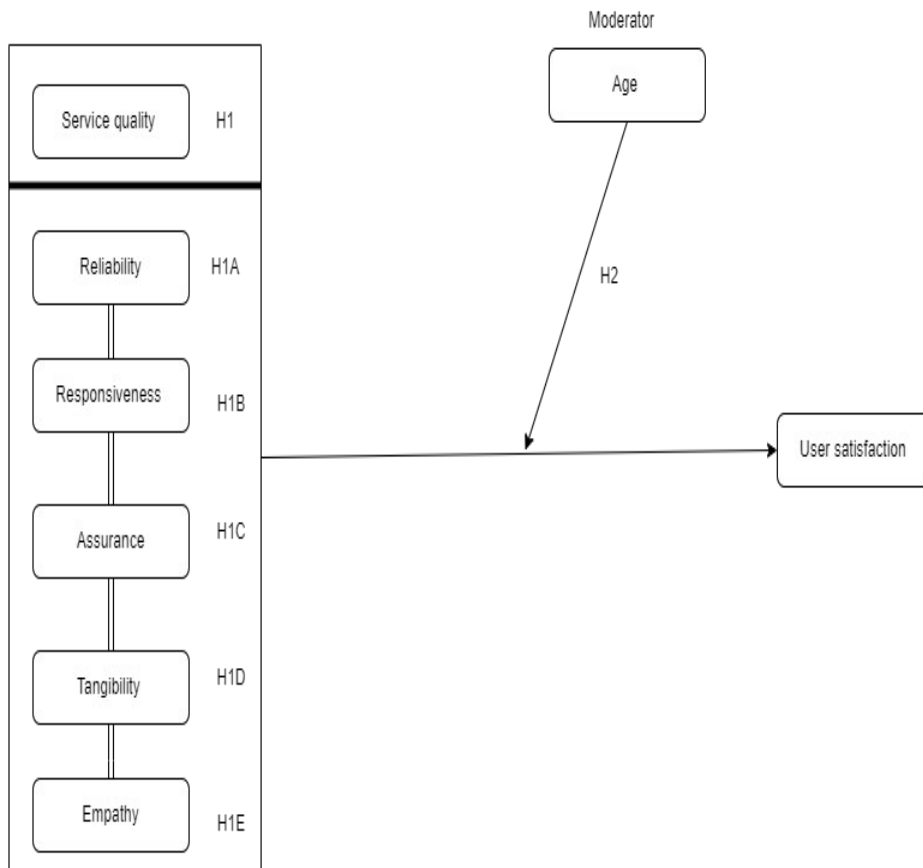
Regarding the eighth question, Expert 1 suggested that Telda could save users time and effort by introducing intelligent features like automatic bill payments and leveraging machine learning for personalized recommendations. He also recommended optimizing the app and web interface for quick and easy access to features. Expert 2, however, believed that Telda already applies the best practices, using fast and reliable systems for transactions and utilizing technology efficiently within the limitations in Egypt.

On the ninth question, Expert 1 acknowledged that while age can influence the adoption of new technology, Telda's user-friendly app and simple registration process make it accessible to all ages. He believed that adoption depends more on the willingness to try new technologies rather than age. Expert 2 noted that age could be a significant factor, with older customers being less likely to use mobile banking. He mentioned that about 60% of Telda users are under 21, attributing this to the perception that Telda offers no additional benefits over existing financial services. He argued that this perception is incorrect, as Telda provides features like spending tracking and quick transactions that enhance the user experience.

Proposed conceptual model

Figure (1): The Proposed Conceptual Model

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Research Methodology

Introduction to Research Methodology

Research methodology is the method or approach in which the research problems are solved by. It studies how the research is conducted systematically. The researcher explains the different approaches generally taken to study the research problems. Therefore, the approaches used to conduct research is called research methodology (Mishra&Alok,2022). Research methodology helps in understanding the scientific inquiry and also the process itself, as it aims to analyze and describe processes by clarifying the resources and limitations (Patel&Patel,2019).

Research approaches

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Qualitative Research: The qualitative research is defined as the exploration of the nature of phenomena, by assessing the quality, different indices, the way in which they appear, and the way it is perceived. Furthermore, qualitative research includes data in words form rather than in numbers form (Busetto, et al., 2020). The qualitative data are collected via various ways such as focus group, interview, or observation. Additionally, qualitative research goal is to collect the perspectives of the patients that the research problem and question discusses (Haven&Grootel,2019).

In this study, in-depth interviews were conducted with 2 experts and 10 Telda users to gather qualitative insights. This approach aimed to explore varied perspectives and experiences related to the research topic. The qualitative data enhanced understanding and formed a basis for meaningful analysis.

Quantitative Research: Quantitative research is a type of research that depends on natural science methods, as it depends on mathematical data and science facts. It establishes cause and relationship between variables by using mathematical and statistical approaches. Quantitative research allows researchers to construct graphs and tables to make it easier to analyze the conducted results (Ahmad, et al., 2019).

The quantitative analysis focused on Telda users, comprising a research population of 310 individuals using non-probability convenience sampling. Data were collected through online questionnaires distributed via social media platforms and among university students. Statistical analysis, solely conducted using SPSS

Methods of data collection

Questionnaire

A questionnaire is a research tool that consists of a series of questions used to gather information from participants. Questionnaires are employed in different settings, including academic studies, market research, and customer satisfaction surveys. They can collect various information, such as opinions, attitudes, preferences, demographics, and other relevant data. Questions in a questionnaire can be open-ended, allowing detailed responses, or closed-ended, providing predetermined choices. Questionnaires are widely used in fields like social science research, marketing, psychology, healthcare, and business (Grassini & Laumann, 2020).

Scale

A Likert ordinal scale is a widely used survey tool to measure attitudes and opinions. It involves presenting statements and asking respondents to indicate their level of agreement, typically ranging from

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"Strongly Disagree" to "Strongly Agree." This structured approach allows for quantitative analysis, making it easy to compare and interpret responses across different groups. Named after its creator Rensis Likert, the scale is a fundamental instrument in various fields, including psychology, sociology, education, and market research (Taherdoost, 2019).

Pretest

In preparation for our research, a pretest was conducted to evaluate the clarity and effectiveness of the questionnaire. We distributed 20 questionnaires randomly among participants, and we appreciate the input received. Of the participants, 12 females, and 8 as males, falling within an age range of 19-24. On average, respondents took 3 to 5 minutes to complete the questionnaire. During the pretest, some participants provided feedback indicating that the statement "Telda's customer service interested in enhancing the overall experience" was not entirely clear to them. Respondents raised questions about the specific aspects or methods through which Telda's customer service aimed to enhance the overall customer experience. Participants also expressed concerns regarding the statement "I believe that Telda's app is user-friendly." Some responders found this statement to be ambiguous, and they asked about the characteristics of Telda's app that contribute to its user- friendly nature.

Population and Sampling

Research Population

The Research population consists of users of Telda financial services, the people that relies on Telda's financial services completely or partially.

Sampling Type

Non-probability sampling was used in this research. Convenience method was used as the researchers conducted the questionnaire from their related communities as university and workplaces.

Sampling Size

The sample size of this research was 310 respondents who completed the questionnaire.

Data collection

This study was conducted by two researches, these researchers collected 310 respondents via distributing their questionnaire on their social communities.

Data coding and Verification Entry

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In this research, we utilized the Statistical Package for the Social Sciences (SPSS), a statistical program, to analyze data gathered from 310 participants via an online questionnaire. SPSS, a widely-used and adaptable statistical software, empowered the researchers to conduct a thorough data analysis. Additionally, the researchers made use of SmartPLS, a user-friendly software with a graphical interface, facilitating variance-based structural equation modeling (SEM). SEM, a statistical method for exploring relationships between multiple variables, was applied to examine the interactions among the study's constructs. The intuitive graphical interface of SmartPLS simplified the SEM process, making this intricate statistical technique more accessible. Moreover, the researchers applied the concept of average variance extracted (AVE) to assess the reliability of their constructs. AVE, measuring the portion of variance in a construct attributed to the construct itself, was employed to ensure the consistency and reliability of the study's measurements.

