

Smart Cities and Sustainable Finance: The Islamic Perspective

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Abstract— In the current global context, policymakers are called to face complex and numerous challenges in achieving sustainable development with rapid urbanization and industrialization. The world's population is growing, and cities will be increasingly condensed in the future. Nowadays, cutting-edge technologies and digitalization are radically changing urban life and how cities are planned, financed, and managed. A new urban model, known as a “smart city”, is being developed throughout Europe and elsewhere worldwide. In a smart city, all the infrastructures are interconnected and integrated in an efficient and functional way through ICT by optimizing resource consumption, enhancing the quality of public services (Government services) through participatory governance, and increasing citizens' security. Indeed, urban transformation requires multiple stakeholders to come together toward shared and common goals. City leaders face challenges in enacting changes in balancing the needs of citizens, government, businesses, NGOs, and others: smart city development requires a strategic, long-term vision to create inclusive, fully integrated and synergistic systems. Technological progress is a fundamental requirement for the development of smart cities, but it must be supported by sustainable financial instruments. This paper aims to conduct a comparative analysis of the smart cities' projects and financial instruments used for implementing those models, traditional as well as innovative and sustainable. In particular, the analysis aims to highlight the ethical financial approach - having in mind the European and Islamic models- that characterizes some of these smart city models and the underlying idea of sustainability.

Keywords- Smart cities, Islamic finance, Green Sukuk

I. INTRODUCTION

During the last ten years, the topic of smart cities has been thoroughly analysed by pointing out diverse urban context which diverges economically socially and politically. Different cultures, categories of governance and management methods affect interactions among policymakers citizens and

stakeholders involved in the decision-making process, especially in relation to green and sustainable policies. In such context, policy makers must move towards new urban eco-social model by promoting sustainable investments in urban areas.

Moreover, the phenomenon of sustainable financial tools aimed at developing green and sustainable projects is widely discussed in literature [1-4] but what is missing is a unified vision from the financial point of view of the smart city concept, and a full funding system of these new urban realities. The overall rationale of this gap is extremely varied but, to completely overcome these barriers, it would be necessary to increase public awareness of the importance of sustainability to raise awareness of the use of sustainable financial instruments for financing these new entities.

II. METHODOLOGY

Through the existing literature, this paper aims to contribute to the current debate considering the most advanced smart city models in Europe and the Islamic world from a management financial and cultural perspective. Moreover, the following analysis has been carried out by combining the concept of sustainable and innovative cities with the Islamic objectives (*Maqasid al -Sharī'a*) to define a holistic model of sustainable cities based on an integrated and ethical approach to urban management financed by sustainable and Islamic financial instruments.¹ Based on *Maqasid al -Sharī'a* [5] [26-

¹ According to Kamali, *Maqasid al -Sharī'a*, profoundly rooted in Qur'an and Sunnah, are designed to promote social wellbeing and to repeal harms. As such, these objectives aim to establish justice, eliminate unfairness and alleviate poverty. Thus, *Maqasid al -Sharī'a* aim to o protect religion (*din*), life (*nafs*), intellect (*aql*), lineage(*nasl*) and their property (*maal*). Moreover, these objectives provide guidelines to ensure the realization of Maslahah (social wellbeing) and the prevention of Mafsadah (harm) in everyday life as well as in the financial market.

29], Islamic green finance, play indeed a key role in promoting innovation while preserving natural resources, and this study provides a comprehensive framework of the actualizing *Maqasid al -Shari'a* in smart, sustainable and innovative cities.

III. SMART CITIES: ONE CONCEPT, DIFFERENT VISIONS?

The ongoing digital transformation, which is expected to rise rapidly, is radically changing economies, societies, and our daily life. Today, cutting edge technologies are indeed profoundly changing urban life and how cities are planned, financed, and managed. Digitalization is certainly becoming a powerful tool to stimulate paradigmatic shifts in urban development-related visions, strategies, and implementation. Therefore, digitalization has a strong impact also on the urban environment making cities more liveable, sustainable, and energy efficient. Cities have indeed a crucial role for the future because are the key to addressing societal challenges since they have the critical mass of different people and influences that come together to spark innovation and new ideas [6].

