ISSN 2409-2665
Journal of Logistics, Informatics and Service Science
Vol. 12 (2025) No. 1, pp. 284-306
DOI:10.33168/JLISS.2025.0115

Encouraging Sustainable Behavior in Urban Tourism through a Localized Gamified Digital Currency Model

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Abstract. After a growing concern for the environment, those involved in the environmental movement began to produce ecologically friendly products. Therefore, the article explores the possibility of creating a hybrid digital currency PCoin through eco-design. This approach is used to implement a more efficient and environmentally friendly way of handling transactions. This tool attracts many tourists to the Porto Velho region. Additionally, it is an effective environmental and tourism tool that benefits businesses and consumers. It offers the following benefits: Cost reductions, reductions in costs associated with services, product and technology innovations, better service quality, and competitive advantages.

Keywords: Ecodesign, Sustainable economic, Urban development, digital currency, Pcoin, Social Innovation, gamification.

1. Introduction

The city of Porto Velho has a wide variety of natural tourist attractions, however, despite its potential, not all places are open to visitors or organized through tourist routes.Therefore, pPromoting social innovation requires finding new solutions to problematic situations, working together with those affected to develop new skills and create social structures. To meet their needs and preferences, tourists need a wide range of services, from those using transport, such as planes and boats, to public services, such as tourism administration. In addition to those who use hotels and other accommodation options that offer receptive services, such as entertainment and food to tourists.Lage and Milone (2000) state that tourist demand can be understood as the number of items desired by tourists. Likewise, Lemos (1999) states that consumer demand corresponds to the quantity of goods and services that a person is willing to acquire for a given price, location and quality. Knowledge sharing is critical for organizations to achieve strategic success, provide continuous innovation, and contribute to organizational learning. In a managed environment, knowledge gained from projects can be reused, so knowledge sharing promotes collective action learning and avoids problems related to costs and repeated errors.

Research activities are conducted to discover and build new knowledge. The data collection sources used to develop the study were selected according to the specific objectives of the work and the methods used to achieve those objectives.

The study as a whole is not limited to the results presented in it, and given the limitations of current research, make some suggestions for future research based on the results obtained so far. Cooper (2001) study depicts the tourist demand for the existence of tourist supply, considering the change in the prices of goods and services offered in a given period. In the field of applied social sciences, researchers can create an agenda of arguments on sensitive issues, such as intercurrent attitudinal measures in urban environmental exploration. This relationship is very complex because the growth of cities, overpopulation, intense search for space and excessive coexistence are just some of the reasons that point to the need for environmental protection and quality of life (Dolnicar,2020). The search for green urban space can be a measure to promote aesthetics, leisure and entertainment. When environmental issues are well institutionalised, they allow for better behavioural control for the masses interested in tourism and hospitality in sensitive environments like those of the Amazon (Sun et. al., 20220. The notion of eco-friendly behavior covers environmentally friendly actions that are sustainable like recycling and reducing energy usage. These actions can be encouraged through the use of digital incentives in the form of digitally offered rewards or benefits (Náñez Alonso et al., 2021). The collaborative and interactive nature of behavioral modeling becomes relevant in multidisciplinary studies where definitions of digital technology used in tourism management are applied, as discussed in this paper. Thus, there is another incentive through the proposal of digital currency, which serves to encourage tourists, entrepreneurs, local government and host residents (Fazito et.al., 2016). The rise of e-commerce has led to an increased demand for digital transactions (Agur et al., 2021). The emergence of blockchain technology has enabled the creation of digital payment methods, such as cryptocurrencies (Filimonau and Naumova, 2020), which has contributed to the growing popularity of Digital Currency. It is essentially a digital form of currency issued by a central bank (Bijlsma et al., 2021). In simpler terms, it is like a digital banknote that can be used to purchase goods and services, including those in the hospitality and tourism industry (Náñez Alonso et al., 2021).

Currently, there is a significant amount of marketing material focused on Digital Currencies.