Statistical Analysis

The p-value is the probability of obtaining a test statistic equal to or more than the obtained results under the assumption that the null hypothesis is true. Furthermore, it is a quantitative measure of discrepancy between the data and the point null hypothesis. If the p-value of the sample data is less than the specific threshold or significant level at 0.01, 0.05, and 0.10, the result is said to be statistically significant and the null hypothesis is rejected (Maneejuk&Yamaka,2021).

Hypotheses testing and analysis

Demographic characteristics

Table 1 Frequency table for demographics in the sample

Variable	Categories	Frequency	Percentage
Gender	Female	106	34.2%
	Male	204	65.8%
Age	15 to Less than 22 years old	261	84.2%
	23 to Less than 30 years old	49	15.8%
Education	Bachelor degree	61	19.7%
	Undergraduate	249	80.3%
Income	No income	1	0.3%
	Less than 5000	265	85.5%
	5000 to Less than 10,000	44	14.2%
Occupation	Private sector employee	50	16.1%
	Public sector employee	42	13.5%

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	Unemployed	218	70.3%
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Around 65.8% of the sample were males (204). The majority aged from 15 to 22 years old (261). Almost 80% of the sample were undergraduates (249). 85.5% of the sample had income less than 5000 EGP. Those were unemployed (218) represented 70.3% of the sample.

Reliability analysis of the variables in phenomenon

Reliability statistics for measuring for measuring the impact of service quality dimensions on user satisfaction.

Table 2: Reliability testing

	Items	Loadings	VIF	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
Assurance	A1	0.842	1.773	0.766	0.864	0.679
	A2	0.790	1.561			
	A3	0.840	1.471			
Empathy	E1	0.752	1.242	0.679	0.824	0.610
	E2	0.830	1.522			
	E3	0.759	1.362			
Reliability	R1	0.821	1.335	0.673	0.820	0.603
	R2	0.721	1.242			
	R3	0.784	1.393			
Responsiveness	RP2	0.906	1.473	0.723	0.871	0.772
	RP3	0.800	1.473			
Tangibility	T1	0.836	1.383	0.686	0.822	0.609
	T2	0.836	1.255			
	T3	0.656	1.873			
User Satisfaction	US1	0.805	1.357	0.819	0.875	0.586
	US2	0.610	2.092			
	US3	0.808	2.378			
	US4	0.830	1.683			
	US5	0.754	1.175			

Observing (table 2), the reliability and validity is assessed for the statements. Loadings represent the strength of the relationship between each item and its underlying latent construct. It was observed that loadings were all higher than 0.6, representing importance of each statement. Outer VIF assesses multicollinearity among items. As the VIF was reported to be less than 10, thus there will be no multicollinearity in the statements. To assess reliability, Cronbach alpha had been evaluated and was found to be more

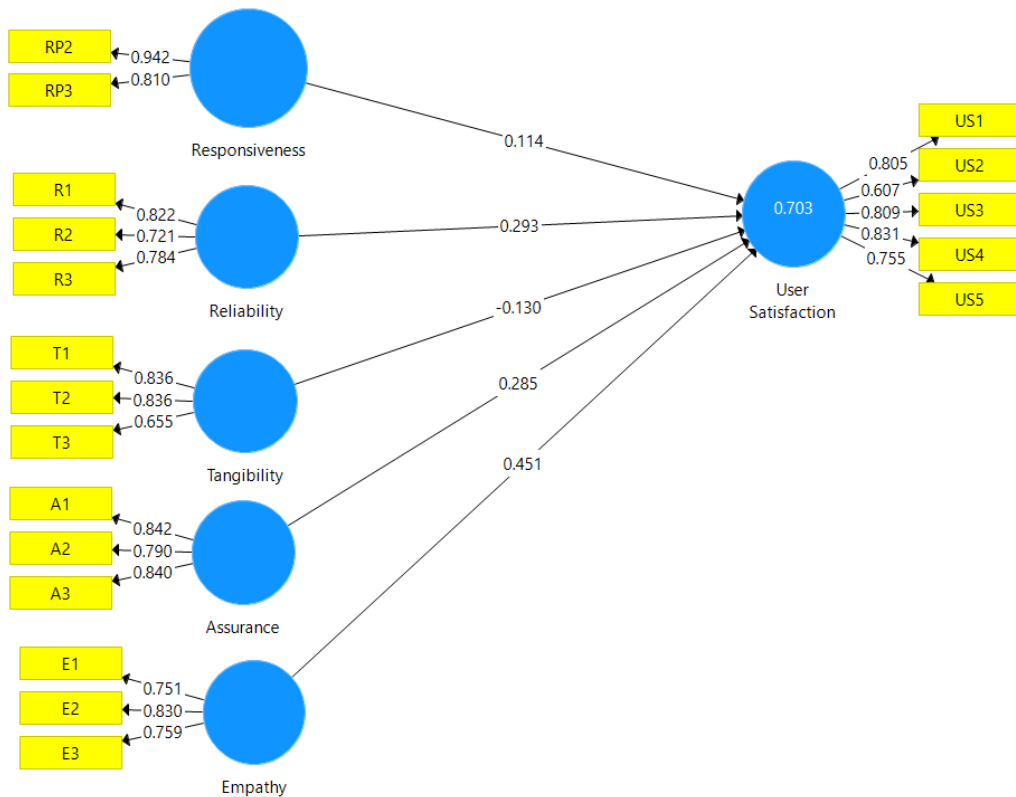
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than 0.7, such that statements are reliable. Concerning validity, the construct was found to be valid and consistent, since composite reliability was greater than 0.7 and average variance extracted was greater than 0.5 for each construct (Wong, 2013).

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Model Building

Figure (2): Structural Equation Model of phenomenon



The figure (2) shows the relationships between variables and how each statement represents its loadings to the latent variables. It also shows the impact of each construct on User satisfaction. The age was found to have an insignificant impact on the User satisfaction, therefore it will not be added to final model and cannot moderate the relationship between the latent variables and user satisfaction.

Table (3): Path coefficients of Structural Equation Model in phenomenon

	Original Sample	Standard Deviation	T Statistics	P Values
Assurance -> User Satisfaction	0.285	0.061	4.645	0
Empathy -> User Satisfaction	0.451	0.042	10.846	0
Reliability -> User Satisfaction	0.293	0.043	6.814	0
Responsiveness -> User Satisfaction	0.114	0.045	2.521	0.012
Tangibility -> User Satisfaction	-0.13	0.069	1.873	0.062

At 99% of confidence level, assurance, empathy and reliability have positive significant impact on User Satisfaction. Responsiveness has positive significant impact on User satisfaction at 95% confidence level. At 0.1 level

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of significance, tangibility has negative significant impact on user satisfaction.

Table (4): Model evaluation metrics of Structural Equation Model in phenomenon

Model	SSO	SSE	Q ²	R Square	R Square Adjusted
User Satisfaction	1550	937.539	0.395	0.703	0.698

SRMR=0.105, d_ULS=2.101, d_G=0.973, Chi-Square=1586.477, NFI=0.566

Q² is metric indicating how well the model predicts the endogenous variables. It is 0.395, suggesting moderate predictive relevance (Purwanto, 2021). R Square measures the proportion of variance in the endogenous variables explained by the model. For User Satisfaction, it is 0.703, indicating that the model explains approximately 70.3% of the variance in user satisfaction (Purwanto, 2021). Standardized Root Mean Square Residual measures the discrepancy between the observed correlations and the model-implied correlations. A lower value indicates better model fit. It is 0.105, indicating a reasonable fit (Purwanto, 2021).