In this context, a new urban model known as *smart city* is being developed throughout Europe as well as around the world including Islamic countries, where innovative technology meets tradition. OECD defines these new urban realities as “initiatives or approaches that effectively leverage digitalisation to boost citizen well-being and deliver more efficient, sustainable and inclusive urban services and environments as part of a collaborative, multi-stakeholder process”.² According to the literature, in a smart city, all the infrastructures are efficiently interconnected and integrated by optimizing resource consumption, improving the quality of public services, and increasing citizens’ security as well. In such context, innovative technologies and connected solutions - such as IoT, Big Data, ICT, AI, etc. - are the drivers of economic growth, social wellbeing, and sustainable development, by enhancing quality of life and preserving social inclusion [7-13]. Making cities more sustainable, safe, and liveable is a complex issue in the process of sustainable and inclusive growth, which requires to design and manage cities with an innovative and holistic approach (involving investments in infrastructure, mobility, buildings, separate collection systems, roads, health etc.) to pursue the path towards a greener future. Achieving this goal presents complex and significant challenges which concern not only an ever smarter, greener, and sustainable world view, but also the strategic choice of ethical and sustainable financial modes. This is the crux of the matter. Despite the growing awareness of the importance of supporting sustainable policies in line with the Agenda 2030 (such as the decisions taken and the commitment made by the G20 leaders – *inter alia* by

²https://www.oecd.org/cfe/cities/OECD_Policy_Paper_Smart_Cities_and_Inclusive_Growth.pdf (OECD, smart cities and inclusive growth p.8, 2020)

designing greener safer and smarter cities-) apart from a few exceptions³, there has so far been no corresponding strong and incisive comprehensive policy to promote compatible financial instruments for implementing such projects. Financing smart cities is indeed one of the main challenges which policy makers and local authorities are bound to face. Across different countries, financing smart cities requires indeed various financial tools and models including both public and private actors as well as "hybrid" models known as public-private partnership (PPP) which can be fully exploited for creating greener, smarter, and sustainable cities. According to the *Recommendation on Effective Public Investment Across Levels of Government* elaborated by the OECD, it is necessary to “mobilise private actors and financing institutions to diversify sources of funding and strengthen capacities”⁴ at national and subnational levels. Therefore, the issue of financing smart cities is of paramount importance for the development of these new urban models which are in the vanguard of environmentally friendly urban living, technologically advanced and socially inclusive.⁵

To this regard, there are many structural and managerial differences between European smart city models and those of Islamic countries. While in Europe the development of sustainable cities is supported by the European structural and investments funds⁶, or by the

³ Such as Göteborg, Amsterdam, Masdar City, Dubai, Tianjin Eco-city, Singapore, etc.

⁴ Recommendation of the Council on Effective Public Investment Across Levels of Government, OECD, p.10, 2014

⁵ Financial and economic barriers may indeed hinder the development of energy-efficient and eco-friendly cities based on low carbon economies, renewable energies, and innovative technologies. However, to promote the development of *smart cities*, there are numerous obstacles which need to be overcome such as institutional and administrative barriers, data integration barriers, the lack of right competences to successfully manage *smart cities*, the lack of an efficient shared communication network among numerous stakeholders and limited funding. These and other hurdles can be overcome through numerous strategies such as innovative governance models by revising administrative abilities as well as involving citizens in policy decisions by promoting social inclusion and the development of Public Private Partnership (PPP). [35-38]. The recommendations previously set out are necessary to overcome various hinder to build fully functioning, integrated, and interconnected smart city models. These recommendations should be implemented both in Europe, with its multilevel and advanced governance structure, and in Islamic countries, where, at least on paper, these tools should be more easily accepted and should obtain the favourable opinion of the local authorities and entities interested in financing *smart cities*.