A new lifestyle presents a challenge of socio-environmental, economic, environmental and institutional issues; and to address these issues, urban spaces have been imagined by the bourgeoisie as open spaces that allow less stressful routines and more leisure. This notion is necessary because urban agglomerations have become problematic, bringing together individuals subjected to hard work, lack of leisure, associated with social and environmental pressures, frustration in achieving human excellence, and the desire to optimize the relationship between individuals and their living space (Scheyvens et.al., 2021).

The trend of today is to provide quality of life to the inhabitants of urban agglomerations, allowing them to satisfy their basic needs while protecting them from risks such as pollution and stress wear, by designing shelters that promote community and social life in everyday life. These issues have physical, cultural, economic, and social dimensions that require optimal adaptations (Sapuan, 2021).

Therefore, the following question arises: how would a digital currency help shape the attitudes of those working in tourism and hospitality? The study aims to address several gaps in the existing literature related to urban environmental exploration, tourism, and hospitality. It seeks to investigate the attitudes and behaviors of residents living in environmentally sensitive areas, such as the Amazon, towards tourism and hospitality activities. The study also develops a system and control mechanism to manage social innovation in support of tourism in fragile environments. It further proposes an intervention using a digital currency system to enhance the interaction between visitors, hosts, and the environment in the tourism industry.The observed problems are crucial for the sustainable progress of tourism and hospitality, especially in environmentally sensitive areas, and the possible influence of digital currencies on behaviour and attitude development in these sectors.

The task entails developing management strategies that emphasize the proactive behaviour of tourism and hospitality, focusing on logical and believable values to support solutions that enhance the socio-technical coexistence governed by a cybernetic system. One innovative way to approach this is by using digital or cryptocurrency for tourism transactions, which could be an initial step in developing an eco-friendly and sustainable approach to tourism. In context of promoting sustainability, The notion of eco-friendly behavior, Gamification involves stakeholders participating in designing processes, guaranteeing that incentive plans as well as gamified experiences will be effective and appealing. These concepts constitute an all-inclusive approach towards green behavior promotion and sustainability using digital tools and user participation for a meaningful transition.

2. Literature Review

2.1.Concepts about social reality, behavior and sustainability.

The focus on social vulnerability lies in the ability of individuals to exploit it; for example, my study in Marques Leão et al. (2014) shows that urban dwellers exposed to deteriorating socioeconomic and social conditions are much more exposed to risks resulting from negative socio environmental impacts. The consequences for these vulnerable people are precarious health as they are exposed to debris, fungi, and pollutants. There is global concern about climate change, which also affects the built environment, including visual and acoustic pollution and congestion of systems in general (Chang et al., 2021). The growing number of people living in cities makes them more susceptible to the effects of natural disasters and climate change. Research has shown that urban areas around the world are facing increased exposure to natural hazards and stresses caused by climate change (Williams et al., 2019; Zeng et al., 2022; Kyprianou et al., 2022). These can have a negative impact on the health and well-being of residents. While natural disasters like floods, earthquakes, and storms can cause significant damage to urban areas, factors such as inadequate housing, unemployment, and limited access to essential services can also contribute to their vulnerability.

Herbert Alexander Simon's behavioral theory of management (Simon's, 1947) reconciles various concepts of decision making with organizational structure within rational boundaries. Simon's theory highlights the significance of acknowledging that decision makers exhibit bounded rationality, which refers to making decisions with constraints on knowledge and cognitive capacities. The theory informs our approach by recognizing that stakeholders in the tourism and hospitality sector, such as tourists, entrepreneurs, local governments, and residents, may not consistently make rational decisions regarding the adoption of new systems or technologies, like a digital currency system (Bhandari 2020).

Simon's theory aids in comprehending how human needs and behaviours influence stakeholders'

reactions to the digital currency system in our study. Stakeholders may have varying demands, motivations (Koumakhov, R., & Daoud, A. 2021), and decision-making processes that impact their attitudes toward the digital currency system. Tourists may prioritize convenience and cost savings, while local residents may prioritize protecting their way of life and the environment.