Research discussion

Table (5): Discussion of the results

Table: Discussion of the results			
Hypotheses	Previous Literature	Results	Discussion
There is a relationship between service quality and user satisfaction	The service quality process involves the contact among individuals, the effectiveness of the service, and the customer's overall experience. It's through this interaction that customers evaluate the quality of service provided. Service quality dimensions and the customer satisfaction are direct proportional, which can result in perceiving loyalty and maximizing profits. Employees' satisfaction is usually the indicator of the service quality (Yas, et al., 2020).		

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<p>There is a relationship between responsiveness and satisfaction</p>	<p>The level of responsiveness in service firms is primarily determined by how their personnel respond to customer needs. When employees pay individual attention to customers and address their problems promptly, it leads to a significant improvement in their satisfaction levels (Pakurár, et al., 2019).</p>	<p>There is a positive relationship between responsiveness and user satisfaction.</p>	<p>Previous studies have approved the relationship between responsiveness and satisfaction (Pakurár, et al., 2019). Although the findings of this research had approved this correlation with a significance level 0.489.</p>
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<p>There is a Relationship between reliability and satisfaction</p>	<p>Reliability is the most important factor to retain customers in the banking and financial sectors, since it will involve maintenance, accuracy, fulfilling expectations and completing the orders given. Additionally, satisfied customers are more likely to remain loyal to the organization (Haddad, et al., 2019).</p>	<p>There is a positive relationship between reliability and user satisfaction.</p>	<p>Previous studies have approved the relationship between reliability and satisfaction (Johnson&Karlay,2021). Although the findings of this research had approved this correlation with a significance level 0.534.</p>
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<p>There is a relationship between tangibility and satisfaction</p>	<p>Tangibility is the appearance of an organization's facilities such as management, equipment and facilities. By providing positive tangible cues, organizations can enhance customers' confidence in the service provider, increase their satisfaction levels, and contribute to their overall experience. Additionally, many researches stated that there is an influence from tangibility towards customer satisfaction in the financial services sector (Pakurár, et al., 2019).</p>	<p>There is a positive relationship between tangibility and user satisfaction.</p>	<p>Previous studies have approved the relationship between tangibility and satisfaction (Pakurár, et al., 2019). Although the findings of this research had approved this correlation with a significance level 0.465.</p>
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<p>There is a relationship between assurance and satisfaction</p>	<p>Assurance is the behavior and knowledge of employees to give confidence and trust to the customer. Assurance is one of the fundamental dimensions of service quality that significantly affects customer satisfaction is assurance. This is because it creates a positive perception of the organization in the customer's mind, which can lead to word-of-mouth activity, especially in the context of financial institutions. Reliable financial service providers instill a high level of confidence in their customers (Johnson & Karlay, 2021).</p>	<p>There is a positive relationship between assurance and user satisfaction.</p>	<p>Previous studies have approved the relationship between assurance and satisfaction (Alabboodi, 2019). Although the findings of this research had approved this correlation with a significance level 0.403.</p>
<p>There is a relationship between empathy and satisfaction</p>	<p>Empathy is giving attention and providing service in a regular way. There is a direct link between empathy and customer satisfaction. They found that if service providers lack empathy, customers are likely to be dissatisfied with the quality of service they receive. Thus, empathy plays a crucial role in determining customer satisfaction and can have a significant impact on the long-term relationship between customers and the company. Additionally, better communication between the organization and customers influences the satisfaction positively (Johnson & Karlay, 2021).</p>	<p>There is a positive relationship between empathy and user satisfaction.</p>	<p>Previous studies have approved the relationship between empathy and satisfaction (Johnson & Karlay, 2021). Although the findings of this research had approved this correlation with a significance level 0.376.</p>

Conclusion

The purpose of this research was to determine the moderating role of age between the relationship of service quality and user satisfaction. There are 6 hypotheses in this research.

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The first hypothesis stated that there is a positive relationship between service quality and user satisfaction. The reliability test proved the reliability and consistency of the statements. while, the correlation analysis proved that there's a positive relationship between the variables of the hypothesis. **Therefore, hypothesis 1 is accepted.**

The second hypothesis declared that there is a positive relationship between responsiveness and satisfaction. The reliability test proved the reliability and consistency of the statements. Additionally, the correlation analysis proved that there's a positive relationship between the variables of the hypothesis. **Therefore, hypothesis 2 is accepted.**

The third hypothesis stated that there is a positive relationship between reliability and satisfaction. The reliability test proved the reliability and consistency of the statements. Besides, the correlation analysis proved that there's a positive relationship between the variables of the hypothesis. **Therefore, hypothesis 3 is accepted.**

The fourth hypothesis expressed that there is a positive relationship between tangibility and satisfaction. The reliability test proved the reliability and consistency of the statements. Also, the correlation analysis proved that there's a positive relationship between the variables of the hypothesis. **Therefore, hypothesis 4 is accepted.**

The fifth hypothesis mentioned that there is a positive relationship between assurance and satisfaction. The reliability test proved the reliability and consistency of the statements. In addition, the correlation analysis proved that there's a positive relationship between the variables of the hypothesis. **Therefore, hypothesis 5 is accepted.**

The sixth hypothesis declared that there is a positive relationship between empathy and satisfaction. The reliability test proved the reliability and consistency of the statements. while, the correlation analysis proved that there's a positive relationship between the variables of the hypothesis. **Therefore, hypothesis 6 is accepted.**

In conclusion, the findings of this research contribute to a deeper understanding of the dimensions of service quality and their influences on user satisfaction. These insights provide valuable guidance for businesses seeking to optimize their services and enhance customer experiences across various dimensions of service quality.

Following the examination of the hypotheses and a review of the data analysis results, there are observed some problems such as complicated financial terms used from Telda that requires clarification, poor customer service, lack of assurance, and low concentration on increasing targeted age levels.

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Recommendations

1. Use easy financial terms: Using easy financial terms in Telda's mobile application will facilitate the app's usage and prevent any transactional errors to take place from some users.
2. Employee training: train employees to have the ability of handling unassisted and angry customers. Provide training sessions for staff to understand and assist customers from diverse backgrounds and with different ways of providing information. Fostering a welcoming and inclusive service environment.
3. Technology improvements: Provide chatbots and newly updated AI systems to assist users in small issues to reduce the time consumption of visiting the booths or calling the customer service. Also, invest in robust data infrastructure and analytics tools to leverage data analytics.
4. Increase range of targeted age levels: Offer other services that attract higher age levels such as increasing the amount of accepted money transactions or purchases.
5. Other currencies receipt: Provide option of receiving other currencies (Dollar, Euro & English Pound) from countries worldwide. This will help in treating a major issue since most people that rely on receiving financial transaction abroad face problems with multiple things as receiving the transaction in the actual sent currency, high transaction fees, and governmental banks implemented barriers.
6. Reliability: Enhance the reliability of the mobile application by conducting regular testing and updates to address any bugs or technical issues promptly. Additionally, ensure that transaction processes are smooth and error-free to build trust and confidence among users.
7. Personalization: Implement personalized features in the mobile application based on user preferences and transaction history. This could include customized notifications, transaction recommendations, and tailored financial advice to enhance user experience and satisfaction.
8. Consistency: Ensure consistency in service delivery across all touchpoints, including mobile app interactions, customer service interactions, and in-person experiences. Maintaining consistency in service quality and standards can help build a strong reputation for reliability and dependability among users.

The research limitations and suggestions for further research

Research limitations

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- The researchers would collect the results from nearby geographical locations as Sheikh Zayed and 6 October due to convenience.
- The researchers would mostly distribute the questionnaire for university students due to convenience.

Suggestions for further research

1. Test the effect of loyalty programs on customers' retention and satisfaction.
2. Test the impact of emerging technologies on customer satisfaction in the Fintech sector.