⁶ Even though there is not a specific European structural fund dedicated exclusively to the development of *smart cities*, The

implementation of innovative programmes (such as Horizon2020, LIFE, Jumper, etc.), to date in the Islamic world the need to finance smart cities is perceived not (only) as a requirement in compliance with *Shari'a* objectives but rather as the result of political strategies aimed at accrediting a modern and efficient image of the State at an international level.⁷

IV. SUSTAINABLE DEVELOPMENT AND SMART CITIES: THE ISLAMIC PERSPECTIVE

From the sixties onwards, the industrial field has experienced an unpredictable and unprecedented development, which led to a misbalance between available supply and expected demand. The world's population is growing and with it the demand for resources and products. The growing shortage of natural resources over the short, medium, and long term, will lead to a steady increase in the cost of obtaining and using the worldwide demand. There are no endless resources in the world, and to ensure enough resources for future generations, it is necessary to promote new measures toward sustainable development such as climate change strategies, resource efficiency, social inclusion, and sustainable urban planning⁸ [7], [14-19] [33].

From an Islamic perspective, sustainable development is the perfect balance between economic-social progress and the effective and efficient exploitation of resources [20-25]. From an Islamic point of view, sustainable development means achieving the ideal balance (*mizan*)

European Structural and Investment Funds are known to be one of the main financial instruments used by the European Union within its economic and social cohesion policy for the development of *smart cities*.

⁷ About the Gulf countries, and in particular to the Saudi Arabia, where a wide innovative reform programme is currently underway, - in order to change the widespread perception of the country as the emblem of a radical, conservative Islam, resistant to any form of modernisation- the development of *smart cities* contributes to affirming the country's leadership not only in the Islamic world but also at international level. Thus, Saudi Arabia confirm the image of a technologically advanced and cutting-edge country. In this context, there is therefore a growing need for a greater awareness of the actual effectiveness of an all-round sustainable system.

⁸ The most common definition of sustainable development is the one given by the United Nations in 1987, introduced in the Brundtland Report, also known as Our Common Future. This report defines the sustainable development as the "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Furthermore, it states that "sustainable development has evolved as the guiding principle for global long-term development". It specifies that sustainable development consists of three pillars interrelated to each other: economic, social, and environmental one.

between economic and social progress and the effectual and efficient exploitation of natural resources. Indeed, unsustainable consumption and production and wastage of resources violate *Shari'ah* fundamental and general objectives (*Maqasid al -Shari'a*). The social aspect of sustainability requires an equal and fair distribution of resources in a way to ensure equal opportunities for all by promoting social inclusion and integration, economy development and poverty reduction and reducing environmental risks (*maslaha*). In such a system, based on environmental protection, equal distribution of resources and sustainable finance, work opportunities are created to improve living standards, and social cohesion, promote sustainable development and support human and social needs. *Islām* gives indeed a great emphasis on environmental preservation, which plays a key role in human life and towards the ecological transition path. Therefore, according to *Islām*, people must adopt moderate and responsible behaviour (*wasatiyya*) in production and consumption to ensure an effective and efficient allocation of resources considering the needs of every member of society [26-29].

In doing this, people work towards increasing the sustainable consumption and production pattern through better allocation of resources, based on eco-friendly investments and fair distribution of resources. Considering the above-mentioned principles some of the most developed Islamic Countries, such as the United Arab Emirates, Qatar, and Saudi Arabia, have elaborated a strategic path for achieving sustainable development in compliance with Islamic tradition.

The concept of *sustainable development* is strictly related to the concept of *smart cities* which promote interactions between citizens and innovative technologies for a sustainable urban living environment. Therefore, *smart cities* are seen to create a sustainable urban development with citizen's engagement in policy decisions by harnessing innovative technologies [6-13]. Moreover, a smart city often requires effective collaboration and support across different stakeholders, both private and public [30-34]. The development of *smart cities* models requires indeed a right policy mix, which allows an efficient coordination and interaction between different stakeholders to overcome conflicts in decision-making process. Although cities are becoming even-smarter and more sustainable, these new urban realities require a new data management system which should be integrated and interconnected by providing access to information and exchange of data among private and public stakeholders [8,11] [31,35-38]. Hence, in the implementation of a sustainable urban development model, *smart cities* represent an ideal solution and play a central role in promoting the image of moderate and modern Islamic cities, open to innovation, progress, and technology.⁹ Nevertheless, local

⁹ Moreover, in an ever changing world, thanks to their peculiarities, Smart Cities can be a catalyst for the development of Halal tourism. For more details please see: P. Biancone, S. Secinaro, S. Islamic

authorities should develop appropriate objectives and strategies to face the challenges and address climatic, urbanization, energetic and financial issues. *Smart cities* are not an unattainable utopia anymore, but they are still a new concept with new technologies and require a new infrastructure investment model.