The Theory of Planned Behavior (TPB) is a development of the Theory of Reasoned Action (TAR), which holds that behavior is a function of intention conditioned by attitudes associated with particular behaviors and subjective norms, as discussed by Fishbein and Ajzen (1975). Actor Network Theory (ANT) is based on the rational use of information available to individuals during their behavioral decision-making process and argues for the mediation and relationship between attitudes, subjective norms, and behaviors. During the course of research on behavioral intentions, it was noted that ANT is limited to determining people's will without considering the resources they use to implement that will. The theories guide the research in exploring the stakeholders' behaviours about the proposed digital currency system. It views attitudes, subjective norms, and perceived behavioural control as crucial factors influencing behaviour. It helps explain the factors influencing stakeholders' willingness to accept the digital currency system, based on their beliefs and perceptions. ANT focuses on the relationships and networks that influence behaviour. Which aids our to study examine the connections among stakeholders and the digital currency system, exploring how different actors impact each other's choices and behaviours. However, Ajzen (1991) introduced the TCP, which focuses on behavioral control and aims to measure the intensity of the individual's belief and the possibility of adopting a particular behavior; then, this measurement of the belief of factors that may facilitate or hinder the execution of the behavior.

We can find that an individual's attitude is determined by his feelings about the execution of a behavior for Fishbein (1975), on the other hand, attitude is a function of beliefs and behavioral evaluations. That is, a person's attitude is based on his beliefs and his evaluation of the consequences of his behavior. For Fishbein (1975), attitude is a function of beliefs and behavioral evaluations. That is, a person's attitude is based on his or her beliefs and his or her evaluation of the consequences of his or her behavior. For Fishbein (1975), attitude is a function of beliefs and behavioral evaluations. This means that a person's attitude is based on his or her beliefs and his or her evaluation of the consequences of his or her behavior. According to Silva's (2015) bibliography, sustainability is seen as a means to balance social, economic, environmental, geographic, and cultural dimensions. Author Silva (2015) should focus on mitigating the impact of economic, social and environmental factors on the lives of residents when analyzing the indicators of the Brazilian Institute of Geography and Statistics. As recently observed in Cork, Ireland, residents can participate in accommodating visitors through these platforms, similar to B&Bs. They can be considered for the tourism and hospitality theme.

2.2.Definition of social control system, management of social innovation and on tourism and hospitality.

Success in the tourism sector is greatly enhanced by the host resident possessing a natural inclination for welcoming and hospitality. Isolated communities exhibit shyness towards visitors, hindering communication between travellers and residents. This necessitates social innovation to promote progress and sustainability. The topic discusses key concepts for interventions aimed at adapting to an environment like the Amazon, including social control systems, social innovation management, and tourism and hospitality, as outlined in a research by Kunzler (2004). The argument focuses on suggestions for social change that are supported by those who seek the success of a forward-thinking and flexible community. Social innovation is considered an important tool for social development in academic, governmental, and entrepreneurial fields. According to Benevides (2017), with social innovation it is possible to solve problems in a sustainable way to meet social needs, further promote income, and facilitate access to goods and services. Social innovations are ideas, practices,

approaches, and interventions that are innovative or can be adapted to be turned into services or products to solve problems. There is no doubt that a well-structured tourism industry requires social innovations that qualify the social relationships of stakeholders.

Valduga (2022) describes hospitality as an interplay of human relationships, behaviors, strategies, and techniques that promote cultural and knowledge exchange. It is important to point out that local people and governments are responsible for tourism practices and activity-rich itineraries. Therefore, it is necessary to develop or create a local tourism system that meets the needs of tourism by ensuring that the knowledge content serves as life experiences and promotes the tourist's reflection to add aspects that correspond to the tourist's personality, in addition to offering a unique activity. Currently, technology-enabled interventions in tourism and hospitality enable better management of the sector's public affairs in terms of quality of life, leisure and entertainment. Therefore, a platform that facilitates these activities can benefit from the suggestions of customers who use the services offered by a well-structured tourism and hospitality network. It would be conceptually appropriate to include a strategy in the actions, especially those aimed at raising travelers' awareness of their relationship with the environment through ethical behavior guided by the principles of conservation and preservation.