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Investigating the Impact of Circular Economy on Stock Market Performance: European Union Countries

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Abstract: Nowadays, circular economy (CE) has a substantial impact on stock market performance (SMP) especially in European Union (EU) countries that promote sustainable practices and encourage large companies to implement those practices in their business operations, this research investigates the impact of CE on SMP through examining the mediating role of the sustainable development goals (SDG) in the EU countries over the period 2000-2021. The variables used to measure CE are, annual freshwater withdrawal (AFWW), generation of municipal waste per capita (GMW), resource productivity (RP), recycling rate (RR), and recovery rate of recycling (RRR), further the SMP is measured by stock market indices return using panel least square regression analysis. Findings revealed that CE practices have a positive significant impact on SMP. However, the SDGs have insignificant mediation among CE practices and SMP. Accordingly, it's highly recommended that other researchers study this nexus in the context of emerging countries especially in Egypt, as in our research we focused on EU countries because EU countries are considered highly innovative and apply CE practices comprehensively.

Keywords- *Circular Economy, Sustainable Development Goals, Stock Market Performance.*

JEL Classification : *Q56, H54, N24*

Introduction

CE refers to the efficient use of resources to decrease the consumption of raw materials as inputs and wastes as outputs. This idea extends beyond waste reduction as it can also influence the economic strategies of firms' operations. Nowadays, numerous organizations are adopting a CE model to achieve sustainable growth in which stakeholders place equal importance on environmental factors as they do on economic ones (Murali & Kaya, 2023). Furthermore, the CE concept is based on the principles of the six R's (reuse, recycle, redesign, remanufacture, reduce, recover).

The EU has designated CE as an integral part of its industrial innovation strategy. The European Commission declared in December 2019 that the climate challenge will be transformed into an opportunity for a new development model (CE model) with the goal of achieving carbon neutrality in the EU by 2050. This notion will be implemented through an ecological transition path and an industrial strategy focused on sustainable production. In addition, the Next Generation EU introduced a new CE action plan in March 2020 that focusses on sustainable product design and circularity in manufacturing processes, as well as specific resource-intensive industries with significant environmental consequences (European Union, 2022; European Commission, 2022). A cluster analysis was conducted by Rodríguez et al. (2022) to examine the relationship between the CE and sustainable development goals (SDG) within the framework of the new 2030 Agenda and the European CE plan. The results of this research are illustrated in figure 1. Austria, Belgium, Denmark, France, Germany, Italy, the Netherlands, and the United Kingdom make up the first cluster (C1). These countries exhibit above-average performance in CE in terms of per capita municipal waste generation, municipal waste recycling rate, overall packaging recycling rate, e-waste recycling rate, and biowaste recycling. They have achieved SDGs 1, 3, 4, 5, 6, 8, 9, 10, 11, 14, 15, 16, and 17. The second cluster (C 2) consisted of Bulgaria, Czech Republic, Estonia, Hungary, Ireland, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Romania, and Slovenia. These countries have above-average performance in several aspects related to CE (such as recycling rate of municipal waste, recycling rate of e-waste, recovery rate of construction or demolition waste, circular material use rate, gross investment in tangible goods, and persons employed). They have successfully achieved SDGs 4, 12, and 14. The third cluster (C3) consists of Croatia, Cyprus, Finland, Greece, the Slovak Republic, Spain, and Sweden. These countries have above average CE indicators, such as circular material use rate and employability, and have

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achieved SDGs 2, 3, 5, 7, 9, 10, 13, and 15.

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Figure 1: EU clusters by CE result (Rodríguez et al., 2022)



Today, numerous companies worldwide are increasingly adopting a CE strategy to achieve sustainable growth, taking into account its impact on stock performance in terms of returns and volatility. The SMP is influenced by demand and economic growth, reflected in stock prices, returns, risk mitigation, and investors' perception of market volatility. CE programs such as reusing, remanufacturing, recycling, and no waste attract venture capital investors and potential investors to the financial sector, resulting in financial returns with reduced linearity risks and lower resource dependence (Dewick et al., 2020). Moreover, SMP demonstrates a positive response to the disclosure of companies' new environmental projects, as investors believe that these companies demonstrate ecological awareness in their investment choices (Flammer 2013; Schmidt, 2022; Torre et al., 2020). However, Murali et al., (2023) argued that investors' focus on these stocks is cyclical and inconsistent. Certain stocks may gain popularity within a short span of time but then rapidly lose their appeal. Typically exhibiting cyclical patterns, this particular company offers investors several prospects to generate profits inside the short to medium timeframe.

Wierzbicka (2021) stated that the adoption of a CE will lead to the establishment of a system that effectively manages the achievement of

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sustainable development objectives in three key domains: the environment, society, and economy. CE adaptations engage firms in prioritizing the development of sustainable business models that are socially creative, environmentally friendly, and efficient in using economic resources. The SDG implementation enhances the strategic value and market competitiveness of firms, leading to a positive impact on SMP (Goncalves et al., 2022; Kirchherr et al., 2017; Korhonen et al., 2018; Ma et al., 2014; Muhamad & Muhamad, 2020; Park et al., 2010; Wierzbicka 2021; Xue et al., 2010). Nevertheless, other scholars argue that circularity is not a prerequisite for sustainability. The use of certain CE practices, such as eco-design and the use of new materials, can have rebound adverse effects that diminish or even eliminate the positive environmental implications required (Helander et al., 2019; Salvador et al., 2020; Zink & Geyer, 2017). Furthermore, recycling, which often aims to prevent material losses and the extraction of new materials, may, under certain circumstances, be more energy-intensive than the original process Geissdoerfer et al., 2017; Harris et al., 2021; Lamba et al., 2023; Momete, 2020).

A number of theories have been developed to understand the influence of CE on SMP and to help scholars in establishing stronger connections and foundations for their research. A widely used socio-political theory is the stakeholder theory which posits that the economic dimension of an organization cannot be studied without taking into account the social, environmental, institutional, and political context in which the organization operates (Grey et al., 1995, Deegan & Blomquist, 2006). Particularly, the stakeholder theory centers on analyzing the current interactions between companies and the different individuals or groups who have a stake in the business activity, referred to as stakeholders. (Gray et al., 1995; Freeman 1984; Nicolò et al., 2021). Additional prominent theory encompasses transaction cost suggesting that initial transaction cost surge because of the need for complex and costly activities by large interdisciplinary teams in striving to overcome barriers in interconnected exchange and supply loops (Werning & Spinler, 2020). Moreover, Legitimacy theory posits that the political, social, and institutional environment significantly influences the economic activities of corporations. Hence, the choice of the company to adopt an alternative business model, such as a CE, should be evaluated considering the political environment encompassing regulations, the internal and external social dynamics, and the institutional structures in which the firm functions (Kwarteng et al., 2022).

Prior research explored diverse perspectives related to the effect of CE on SMP. Previous studies (Mazzuchelli et al., 2023; Balcilar & Toren, 2021; Figgie et al., 2021; Palea et al., 2023; Zara et al., 2023; Ha, 2022) found a positive relationship between CE and SMP. The positive relationship

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is attributed to the company's proactive implementation of a circular transition, which results in positive economic outcomes. Companies are inclined to adopt the new economic paradigm if it complements their efforts to enhance their economic and financial standing. Capital providers regard the concept of CE as a viable strategy or a less hazardous approach in comparison to a linear modelling approach. The stock market rewards firms with superior CE results with increased share prices. On the contrary (Horak et al., 2023; Morea et al., 2022; Safraz, 2022) revealed a negative relationship between CE and SMP. This can be ascribed to the epidemic triggered by covid-19, which directly impacts the implementation of CE in numerous nations. Accordingly, this research intends to answer this question: How does CE affect SMP through sustainable performance mediating effect?

The current research has made substantial contributions to the growing literature of finance. Based on our current understanding, this is the first attempt to investigate the mediating influence of sustainable performance on the relationship between CE and SMP. Most current research focuses on CE and stock return nexus without considering the mediation effect of attaining SDGs (Morea et al., 2022; Zara et al., 2022). Furthermore, we expand upon previous research on stock returns (Moe & Oversveen, 2022; Ghosh et al., 2020) by including EU indices. Our contribution to the literature is based on our consideration of them as a sample. The selection of European markets is because Europe, as a group, constitutes the second largest portion of the green economy in terms of green revenue exposure (FTSE Russell, 2018). This characteristic makes Europe the fitting market for studying the current topic. Moreover, we outweighed the theoretical debate on the potential benefits or costs of CE activities, especially among EU countries. The results of our study indicate a positive relationship between CE and SMP.