In this context, the main question is how to finance the development of *smart cities*. According to the literature, the financial instruments used to promote the development of *smart cities* differ widely among different countries and may include both public and private funding as well as hybrid financing modes, known as a public-private partnership (PPP) [30], [32] [35-38]. Technological progress is indeed a key driver for the development of smart cities, but it must be supported by sustainable financial instruments. Among different sustainable financial instruments, social impact investments are one of the most effective and efficient for achieving the UN SDGs as well as for promoting the development of *smart city* projects which are completely eco-friendly, technologically advanced, and socially inclusive. Sustainable investments generate both socio-economic and environmental benefits such as reduction of pollution and greenhouse gas (GHGs) emissions, energy efficiency, and tackle climate change while increasing public awareness of the importance of sustainable development. [39] While sustainable and responsible investment (SRI) are increasingly rising worldwide, the growing trend of green finance should be seen as an opportunity to explore the Islamic financial instruments as compatible tools to promote the development of *smart cities* both in Islamic countries and elsewhere around the world.

V. ISLAMIC FINANCE AND *ŞUKŪK*

The Islamic financial system is based on moral and ethical objectives and therefore it is structured to converge socio-economic needs by supporting *Sharī'ah* compliant financial instruments to foster sustainable economic growth, social wellbeing, and the protection of the environment [24] [41-43] [49-52]. The Islamic finance aims indeed at promoting sustainable development in its multiple dimensions such as economic growth, poverty reduction and wealth distribution, financial and social inclusion, and preservation of the environment. Therefore, Islamic finance enhance the promotion of sustainable development through the principles of fairness, equality and ethics which are profoundly rooted in the above-mentioned objectives of *maqāṣid al-sharī'ah*. This makes Islamic finance an alternative financial system to promote sustainable development globally [5] [44-48]. [51-54]. Indeed, due to the large scale of the needed financial resources, policy makers are turning away from conventional financial instruments, and are heading towards alternative

financial tools to achieve sustainable goals and safeguard profit. While *zakāt* and *awqāf* represent useful financial tools to support small-medium projects, the Islamic (i.e., *Sharī'ah* compliant) bonds, known as *şukūk*, (sing. *şakk*) can be successfully used to finance bigger projects [53-59] [71]. In the international capital market, *şukūk* are indeed becoming as one of the main Islamic financial instruments used by Governments and private institutions to raise finance.

The Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) defines *şukūk* as “certificates of equal value representing undivided shares in the ownership of tangible assets, usufructs and services or (in the ownership of) the assets of particular projects or special investment activity”¹⁰. More in details, AAOIFI defines *sukuk* as “proportional undivided ownership right in tangible and intangible assets, monetary assets, usufructs, services, debts or a pool of these assets, or a business venture such as a *Mudārabah* or *Mushārakah*”.¹¹ The fundamental principle is that of a strict correspondence of a financial bond to its underlying material asset. Based on Islamic Profit and Loss Sharing principle (PLS), the main difference between *şukūk* and traditional bonds lies in the fact that *şukūk* grant investors a share of an asset instead of an ownership of debt. Additionally, *şukūk* are based on different Islamic contracts to generate obligations and mutual relations between issuers and investors. Depending on the underlying contract, *şukūk* can be classified as: *Ijarah şukūk* (leasing), *Mudārabah şukūk* (entrepreneurship), *Murābaha şukūk* (cost plus mark-up), *Salam şukūk* (sale with prepayment - *anticipato pretio* -, or late delivery), *Istisnā' şukūk* (manufacturing contract), *Musharakah şukūk* (partnership), *hybrid şukūk* (convertibles and tradeables). Regardless of the legal nature, *şukūk* are issued to finance *Sharī'ah* compliant projects by paying profits instead of *Sharī'ah* forbidden interests of loans [58], [60-62]. Parties involved in the process of issuance of *şukūk* are the Originator, who is the person/company who wishes to raise funds, the Special Purpose Vehicle (SPV) - namely the issuer of *şukūk* -, and the *şukūk* holders who hold ownership rights on the underlying asset and its cash flows. Issuing *şukūk*¹² is like a Western law securitization process, given (that) the *şukūk* structure relies on the creation of a SPV.