2.3.Concepts about the digital currency system and the tourist industry.

Environmental services provided in activities such as tourism and hospitality are affected by the industrial scenario in sensitive spaces such as the Amazon. And the creation of digital currency can be a logical argument for the social control of those who exploit the environment. Behold, I study in Yael et al. (2008), points out that we consider ways to encourage “green urban behavior”, which means pro-ecological and pro-social behavior that manifests itself positively, that benefits other people motivated by empathy, moral values and responsibility, rather than a desire for personal gain. The involvement of residents in the process of designing a learning environment, especially one based on the development of Information and Communication Technologies (ICT), it is a crucial component of the process aimed at its efficient implementation in real-life conditions. Participatory design actively involves stakeholders in the design process to ensure the outcome meets their needs and is beneficial. Mitchell et al. (2016). The PortoCity Coin cybernetic system, which can become an educational tool to strengthen the process of implementing adaptive urban policies adapted to the needs of its residents.

Digital currency is a cryptographic system designed using cybernetic principles that can be used to provide incentives for ecological behaviour, leading to the exchange of a social currency. This digital social money can be exchanged using a smartphone equipped with a dedicated application. Miranda (2008) defines the economy as a set of activities involved in producing and distributing wealth. These activities are interconnected and serve as a way to achieve various societal, political, and cultural outcomes. Singer (2004) considers social currency as a tool for solidarity economic analysis. It is a parallel currency to the official one, established and controlled by the community to enhance local economic cohesion. Singer (2004) suggests that this strategy establishes an economy that caters to a population not served by traditional financial institutions, promoting local economic integration to fulfill the project's unique goals.

When dealing with collaborative design, it is necessary to keep in mind the scenario in which it emerged (Coutinho, 2010). Currently, there is a significant amount of marketing material focused on Digital Currency, which enhances the visibility of digital payments in today's society (Dupuis et al., 2021). There numerous nations are actively engaging in negotiations to implement Digital Currencies, with many of them having already conducted test runs for digital currency payment integration (Maharjan et al., 2020). Their research focused on the advancement of Digital Currencies, financial confidentiality, and privacy in nations like Brazil, Bahamas, China, Combodia, and Thailand, which have concrete strategies for implementing digital currencies(Maniff and Wong, 2020). That will definitely enhance visibility and testability. The innovation qualities would stimulate the requirements

of DC payment and encourage external factors, which initiate the consumer acceptance process (Bijlsma et al. 2021). The present study focusses on the collaborative design appears as an alternative approach to make the design method more humanized, as well as to value even more the interactions during the process of addressing the research gaps in respect to digital technology contributing towards sustainable tourism.

2.4.Digital technology and sustainability

Virtual currency and their transactions are stored on a blockchain system (Yano, 2020). The emergence of digitization and digital technologies has led to significant changes in our lifestyles, work environments, and modes of transportation. The internet has facilitated easier access to tourism information by allowing users to enter keywords into a search engine, generating numerous options based on their search terms. It has led to the development of a new ecosystem of services and providers in digital tourism. (Almeida-Santana et al., 2020; Camilleri, 2018). Digitalization transforms manual operations and processes into a format that can be interpreted by machines, computers, and smart systems. The process generates data that is then processed into information for utilization by stakeholders and policymakers within the system (OECD, 2020).