The following sections of this research have been organized as follows: The review of existing literature and the formulation of hypotheses are addressed in Section 2, while Section 3 outlines the sample and statistical technique employed. Section 4 provides an in-depth description of the empirical results and a thorough discussion. Section 5 presents the conclusion, practical implications, limitations, and recommendations for future research.

Literature Review

Circular Economy

Since the linear model of resource consumption destroys the environment and depletes natural capital, it does not seem to be sustainable, further, resources are being wasted and ending up in landfills due to this unsustainable path of production and consumption, making the need for more

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sustainable systems critical. Hence, the concept of CE has arisen and has become of great importance in the last decade. The CE is a modern model of the economy, in which its focus on creating a new consumption and production model, which uses fewer resources and less amount of waste, in addition, to minimizing pollution. The CE aims to improve the living standards of the population, moreover, protect the environment, in addition to being a tool for achieving and promoting sustainable development at the national and global levels (Popović & Radivojević, 2022). Further, the CE, according to the European Economic Forum, would cut carbon emissions by roughly 45 tons annually. CE is thought to be a potential solution for issues like the rising worldwide resource demand, unstable prices for raw materials, as well as global population growth and consumption (Anton et. al, 2019).

Moreover, the economy we are living in is primarily linear, the linear production model implies that the product ends up in a landfill. On the other hand, the CE is continuous of the linear economy, and is based on using waste as a main resource to create new goods with the least amount of energy consumption and resource extraction from the environment, unlike the linear economy model, so the main idea of the concept of CE is to replace the linear model in the economy, however, in today's business context, this becomes unfeasible because of scarce resources, waste buildup, and, insufficient waste management (Popović & Radivojević, 2022).

Stock Market Performance

One of the core functions of an investment is to buy stocks and start to trade in the stock market either individually or in companies through the assistance of brokerage firms to allocate the stocks efficiently. Almost every country should have an index that clarifies the performance of companies' stocks listed in the market that reflects the investment situation in this country. The main determinants and key players in the stock market are stock prices and returns. In addition, there are certain investment styles in the stock market including growth and value stocks which contribute to high returns and efficiency in the financial market. Stock market index clarifies the performance of the stock market in each country to show the movements in stock cycles through certain indices. Previous studies (Neves, et al., 2021; Iglesias, 2015) analyzed how the stocks respond to changes in the market which is stock index cycles which are mainly the fluctuations or movement in returns either growing or declining. When the stock market is efficient the co-movements no longer exist between stock market indexes. Further, stock market synchronization is critical in assessing the performance of investment in any country. Synchronization is when the index returns that represent the stock markets are correlated and highly dynamic. Zhou (2016) indicated that the correlation of stock indexes can be relatively small when they're

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perfectly integrated and the global stock market synchronization is like a made locking which is mainly synchronizing market fluctuations between stock market systems. Indeed, governments perceive the CE as an essential mechanism for mitigating climate change and enhancing economic resilience (Khanna et al., 2022; Domenech & Bahn-Walkowiak, 2019). In 2000, Japan became the pioneering nation to implement legislation specifically addressing CE (Ministry of the Environment, 2000). In 2015, the EU implemented its initial "Circular Economy Action Plan" (European Commission, 2015). China is also advocating for the CE, however mostly focused on efficiency (People's Republic of China, 2008). In contrast, the United States of America (USA) has not yet undertaken any endeavor in this domain (Palea et al., 2023)

Sustainable Performance

According to the United Nations Agenda 2030, 17 sustainable development goals, are a plan of action for prosperity, the environment, and people. The goal of it is to promote world peace and mainly aim to protect the environment, reduce poverty, and create socio-economic inclusion. To promote sustainable development, there are three priorities which are environment, social, and economy driving the country's growth. First, economic development mainly involves the potential of the economy and limits sensitivity. Second, social development is the role of social institutions in change, development, and resolution of differences. Finally, environmental development is about greener resources and must be aware of its importance through controlling and reducing waste, and water usage, and increasing the recycling of materials (Isa et al., 2021). The sustainability development is achieved and supported through implementing circularity in the country which mainly is zero waste and encouraging better use of resources.

CE is an economic system including business models that seek to promote sustainable development by replacing the notion of "end-of-life" with the reduction, alternative reuse, recycling, and recovery of materials in production, distribution, and consumption processes. The CE is explicitly mentioned in that spot as a direct contributor to the achievement of SDGs 6, 8, 9, 11, 12, 13, 14, and 15. Additionally, the EU has established a reform agenda that has significant growth potential, generated new employment opportunities, and promoted environmentally friendly production and consumption models. The objective is to enhance resource efficiency and reduce waste.

Theoretical Framework

Stakeholders Theory

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So far, research investigating the relationship between CE and SMP has shown inconclusive results, prompting additional studies to get a more comprehensive understanding of this paradox. Different theories have emerged supporting that the CE can improve SMP. The conceptual relation between CE and stakeholder theory arises from certain common beliefs, including the following: (1) the need for businesses to focus on purposes other than maximizing short-term shareholder gain; (2) the relationship between moral and business concerns; and (3) considering a long-term viewpoint that permits the stakeholder value generation now, without sacrificing the capacity to produce long-term value. Furthermore, stakeholder relationships, as proposed by Vildasen & Havenvid (2018), influence business sustainability via (1) relationships on a particular technological project; (2) the accomplishment and growth of mutual sustainability long-term objectives; and (3) networking, which is the systematic relationship-building between a business and the stakeholders in cooperative sustainability projects (Attanasio et al., 2021). In other words, upholding an appropriate relationship with an organization's stakeholders is essential to integrate the three main aspects of sustainability— economic, social, and environmental—and striking an optimal balance between them. Lastly, the proposed theory of stakeholders influences the positive relationship between CE and the stock market by influencing stakeholders involved as investors, employees in the company, market, and government in adopting CE practices in their strategies and aligning stakeholders' interests with stock market growth.

Transaction Cost Theory

Transaction cost theory can aid in the understanding of how businesses might effectively close material loops and establish close partnerships. The transaction cost theory has emerged as a framework for comprehending CE and SMP nexus. This is because the uncertainty surrounding CE results in firms facing the risk of incurring substantial unexpected costs related to contracting. This uncertainty arises from their inability to find partners, their incompetence in drafting contracts that effectively safeguard their interests, or their decision to enter contracts with excessive complexity due to their inability to anticipate the challenges they may face during the transition (Lahiti et al., 2018).

Considering transaction cost theory, a negative association between CE and SMP is proposed. This is because the higher costs and significant expenses associated with circular products impact the market value of companies. Significant upfront expenses required to adopt CE practices resulted in fewer circular enterprises and impacted the stock market indices negatively.