The latter is a separate legal entity with no part in the borrower's liabilities. The SPV issues *şukūk* certificates in consideration of certain goods underwritten by the investors. The Originator subsequently buys the required asset using the gains of the sale of the certificates. Moreover, the SPV protects the underlying assets from creditors if the originator faces financial problems.

¹⁰ AAOIFI Shari'a Standard No.17, p. 468

¹¹ AAOIFI IFSB-15 – Revised Capital Adequacy Standard for Institutions Offering Islamic Financial Services, p. 106,2013

The capital raised must be used for investments in specific assets rather than for undetermined purposes. The funds raised by the investors are later used by the SPV to buy assets from the originator who, in turn, uses the capital raised to finance *Shari'ah* compliance projects. In this way, the investors become pro-quota owners of the originator's goods, which can be the object of specific contracts made by the SPV (such as *Mudāraba*, *Musharakah*, *Ijarah* etc.). In the end, the originator can purchase the asset back from the Special Purpose Vehicle at its normal value and distributes the revenues to the *shukūk* holders [59] [63, 65]. Even though the global *shukūk* market is smaller than the bond one, it has been growing rapidly since the economic-financial crisis, and its future looks bright. Because of the specificities of the *shukūk* market, the private sector is becoming increasingly interested in the market, which is expected to preserve high levels of liquidity, which will continue to raise interest among financial institutions.

VI. GREEN *SHUKŪK*: SUSTAINABLE ETHICAL AND FINANCIAL INSTRUMENTS

The Islamic green finance market represents an opportunity for economic social and political integration, through which several roles, information and competencies come together. Anyway, under different contexts, both private and public actors contribute to fostering the promotion of Islamic green finance which can be a driver for the growth of green investment at the global level. [44-46]. To support green and sustainable projects, Islamic financial institutions have been issuing a particular kind of *Shari'ah* compliance bonds, called green *shukūk*. Green *shukūk* are Islamic green bonds which provide funds for sustainable projects and climate change solutions such as renewables energies sources, low carbon technologies and other environmental assets [66-71]. Therefore, eligible asset for these kinds of *shukūk* are identified by Climate Bond Standards Certification Scheme such as renewable energies, smart mobility and infrastructures, energy efficiency, light rail, electric vehicles etc. This scheme is used by investors, bond issuers and Governments at a global level to ensure that investments contribute to addressing climate change and developing *smart cities*. From a financial point of view, green *shukūk* are likewise traditional *shukūk* (expecting that the proceeds of green *shukūk* can only finance eco-friendly projects) and therefore the issuing process includes the same steps of the conventional one [61,65]. For the revenues to be admissible for sustainable projects, investors need to take into account that the mobilized capital will not finance activities forbidden by *Shari'a*. Hence, a better understanding of *Shari'a* objectives and rules is required to promote the diffusion of the green *shukūk*, and the development of the market.

As the following examples demonstrate, green *shukūk* provide not only economic benefits but also social and environmental ones while integrating the concept of social

Maslaha through sustainable financial instruments. By issuing green *shukūk*, investors have indeed the chance to combine financial aims with wider societal impact in their investment activity since their specific assets produce both financial returns and positively impact the environment (such as renewable energies and infrastructure projects, smart mobility projects, waste management resources and so on).