Digitalization has paved the way for sustainable business practices in the tourism industry by development of sustainable products, services and innovations such as fully digitalized business processes, online or app based travel sales, service promotion campaigns etc (Gochhait et al., 2014). Which rely more on digitally produced documents such as images, pdf files, NFT tickets etc making it more sustainable thanks to the huge volumes of paper that is saved because of these innovations and is becoming more convenient for the customers as a QR Code or a barcode is all one needs to get into the flight, thereby creating a smaller carbon footprint (Paliwal et al., 2023) (Elkhwesky, El Manzani & Elbayoumi Salem, 2022). The innovation is creating new paradigms in the way destinations are marketed leading to the development of more digital and sustainable strategies, tactics and plans of action for tourism and ancilliary activities. (BBC, 2020). According to a report by the World Economic Fourm, digitalization has resulted in an increase up to 300 + billion USD in the global tourism industry due to increased profitability thanks to the sustainable and innovative tourism business marketing, process and service decisions (Kalia et.al., 2022).

The paper is based on the foundations of virtual currencies by (Yano ,2020). Virtual currencies or cryptocurrencies are blockchain based lines of code, which are generally accepted as stores of monetary or economic value. However, they may or may not be backed or guaranteed by the Sovereign power of the State, as is seen in case of paper money (fiat money) or metal coins. The cost of manufacturing of crypto currency is measured in computing power, electricity usage etc and is more eco-friendly in the long run, than printing or minting of fiat money and coins which use huge volumes of paper, cotton fibers, polymers and metallic alloys (Leopold & Englesson ,2017). Being that the focus of this paper is on sustainable tourism and green behaviour models, usage of virtual currency is more congruent for this than physical money. In the United States, it is possible to buy electronic products, games and clothing with digital currencies. Some companies even paid freelancers in cryptocurrencies, and others sold used cars and computers for these currencies.The digital currencies are any type of money that is exchanged electronically. When you pay with a credit card or digital wallet, you are using a digital currency. Cryptocurrencies differ from normal digital currencies in their key characteristics: security, privacy, value, decentralisation and safety(Yano ,2020.) Statistical data has revealed a growth of 3.5% in international tourist arrival numbers increasing the difference from 1.408 Billion to 1.458 Billion between the years 2018 – 19. (Unwto, 2020). The data revealed that the online travel booking platform industry grew up to 200+ billion USD thanks to technological changes brought by the movement restrictions due to the pandemic (Technavio, 2020). There is reason to believe that these numbers will continue to grow with the advent of more sustainable, digital technological innovations in tourism

making the trips more eco friendly for the customers and the companies in general.

2.5.Digital currency as a sustainable alternative to physical money and its role in greenifying tourism

Usage of technology in tourism is rising today as applications for digitization are being discovered and innnovated for and in various tourism use case applications. Of late, digital currency is becoming more popular due to its being more convenient as a storage of value than flat money (Elendner, 2018). For example usage of digital currencies (cryptographic coins such as bitcoins) and payment solution gateways such as PayPal, PhonePe, Paytm etc. Are becoming popular as an alternative to physical money and it could be stated that they are more greener and sustainable than physical currencies, when we compare the printing and distribution costs. (Panagariya, 2022).

Digital currency is more sustainable and greener in the long run as its production cost involves computing power and electricity in majority than various physical raw materials and ancilliary products used in minting/printing of coins and paper money (Truby, 2018). Speaking about the actual statistics, the Bureau of Engraving and Printing of the United States of America prints 38 million individual currency note pieces from its printing presses in Washington and Texas with a total face value of 500+ million USD. The production cost per day is equivalently large, with electricity cost alone as an example, coming up to 536 Mega Watt Hours on a daily basis (Ahlers et.al. 2010).

Whereas 1 Bitcoin requires 1449 kwh of electricity to make it, which in the USA will cost around USD 270 (per kwh price of 0.180). (3), (4). Also, Bitcoins can be traded in proportionate values such as 0.1 Bitcoin, 0.0001 Bitcoin etc. and circulated like regular currency making it more sustainable in the long run as the actual cost of mining bitcoin is more revolving around the physical infrastructure such as the mining GPU, electric power supply and other related ancilliaries whose ecological footprint is much lesser than the footprint left by the entire infrastructure involved in the production, distribution and management of physical money and the cost can reduce even further with developments in green electricity production, supply and storage technologies (Krause & Tolaymat, 2018).