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Empirical Review

CE & Stock Market Performance Nexus

Murali et al., (2023) assessed how CE practices can influence investment in the stock market. The sample was extracted from fifteen global companies from different countries such as the USA, UK, Canada, and India covering the time 2010 to 2021. The CE was assessed through the BSE ESG index while daily close prices of stocks and VR ratio (excess volatility to market efficiency) were used for measuring the SMP. The results showed that CE positively affects the SMP and creates additional cash flow prospects for investors in the short and medium term. Furthermore, Palea et al., (2023) investigated the influence of CE strategies on business profitability measures; debt financing, and stock market valuation in the European Union (EU) between 2010 and 2019. CE was assessed by considering waste reduction efforts, e-waste reduction efforts, recycling efforts, eco-design goods, resource reduction improvement, renewable energy use, policy water efficiency, and policy energy efficiency. On the other hand, corporate profitability and debt financing were measured through ROA, ROE, ROIC, ROS, asset turnover, capital intensity, leverage, and working capital. The results indicated that the stock market rewards the application of CE techniques inspiring businesses and capital providers to allocate resources towards the adoption of CE. In addition, Mazzuchelli et al., (2023) examined the association among CE practices and financial performance by considering well-known firms in the manufacturing sector located in Italy as a sample to be studied. CE was measured by recycling rate & waste treatment, whereas financial performance was assessed by ROA and the increase in market share. Results showed that engaging in CE practices improved firm performance as circularity helps organizations improve their reputation by positively shaping stakeholders' perceptions. Furthermore, Horak et al., (2022) investigated if CE principles adoption impacted firms' stock return. CE was measured by DJSI World Sustainability Index, and the stock return fluctuations were assessed by the market capitalization and weekly and daily stock prices for selected companies such as Microsoft, Google, and United Health Companies from 1990 to 2021. Results showed a positive shift in firms' stock prices and market capitalization within the ten years following the application of CE principles promoting sustainability into corporate cultures. Lastly, Zara et al., (2021) examined the impact of CE practices on risk-adjusted performance of 222 EU circular shares from 2013-2018. CE score was employed as a proxy for CE adaption, whereas the sharp ratio, Treynor ratio, and closing stock prices were used as proxies for the stock returns. The results showed a positive relation between CE and stock returns since circularity can be considered as a motive for a high-yield

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investment strategy.

In contrast, Sarfraz et al., (2022) illustrated the association between CE performance indicator and the financial performance of 411 corporations in the G7 between the period 2014 and 2020 using multivariate econometric estimations. The sample was extracted from the EU since its compliance with the European Green Deal. Results revealed that companies struggled to incorporate CE practices since certain eco-innovations are more expensive and have no immediate impact on profitability. In the same vein, Morea et al., (2022) examined the association among corporate CE strategy and market performance. ESG scores were utilized as a substitute for CE, while daily returns from the ESG Euro Stoxx 50 and Euro Stoxx 50- ESG index were used as indicators for SMP. Empirical evidence revealed that the financial sector is more aware of environmental, social, and governance (ESG) concerns. Nevertheless, there is little evidence to suggest that CE activities can impact stock returns. Thus, the first hypothesis is formulated as follows:
H1: There is a significant positive nexus between CE and the SMP in EU context.

CE, SDGS, and Stock Market Performance Nexus

An analysis conducted by Su (2023) examined the influence of green innovation (GI) on the financial performance of 526 non-financial firms listed in the EU between 2012 and 2022. The investigation considered both accounting and market-based techniques. The objective of the investigation was to examine the possible moderating influence of research and development (R&D) investments and ESG disclosure on the association between GI and financial performance. Analysis revealed an adverse relationship between GI and accounting- based financial performance, and a positive relationship with market-based financial performance. Furthermore, the results revealed that GI influences accounting-based financial performance by means of R&D investments and market-based financial performance by means of ESG disclosure. This helps managers to be better equipped to tackle the difficulties of implementing CE by using sustainability disclosure. Therefore, the second and third hypotheses are formulated as follows:

H2: There is a significant positive nexus between CE and the SDG in EU context. H3: There is a significant positive nexus between SDG and the SMP in EU context.

Methodology

Data Description

In this research, the data type used is panel data, since panel data is extremely beneficial in this case because it captures and explains the dynamic shifts and

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enhances the number of observations, particularly because the sample selected from ten EU countries including Austria, Denmark, France, Hungary, Ireland, Netherlands, Poland, Slovenia, Spain, and Sweden from the EU representing 220 observations based on the availability of data and CE adaptation. Moreover, this research focuses on the time frame from 2000-2021, the rationale for choosing this time frame is that CE is a recent concept and has recently emerged and was not well known to the countries and people before this.

Description and Measurement of Variables

The dependent variable which is SMP is expressed in the model as stock market indices namely including the Vienna stock index, OMX Copenhagen stock index, CAC 40, BUX index, ISEQ index, AEX index, WIG30, SBITOP index, IBEX35 index, OMX Stockholm 30 index. The index shows the average daily return or percentage change of each country's stock market. Then the percentage change was collected yearly to reflect the changes in return from a year to a year in each country.

While the independent variable is CE, it was measured through five dimensions. First, annual freshwater withdrawal (AFWW) that considered a crucial part of CE, it is the volume of freshwater used annually. Second, the generation of municipal waste per capita (GMW), shows the waste collected on behalf of municipal authorities and waste management disposal, mainly household, office, and commerce institutions waste. Third, resource productivity (RP) which is mainly GDP divided by domestic material consumption (DMC). It measures the total raw materials directly extracted from the local economy. Fourth, the recycling rate (RR) explains the CE by identifying the number of recycled materials. Fifth, recovery of recycling rate (RRR) which is the percentage of collected recyclable materials. These CE dimensions were collected from OECD (Organization for Economic Cooperation and Development) and EUROSTAT.

SDGs score is an indicator for sustainable development implementation in each country (SDGs) and act as the mediator between CE and SMP. The score measures the SDG achievement; the higher the better. Finally, the first control variable is the Gross Domestic Product (GDP) which reflects the value of a country's production, measured in current international dollars, adjusted by the purchasing power parity (PPP) conversion. GDP is the total value added by all domestic producers in a country, calculated by adding any product taxes and subtracting any subsidies not included in the product value. PPP conversion factor is a geographical price deflator and currency converter derived from the World Bank database that effectively removes the impact of price level disparities among nations. Long-term interest rates, which relate to government bonds with a maturity of 10 years, serve as the second control variable. Interest rates are mostly influenced by

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the lender's fees, the borrower's level of risk, and the decline in the capital value. In general, long-term interest rates are calculated as the average of daily rates, expressed as a percentage, and obtained from the Organization for Economic Co-operation and Development (OECD).

Econometric Model

The empirical analysis of the impact of the CE aspects on SMP is conducted using a panel least-squares regression model with control variables, including the mediating effect of SDGs. The choice of this approach is based on the specific attributes of the dataset and the intended research objective. The use of control factors serves to mitigate the effects of omitted variables and endogeneity bias (Black et al., 2014). The data were subjected to statistical analysis using STATA 14 at significance levels of 1% and 99%. Winsorizing was implemented on all variables to mitigate the impact of potentially irrelevant outliers.

The model equation is:

The functional model for this research is specified as follows:

$$\begin{aligned} \text{SMP}_{it} = & \alpha_0 + \beta_1 \text{AFWW}_{it} + \beta_2 \text{GMW}_{it} + \beta_3 \text{RP}_{it} + \beta_4 \text{RR}_{it} + \beta_5 \text{RRR}_{it} \\ & + \beta_6 \text{SDG}_{it} + \beta_7 \text{GDP}_{it} + \beta_8 \\ & \text{LTIR}_{it} + \epsilon_{it} \end{aligned}$$

(1)

Where:

SMP_{it} is the country (i) the yearly stock market performance in the year (t),
 AFWW_{it} is the country (i) the yearly Annual freshwater withdrawal in the year (t),
 GMW_{it} is the country (i) the yearly Generation of municipal waste per capita in the year (t), RP_{it} is the country (i) the yearly Resource productivity in the year (t),
 RR_{it} is the country (i) the yearly Recycling rate in the year (t),
 RRR_{it} is the country (i) the yearly Recovery rate of recycling in the year (t),
 SDG_{it} is the country (i) the yearly score of sustainable development goals in the year (t), GDP_{it} is the country (i) the yearly gross domestic product, in the year (t),
 LTIR_{it} is the country (i) the yearly efficiency ratio in the year (t), ϵ_{it} is the random error.