Moreover, green *shukūk*, in addition, to generating social wellbeing and economic returns, enable investors (the *shukūk* holders) to benefit from sustainable projects. Green *shukūk* can link indeed socially aware investors with companies that want to deliver social outcomes driven by an overall aim of improving social welfare as well as sustainable development which is perfectly in line with *Shari'a* main objectives. Hence, green *shukūk* raises awareness among different investors about how green and innovative projects – which are the basis of smart cities- can face current challenges such as climate resilient growth. For these reasons, green *shukūk* are becoming increasingly popular in the investment strategy of numerous Islamic countries and cutting-edge companies working in these fields. Thus, green *shukūk* allow the –increasing- development of the global *Shari'a* compliant capital market to raise fund for environmentally friendly projects with socially meaningful impact such as smart and sustainable cities.

According to Bashar Al Nator Malaysia, Indonesia, and the United Arab Emirates are one of the main drivers for *shukūk* issuance and are therefore the main countries most active in the market of green *shukūk*. Historically, the Tadau Energy Sdn Bhd, issued the first green *shukūk* in 2017 in cooperation with the World Bank and with the Central Bank of Malaysia. The underlying contract of this green *shukūk* were *isti sna' shukūk* and *Iğāra shukūk* issued to finance the construction of a 50MWac solar plant in Kudat Sabah, for a total amount of 250 million RM. Numerous issuers followed the footprints of Tadau and in the same year, the first green sovereign *shukūk*, (based on *iğāra shukūk*) was issued in Indonesia to finance eco-friendly and sustainable projects, for a total amount of approximately \$1, 25 billion. Thanks to new and sustainable economic development strategies, there is also a strong push for green *shukūk* in the United Arab Emirates, where the first Middle East green *shukūk* was issued by the National Bank of Abu Dhabi (now First Abu Dhabi Bank) in 2017. Moreover, in the United Arab Emirates, there are also numerous "Green" initiatives -which require significant investments- supported by sovereign funds and which could be the driver for the development of the Middle East Green Bond and Green *shukūk* market.¹³

¹³ Among these initiatives, "The Abu Dhabi Vision 2030", a long-term economic vision, developed by the government in consultation with the private sector, aims at reducing the emirate's oil dependency by achieving a 64 per cent contribution to GDP from non-oil sectors by 2030

The emerging market of green *ṣukūk* is a self-regulating market despite several guidelines and different principles such as the Green Bond Principles developed by the International Capital Market Association (ICMA). According to the latter, the Green Bond Principles “*are voluntary process guidelines that recommend transparency and disclosure and promote integrity in the development of the green bond market by clarifying the approach for issuance of a green bond. The GBP are intended for broad use by the market: they provide issuers guidance on the key components involved in launching a credible green bond; they aid investors by promoting availability of information necessary to evaluate the environmental impact of their green bond investments; and they assist underwriters by moving the market towards expected disclosures which will facilitate transactions*”¹⁴ However, these guidelines, concerning both the green bond issuance and the terms of insurance, might not be compatible with Islamic principles¹⁵. Additionally, the Islamic Development Bank is strongly committed to widely promote the development of green *ṣukūk*¹⁶. The Bank is mainly focusing on non-sovereign infrastructure projects to foster economic development, job creation, social inclusion and the transfer of skills and competencies to achieve sustainable growth in its member countries.

The use of green *ṣukūk* for the development of smart cities is doubly advantageous since, in addition to being financial instruments based on principles of transparency and social responsibility, green *ṣukūk* are a means to achieve a tangible, determined end, closely linked to the real economy such as sustainable projects. Over the last years, green *ṣukūk* have indeed become more popular for funding sustainable and eco-friendly projects including smart mobility, infrastructure projects, energy-efficient buildings, sustainable waste management, renewable energy projects and other projects aimed at mitigating the effects of climate change, which are fundamental for the development of the *smart cities*¹⁷. The

¹⁴ <https://www.icmagroup.org/sustainable-finance/the-principles-guidelines-and-handbooks/green-bond-principles-gbp/>, p.8

¹⁵ Indeed, according to Shari‘a, the insurance contract is unlawful, and it is regarded as unjustified enrichment based on the prohibition of *Ḡarar* (uncertainty) in financial transactions.