The development of digital currency has acted as a boon for sustainable tourism as customers need not carry physical cash in their pockets, as everything is in their payment app wallets in their phones, making it more convenient and safe to make transactions in a more sure way as the money is sent directly to the service provider without any hassle and it eliminates the risk of misuse or theft of credit cards which is often seen in developed countries and can act as a way for making tourism more greener and sustainable in the long run.(Hunter et. al.,1995).

2.6.Sustainable economic design in tourism

Sustainable design is a method that involves taking into account the environmental, social, and economic impacts across the whole life cycle of a product or service. The ultimate goal of sustainable design is to efficiently utilize resources without causing harm to the environment. This concept is gaining significant attention in both developed and developing countries as people are increasingly recognizing their role in living more environmentally friendly and sustainable lives. The challenge is finding a balance between economic and ecological considerations. What benefits the environment may not align with financial interests, leading consumers to struggle with choosing between expensive eco-friendly products and inexpensive non-eco-friendly alternatives. Producers are the only ones who can fix this issue by implementing sustainable and green production processes and utilizing eco-friendly raw materials to offer economic ecological alternatives. (Sørensen et al., 2021). Industrial activity in vulnerable regions like the Amazon impact environmental services, including tourism and hospitality. Creating a digital currency could serve as a rational method for exerting social control over individuals

who harm the environment. Jansen-Verbeke's (1995) study emphasizes the importance of promoting "green urban behaviour," which involves pro-ecological and pro-social actions driven by empathy, moral values, and responsibility rather than personal gain.

Tourism, is an industry that has a direct impact on the environment. Therefore, to be held more accountable at the local, national and international scales, a sense and semblance of sustainable and development of green business mindset has to be created. Existing research reveals that more efforts are needed to transform this into reality as sustainability is a complex context which needs to be simplified in order to be understood by the masses in order to become economical (Bendell & Font, 2004). In order to develop a design model in greener, more sustainable tourism, four factors have to be considered – 1) Inclusion of holistic planning in development of strategy. 2) Identification of essential ecological processes and development of touristy ways around them. 3) Promotion of the need for protection of biodiversity and the natural heritage and 4) Development of long term plans and tactics for sustainable tourism practices. (WCED, 1987.) Digital currency plays a role here as it is more sustainable in the long run and can be used to enhance the quality of the green models developed using these factors. It is to be noted that planners, policy makers and stakeholders need to consider economical, social, cultural, political and social factors in these models so that an approach can be identified that can provide eco-friendly tourism in an economical way (Lu, Sarmento, 2017).

2.7.Green Behaviour Model in tourism

Improvements in technologies have made the world a smaller place, as one can travel to various countries within a week or two, something that was unheard before. However, the rise in technology is causing a bad effect on the environment, the concern which is being felt across many countries, particularly the ecologically sensitive ones in the world. To be green, one must develop a sense of balance between the objects, products and services one uses and the environment (MacInnes et.al., 2022). Talking about tourism, majority of the places associated with tourism are natural locations such as forests, mountain passes, countryside locations, jungles, etc. It has been observed, particularly in case of developing counries that tourists who visit such locations often leave trash – plastic bottles, bags, debris, etc. behind and many times break branches off trees, write or inscribe names on tree trunks etc. (Mkono, 2020).

In order to develop green or sustainable tourism, such behaviour will have to be reduced and eliminated in the long run and can be done by changing the attitudes or perception people have towards the environment in general, in order to transform it from ‘Meh. Why bother picking it up?’ to ‘Let us do our part to keep the environment clean’ when it comes to deciding what to do with the trash one might generate, while on a tourist trip. This change of attitude is the key to the development of a sustainable or a green behaviour model (Leslie, 2012). Digital currency also plays a role here as using digital currency, tourists need not carry cash (currency notes, coins, etc.) as their smartphones can function as a wallet, enabling them to pay for the services or products they may use. This can reduce their ecological footprint. However, being that physical currency is more popular, extra efforts are needed for convincing the tourists to use digital currency to play their part in becoming more greener and might be dependent on the level of digitization and the trust in the systems of digital curency, crypto currency and payment gateways of the countries (Treiblmaier, 2021).