Empirical Findings and Discussion of Results

Descriptive Statistics

Based on the given descriptive data (Table 1), the average SMP for all countries is 0.016 while the minimum value is -.019 in France in 2015 which infers that at that time France's stock exchange was not affected by green practices or sustainability at all. While the maximum was also in France about 1.86 in 2008 which means that this is the highest return from all indices with a normal standard deviation. The average recycling rate in the given EU countries in the model is 1989.45 which is high compared to other

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variables in the model like the AFWW, GMW, RP, and RRR that has an average of 18.12, 36.829, 1.887, 40.855, thus it indicated that the RR in those EU countries is higher and used more than the other variables. Further, RR has the highest standard deviation with 1957.22, which reflects a huge gap between the minimum and maximum of the values with a minimum of 13 and a maximum of 9626, the deviation between the values results that Poland had the lowest RR in 2000 compared with the other countries, and France has the highest RR in 2021. The deviation between countries is extremely large, this is because implementing the circularity was challenging especially in Poland due to the transition phase from a central economy to a market-based economy that requires high investment and infrastructure to implement CE which is not the case in Poland at that time while most of the countries achieved high rates of recycling so most of them are large numbers. The AFWW has a mean of 18.12723 with a minimum value of .8145445 in the Netherlands 2019 reflecting sustainable water use, where less water is being taken from freshwater sources to balance water needs for human activities with the conservation of water resources for future generations and the maintenance of environmental well-being. While the maximum value was 105.7 in Hungary in 2009 inferring water scarcity, depletion of water sources, and negative impacts on ecosystems and biodiversity. Further, the GMW has a mean of 36.8, while the minimum value of GMW was 1.6 in Hungary in the year 2000 since the legal basis for preparing national waste management plans was first introduced in Hungarian legislation in the early 2000s. Therefore, waste management in Hungary was at the beginning level depending on landfilling to recycle different types of waste generated. While for maximum GMW was in Austria with 64.3 in 2001. Even though GMW was growing at that time, the overall performance was stable in Austria at high levels and the deviation is relatively small between the minimum and maximum which makes sense throughout the years for all countries. The RP has a mean of 1.8 with a minimum value of 0.4 in Poland 2002 reflecting low efficiency in resource usage, while the maximum value is 4.6 in the Netherlands 2021 as the more recent the years are the better the awareness and knowledge about resource usage and productivity.

The mean of RRR is 40.8, while the minimum value was 2.1 in the early years in Poland specifically in the year 2000. Poland RRR was relatively low in comparison with other countries because of limited recycling infrastructure as recycling facilities and economic priorities weren't about sustainability at that time. While the maximum value in Slovenia in the year 2021 which is had a superior recycling effort at that time; it exceeds the target which is 55% for the year 2025 with a normal deviation between them.

The SDG score has a mean of 79.09191 with a minimum value of

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73.15in Poland in 2000 due to social exclusion because of poverty as one of the main problems faced by Poland, making a challenge to achieve economic growth and high standard of living, while the maximum value was 86.26in Sweden in 2020 through the comprehensive investment in hydropower and biomass, reducing their reliance on fossil fuels.

The control variables which are the GDP and LTIR are statistically normal and the minimum and maximum numbers considered with the standard deviation and mean numbers are in the range and relative to each other.

Table 1. Descriptive Statistics

Variables	Mean	Standard deviation	Min	Max	Robust Standard Error
<i>Panel A: dependent variable</i>					
SMP	.0167199	.01373384	-.19	1.8623	0.009259353
<i>Panel B: independent & mediator variables</i>					
RR	1989.465	1957.227	13	9626	4.61e-06
AFWW	18.12723	24.78212	.8145445	105.7	.0002011
GMW	36.82993	15.652	1.6	64.3	.0009657
RP	1.88722	.9238572	.4388	4.6592	.0121468
RRR	40.85563	14.05293	2.135	76.594	.0006634
SDGs	79.09191	3.291228	73.15	86.26	.0032782
<i>Panel C: control variables</i>					
GDP	29508.55	13316.24	6450	72110	9.41e-07
LTIR	3.372469	2.247339	-.3768333	10.68167	.0052478

Source: authors' calculations

Pearson Coefficient Correlation Matrix

According to (table 2), the findings showed that there is a weak positive correlation between the SMP and the RR at 0.2047 which infers that companies involved in recycling often attract investment from venture capital, private equity, and public markets, especially when there is a positive SMP. Investors are increasingly looking for opportunities in sustainable and green technologies, which include recycling and waste management solutions.

However, there's a negative moderate significant correlation of - 0.6040 between GDP and AFWW, as the GDP increases, the AFWW decreases, this is because the sample is based on EU countries that possess technological advancements, shift to less water-intensive industries, improved water management and infrastructure, compliance to environmental regulations, and increased awareness and conservation efforts.

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While GDP and GMW are highly correlated with a moderate positive correlation of 0.6230, since in EU countries, the service sector which includes hotels, restaurants, and other businesses, expands. These services generate significant amounts of waste, particularly food waste and disposable items like napkins, containers, and plastic utensils.

GDP and RP showed a 0.6833 moderate positive correlation, since EU countries have an increased allocation of resources towards research and development (R&D), leading to innovations that improve resource efficiency. Additionally, EU countries have large economies of scale, which allow them to produce goods and services more efficiently.

While GDP and SDGs score with a correlation of 0.5414 moderately positive, indicating that EU countries have more robust institutions and governance structures, which are essential for implementing and monitoring SDG-related policies effectively.

Also, GDP with RRR is positively moderately correlated with 0.5146, indicating that higher GDP allows for the development of more sophisticated waste management systems. These systems often include integrated approaches that combine recycling with other waste recovery methods, such as composting and energy recovery, leading to higher overall recovery rates. Further, RRR and GMW indicate 0.1291 weak positive correlations indicating that as GMW increases, there is a greater volume of waste that needs to be managed. This often leads to enhanced efforts to improve recycling rates to handle the larger amount of waste more effectively.

On the contrary, the GMW with AFWW shows a moderate negative correlation by - 0.4890 inferring that the increased waste generation is often a result of higher consumption and economic activity, which also drives up the demand for freshwater for production, sanitation, and waste management.

Moreover, the RP indicated negative moderate correlation with AFWW -0.4583, since EU countries represents developed economies, they often transit from resource-intensive industries (such as agriculture and heavy manufacturing) to less water-intensive sectors like services and technology. This shift reduces the overall demand for freshwater relative to economic output, improving resource productivity.

Lastly, RP is correlated positively with RR 0.4248, inferring those innovations in sorting and processing technologies help to increase the efficiency of recycling operations. This means that more materials can be recovered and reused, contributing to higher resource productivity. %. Moreover, the examination of the variance inflation factor (VIF) for all independent variables indicates values below 10, therefore suggesting the absence of multicollinearity issues in our models.

Table 2. Pearson coefficient correlation matrix

Variables	SMP	RR	AFWW	GMW	RP	RRR	SDGs	GDP	LTI
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										R	
SMP	1										
RR	0.2047**	1									
AFWW	-0.0215	0.0708	1								
GMW	0.0458	0.1291*	-0.4890 ***	1							
RP	0.0939	0.4248 ***	-0.4583 ***	0.6091***	1						
RRR	0.0377 -	0.0438	-0.5085***	0.8194 ***	0.4897***	1					
SDGs	-0.0026	-0.0171	-0.2984***	0.6214***	0.2320***	0.4286***	1				
GDP	0.0700	0.0688	-0.6040***	0.6230***	0.6833***	0.5146***	0.5414***	1			
LTIR	-0.0384	-0.2831***	0.4384***	-0.6183***	-0.5318***	-0.5272***	-0.5595***	-0.5200***	1		
Multicollinearity diagnostics											
VIF	–	1.61	1.79	5.46	3.60	3.75	2.65	3.49	2.20		

*Note: *Significant at level 10%, **Significant at level 5%, ***Significant at level 1% Source: authors'*

calculations

Empirical Analysis

Based on the conducted statistical model in (table 3), which is the random effect GLS using the robust estimate to obtain accurate and reliable results, the variables that have a significant positive impact on SMP are RR, RRR, and GDP. This means that when recycling increases by 1 unit then SMP increases by 0.0000191, inferring that when companies listed in the stock exchange encourage recycling or sustainable practices, it will be an attractive investment as it's a new sector that generates high returns in the long run.