¹⁶ https://www.isdb.org/sites/default/files/media/documents/202101/Annual%20Impact%20Report%20on%20IsDB%20Debut%20Green%20Sukuk%20%28Dec%202020%29_0.pdf

¹⁷ After the Tadau Energy which issued the first green *ṣukūk* in 2017, Quantum Solar Park Malaysia has issued the world’s largest green *ṣukūk* (RM1 billion) to finance the biggest solar photovoltaic plant project in Southeast Asia which is located in Pendang. (The company partnered with the Norwegian Statec, CIMB, and Maybank). Concerning The Gulf Countries, even though Saudi Arabia is the largest issuer of *ṣukūk*, the GCC’s first green *ṣukūk* was issued by the National Bank of Abu Dhabi in 2017 and in 2019 by the UAE-based real estate developer Majid Al-Futtaim which raised \$600m to fund green buildings and energy efficiency projects. In the same year, the

reason why the issuance of green *ṣukūk* is gaining ground is that green *ṣukūk* have not only economic and environmental advantageous but also social ones. Indeed, as previously set out unlike the green bonds, the *ṣukūk* holder is the owner of some undivided share of underlying assets and therefore he/she will benefit from the management of the underlying assets. Thus, the eco-friendly project financed with these instruments contributes to both reducing the environmental impact and improve community life while increasing social wellbeing.

Therefore, green *ṣukūk* among all others financial instruments Shari‘a compliant, can play a crucial role in addressing threats faced by the environment and have the potential to promote the development of affordable, reliable, sustainable, and modern cities. Indeed, according to the literature, there are numerous eco-friendly projects that have been financed with green *ṣukūk* (such as photovoltaic systems, electric vehicles, waste management systems, etc.), as in the Gulf countries or in Malaysia and Indonesia. What is missing, however, is an overall vision of the *smart cities* from a financial perspective. Exploiting the peculiarities of the Islamic financial system, and in particular the green *ṣukūk* could therefore be the keystone for the development of these new urban realities not only in Islamic countries but throughout the world. Green *ṣukūk* have indeed the potential to attract a wider pool of investors, both green and Shari‘a compliant ones (both conventional and Islamic ones) since there are notable shared values and aims between green and Islamic finance in terms of advocating certain principles such as ethical and moral ones.

Therefore, for conventional (green) investors green *ṣukūk* are a viable financial alternative able to meet their goals for green investments and could result in bringing in more investors from western countries with sustainable investment mandates into *ṣukūk* markets. Moreover, Green investors are particularly interested in issuing green *ṣukūk* for two main reasons: The first one lies in the fact that green *ṣukūk* provide investors that their money are used to finance green and sustainable projects, and the second one is that there are many greener financial tools on the equity side of the capital market instead of on the fixed income side. Additionally, since *ṣukūk* are similar to a conventional fixed income security, these financial instruments can bridge the fixed income supply gap for green investors because money are reserved for specific green purpose.

The development of smart cities requires significant investments and that is the reason why the public sector has traditionally provided sustainable funds for urban planning.

Saudi-based Islamic Development Bank issued its first green €1 billion *ṣukūk* to finance climate change, renewable energies, and sustainable projects across its 57 member countries, as an instance for the potential of financial institutions in promoting sustainable finance.

Indeed, private investors have only recently started to invest in green projects since an inadequate risk-return profile was one of the major hurdles to attracting private investors for infrastructure projects. Since sustainable urban infrastructure projects of smart cities have a cost premium and carry more risks than conventional projects, there was the need to overcome this and other hurdles to develop financially viable, smart and sustainable projects in cities. In light of this, Islamic finance, through innovative financial tools such as green *shukūk* helped to overcome these barriers (e.g., the risk-reward profiles of sustainable investments). Using green *shukūk* to implement smart cities projects can mitigate initial costs and project risks by balancing the real or perceived risk of investments with a limited commercial track record but strong sustainable development impact and effects. Therefore, financing sustainable projects -such as sustainable infrastructure projects- with Islamic green *shukūk*, has the potential to raise money from both public and private investors while ensuring climate-smart design standards. In addition, as stated above, with green *shukūk*, investors do not have to opt between financial returns and environmental benefits and can be issued to finance sustainable projects by various investors including municipalities, banks, companies and any other private investors.