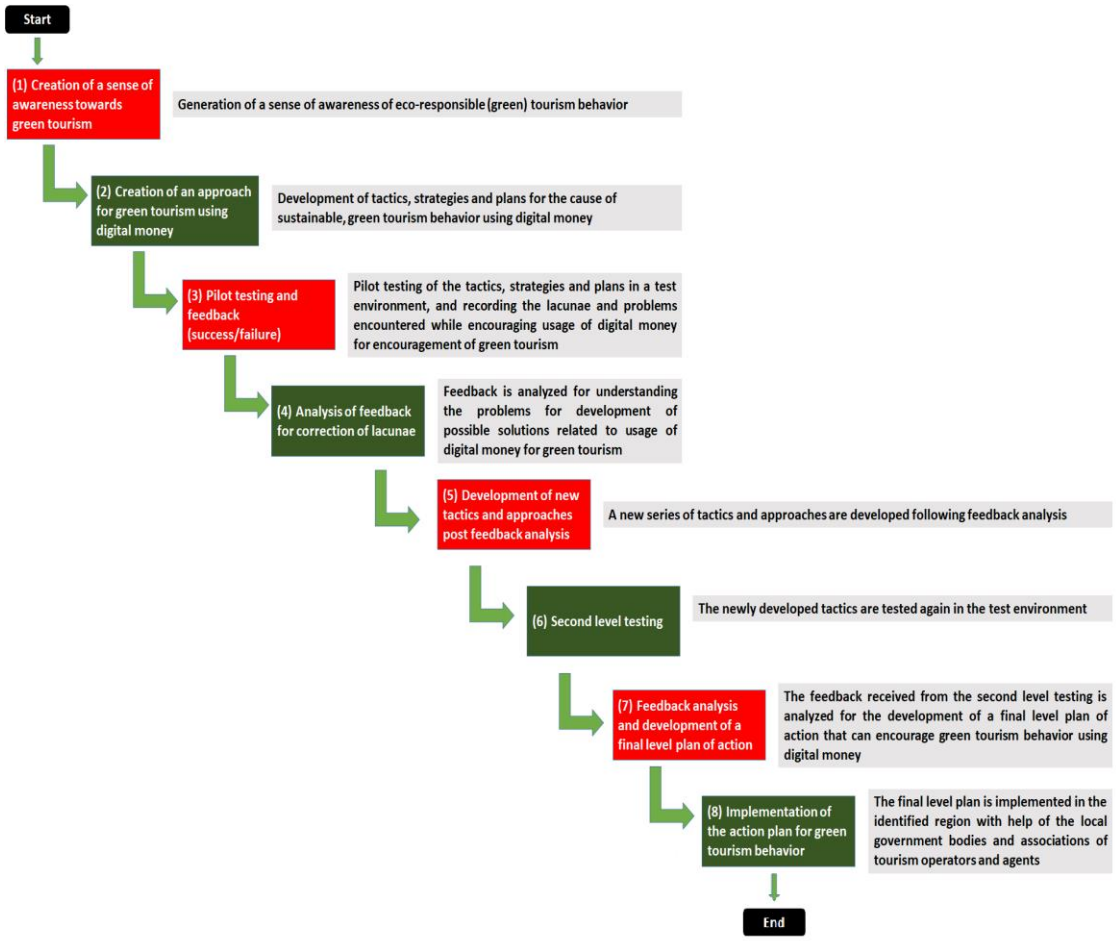

Fig.1: Green tourism behaviour model using digital currency

The model presented here presents a usecase for digital currency/ crypto currency for tourism purpose and can be experimented in a test region by the researchers

The work is based on the behavioral theory of management by Simon (1947), the theory of planned behavior by Ajzen and Fishbein (1975), the definitions of gamification processes by Mora et al. (2017) and Van Houndt et al. (2020), and the fundamentals of virtual currencies by Yano (2020).