Additionally, when RRR increases by 1 unit, the SMP increases by 0.0012889. this is because EU countries typically have stringent environmental regulations and policies that promote recycling and waste management, along with the incentives and subsidies available for companies that achieve high recycling rates, which can improve their profitability and attractiveness to investors.

And lastly, when GDP increases by 1 the SMP increases by 1.86. Because GDP is one of the most influential economic factors that surely affect the SMP; since when GDP grows, it typically means higher consumer spending and stronger demand for goods and services. Companies often witness increased sales and revenue during periods of economic growth, which can boost their profitability and, consequently, their stock prices. Moreover, a growing GDP generally reflects a strong and expanding economy, which boosts investor confidence. When investors are optimistic about the economic prospects, they are more likely to invest in the stock

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market, driving up stock prices.

According to the random effect results, the hypothesis is accepted as CE has a positive impact on SMP which is elaborated through the two significant dimensions of CE. Further, the overall R squared which is 0.0573 approximately reveals that 5% of the variability observed in the SMP is explained by the CE in the regression model. CE practices focus on maximizing the value of resources by reducing waste and reusing materials. This can lead to significant cost savings for companies through more efficient use of raw materials and lower waste disposal costs, which can boost profitability and, consequently, stock prices. Additionally, companies that implement CE practices often benefit from enhanced brand reputation and consumer loyalty. Positive public perception and strong brand value can lead to increased sales and higher SMP. Moreover, companies that lead in CE practices can differentiate themselves from competitors, capturing market share and driving growth. This competitive edge can result in higher stock valuations.

Table 3. Panel Least Square Model

Variables	Coef.	z-statistic	Robust standard error
Constant	0.0430737	0.19	0.2322366
RR	.0000191***	4.14	4.61e-06
AFWW	.0003295	1.64	.0002011
GMW	-.0004149	-0.43	.0009657
RRR	.0012889**	1.94	.0006634
SDGs	-.0018351	-0.56	.0032782
GDP	1.86e-06**	1.98	9.41e-07
No. of Observations.	220		

Note: *Significant at level 10%, **Significant at level 5%, ***Significant at level 1%.

Discussion

According to the statistical findings of the data from using the random effect model using robust estimate, it was concluded that there's a positive significant association between CE and SMP at a significant level of 1% according to the RR, and at 5 % significant level based on the measure RRR, in addition, it was concluded that the control variable GDP is significant at level 5%. Further, these results are supported by previous studies as (Horak et al., 2022) demonstrated that stock prices are positively affected by CE principles implementation that resulted in a shift in companies' market capitalization. The investor encouraged to invest in this sector therefore stock prices increased. While (Thanh Ha, 2022) stated that financialization is affected by circularity in the EU through the increasing number of materials recycled that statistically significantly impact the growth of financial institutions. In addition, there's a positive impact of circularity on SMP as the stock market rewards CE application techniques which leads to more profitability (Palea et al., 2023). In addition, (Figgie,

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2021) has highlighted that CE has an impact on efficient portfolios through mitigating risk and desirable return, by studying two assets (A, B) in the portfolio aiming to examine how CE implementation affects this portfolio. Moreover, (Murali, 2023) highlighted that the company achieving disposal practices implementation will develop its contribution to the environment, in which the results expressed that CE positively affects the SMP due to circular stocks performance in the market as it generates money opportunities in a short and medium run for investors.

Moreover, Balcilar & Toren, (2021) have highlighted that the relationship is positive between CE and the stock market based on their research as a positive shock to the prices of stocks may result in influencing sustainable consumption greatly, especially in Turkey, and encourage consumers to perform circularly. Another study demonstrated that the CE affects risk-adjusted performance and financial returns as examined by Zara et al., (2021). In which the result of finding a positive relation is that circularity is a motivation for investment strategy innovation.

Thus, the overall and most of the research have supported the results that were tested in this research which additionally supports the stakeholder theory which states that there are common values that can be focused on more than the shareholders' value. For instance, building circular business models that can lead to high gains for different stakeholders in the long run. Additionally, based on the legitimacy theory the reputation of the companies can be enhanced by being legitimate which is reflected in investor decision-making in the stock market.

On the contrary, this study results contradicts with some other studies, in which some researchers (Morea et al., 2022; Sarfraz, 2022) have proved that there is no relation between the CE and SMP. These different results can be attributed to many reasons, as the researchers conducted their sample from different periods or used different measures, it can also be from conducting a sample from different country regions. For instance, (Sarfraz, 2022) determined that there is no association among corporate financial performance and the performance measures of the CE, in addition, (Morea et al., 2022) found that there is no relationship between CE strategies and SMP. Lastly, our study results contradict the transaction cost theory which posits that CE can have a negative effect on the stock market as there are high expenses and costs to shift from linear to circular business models thus, making contracts can be expensive which affects the investment negatively.

According to the statistical result regarding the mediation impact of SDG on the association between CE and SMP, it was found that the SDG score does not affect SMP (P- value of SDGs is 0.5576), thus the CE does not affect the mediator SDGs. This can be attributed to the fact that financing sustainable development is not easy and requires large funds to be circular,

limited awareness from different stakeholders about its importance and practices, and finally can lead to ineffective implementation that mainly can negatively affect the relation between the CE and SDGs.

Conclusion, Implications, Limitations, and Recommendations for Future Research

Implementing a CE in the EU will reduce the pressure on natural resources and foster sustainable economic development and employment opportunities. Therefore, it will successfully attain the European Union's objective of achieving climate neutrality by 2050 and limit the decline of ecological diversity. The objective of the research is to investigate how SDG scores mediate the relationship between CE and the SMP in the European context. The current research employed a random effect Generalised Least Squares (GLS) model with robust estimation to assess the data's robustness and address any issues in the standard errors. The sample consisted of 10 European Union (EU) countries within the time frame of 2000-2021.

The indicators employed to quantify CE are AFWW, GMW, RP, and RRR. The findings of our study indicate that RR has a statistically significant and positive effect on SMP at a significance level of 1%. Additionally, both RR and GDP have a statistically significant and positive effect on SMP at a significance level of 5%.

This study has various implications for different stakeholders, companies' managers, investors, and government authorities. First, companies' managers should prioritize how to integrate circularity in their business models to enhance their profitability level and gain a competitive advantage edge. By optimizing resource efficiency, reducing waste, and embracing recycling, companies can enhance profitability, reduce costs, and improve their appeal to investors, thereby driving up their SMP. Second, investors should prioritize companies that are leaders in adopting CE practices as part of their ESG investment strategies. These companies are likely to experience better long-term financial performance and stability, making them attractive investment options with the potential for positive stock market returns. Lastly, governments should continue to develop and enforce policies that promote the CE, such as subsidies for sustainable practices, tax incentives for recycling and waste reduction, and stringent regulations on waste management. These policies can create an environment where businesses are incentivized to adopt circular practices, leading to overall economic growth and positive SMP.

This study has some limitations. First, this study specifically examined a subset of the CE proxies, rather than all of them. Therefore, future studies could investigate the influence of CE on SMP using alternative CE indicators such as the Industrial Circular Economy Questionnaire

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(ICEQ). Furthermore, our approach exclusively relies on market indices as a proxy for SMP. Therefore, future study should investigate the relationship between CE and SMP using alternative indicators of SMP such as Volatility Index. Moreover, future researchers could examine the influence of CE on economic growth, as CE focusses on optimizing resource utilization, minimum waste generation, and maximizing material value. Consequently, enterprises derive substantial financial benefits by reducing their expenditures on raw materials and waste management. The accumulated savings can be allocated to other sectors of the firm, therefore promoting economic activity and making a positive contribution to the growth of GDP. Furthermore, the study sample was restricted to 10 nations inside the European Union, resulting in a small sample size. Future research in this area can investigate other countries, such as the MENA region, as CE interventions are equally relevant to these regions.

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