Therefore, given the social ethical principle and emphasis on risk sharing and asset-backed financing, green *shukūk* can play a crucial role in financing smart, green and innovative projects and enhancing public and private collaboration for juster, low-carbon and sustainable cities. Nonetheless, to ensure continuous progress in this field, steady innovations and new ways of thinking are needed. For example, one such innovation is to use crowdfunding as one of the fundraising options for green *shukūk* by allowing investors to finance innovative and sustainable projects alternatively. These projects such as solar park, renewable energies projects, sustainable infrastructure etc. have good participation rates and excellent prospects for long-term development indeed. Lastly, the establishment of a comprehensive legal framework, joined with financial technology revolution such as crowdfunding etc, can be a catalyst in promoting the overall growth of the green *shukūk* market.

As stated above, Islamic finance can play a crucial role in supporting economic and social development indeed. However, the Islamic Development Bank has to spread the knowledge of these instruments while exploring relevant policy, legal and regulatory framework as well as institutional interventions needed to promote Islamic green finance. In doing so, the implementation of *Shari'a* standards and rules to simplify the creation of a more stable, efficient, and international financial system is paramount of importance. On top of this, the current global pandemic not only has significant health effects but also socio-economic ones. Nevertheless, the COVID-19 pandemic is heightening public awareness of sustainability issues with a growing global recognition that low carbon economy, sustainable development, innovative and (sustainable) financial

instruments as well as *smart cities*, is the only way forward. Hence, COVID-19 is leading to global awareness of the importance of a greener future based on the efficient and effective exploitation of resources since there is no room to develop unsustainable projects. In such a context, the dissemination of the knowledge of the Islamic financial instruments (particularly the green ones such as green *shukūk*) can be crucial and inevitable for achieving this objective worldwide.

VII. CONCLUSION

When technological innovation, policy makers, and citizens come together to improve the quality of life by creating an efficient shared information network, with a long-term strategic vision, that is when cities truly become smart and sustainable. Achieving this goal presents complex and significant challenges which concern not only an ever smarter, greener, and sustainable world view, but also the strategic choice of ethical and sustainable financial modes. Building sustainable and resilient cities, requires indeed significant investments, most of which take place at national as well as at subnational level and managed by local authorities. Both public and private investments are therefore needed to make cities smart, sustainable, inclusive and climate resilient. However, access to finance represents one of the main hurdles to implementing an efficient smart city strategy, and policymakers need, therefore, to develop original strategies to differentiate funding as well as strengthen citizens' access to finance and involve them in decision-making processes (as agents of change).

In this context, the Islamic financial system based on moral and ethical objectives (*Maqasid al-Shari'a*) can play a crucial role in promoting social equilibrium, innovation, and sustainable economic growth which is the very basis of the concept of *smart cities*. Islamic finance provides indeed sustainable financial instruments known as green *shukūk* capable of reducing environmental impact by allocating funds to eco-friendly projects (e.g., renewable energies, electric vehicles, smart mobility) while increasing social wellbeing. Moreover, financing eco-friendly projects by issuing green *shukūk* can mitigate initial costs and project risks by balancing the real or perceived risk of investments with a limited commercial track record but strong sustainable development impacts and effects. Therefore, given the social ethical principle and emphasis on risk sharing and asset-backed financing, green *shukūk* can be the keystone for enhancing public and private collaboration and for creating more just, low carbon, and sustainable cities throughout the world. However, if on one side Islamic financial instruments – first of all, the green *shukūk* – represent an alternative to conventional tools in achieving SDGs, on the other side the bigger problem is related to the lack of a global, comprehensive vision of the cities which includes economic, social and environmental issues.

In terms of policy implications, this requires new policy practices based on smart and inclusive decision-making processes which promote the development of innovative and sustainable financing strategies. Policymakers should therefore diversify the financing mix by fostering sustainable and ethical financial instruments and eventually moving away from financing tools that do not promote the transformative vision of the 2030 Agenda.

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