This study also includes a contribution on the concepts of gamification designers using existing structural methods for specific purposes. Mora et al. (2017) mention that these gamified designs are configured by elements of operational games that target specific points. Their approaches allow for minimizing undesirable outcomes from the project's conception by focusing on indifference, motivational, behavioral, logical, temporal, and other incentives. Long-term gamification is sustainable; gamification enables people to change their behavior. They are balanced by incentives, challenges, contests, progressions, and feedbacks. These are mechanical formulations that are typical of games and can even be used for advertising, as mechanics in games can increase users' motivation to complete tasks with a predictable outcome, as demonstrated in studies by Van Houdt et al. (2020), whose literature showed sustainability phenomena consistent with a reduction in energy consumption per gamified application.

It is valuable to assess how gamification influences sustainable behaviours by considering individuals' awareness of enhancing the development of eco-feedback tools with a beneficial impact (Shahzad et al., 2023). Multiple research have demonstrated that these tools convert individuals'

intentions into enduring actions (Huang et al., 2023; Chen et al., 2023). Alter your daily habits. Research on gamification in promoting sustainable behaviour demonstrates favourable outcomes. Research in this field has concentrated on distinct human behaviours, such as energy consumption or eating (Di Paolo & Pizziol: 2023). In order to achieve lasting behaviour modification, an application must motivate individuals to make comprehensive changes. Yano (2020) asserts that virtual currencies and their transactions are documented in a blockchain. Nevertheless, there exist alternative digital currencies to Bitcoin, collectively known as cryptocurrencies for the sake of this conversation. In the United States, electronic gadgets, games, and clothes can be purchased with digital currencies. Some organizations compensated freelancers with cryptocurrencies, while others exchanged used automobiles and computers for these digital currencies.Yano (2020) defines digital currencies as any form of currency that is electronically exchanged. Yano stated that when you make a payment using a credit card or digital wallet, you are utilizing digital currency. Cryptocurrencies distinguish themselves from traditional digital currencies based on their fundamental features: Security, privacy, value, decentralization, and safety.

3. Methodology

The study uses qualitative and quantitative research design; it establishes references that help explain aspects of reality through understanding, description, and explanation, according to Siqueira (2009). By working with meanings, motivations, aspirations, beliefs, values, and attitudes, qualitative research addresses aspects of reality that cannot be quantified. Quantitative research, on the other hand, seeks to determine the exact composition of the target group through mathematical analysis. Therefore, the two surveys work together to obtain more information and produce better results. This study focuses on research conducted in the western Brazilian Amazon. This subregion consists of the states of Amazonas, Acre, Rondônia, and Roraima, where, despite the freely available potential of natural resources, there are stresses in the form of social, environmental, and other vulnerabilities. This study focuses on Porto Velho, the third largest city in the Northern Brazil region. According to estimates by the Brazilian Institute of Geography and Statistics (IBGE, 2020), Porto Velho has 548,952 inhabitants.

In order to collect valid terms and definitions, research was carried out on specialized websites that allowed a breakdown of the corpus consisting of filters for the texts, which are then categorized, thus guiding the treatment of the focal points resulting from the different approaches to the task; the understanding of the assumptions applied to this document has matured through these procedures. By following the conceptual structure used in developing measures for collecting and processing research data, fluent reading was practiced as part of the defined method. In order to elaborate on this work, a search was conducted in articles selected based on the task, accessed from the public domain books and articles, and followed GIL's (1999) recommendations. Research on platforms such as Portal de Periódicos CAPES, Scientific Electronic Library Online (SCIELO) and other specific databases.

Regarding the application of the Respondent Consultation Form

In developing the questionnaire, we were guided by theoretical frameworks such as the Theory of Planned Behavior (TPB) and Actor Network Theory (ANT), as they are relevant to understanding behaviors and attitudes. The TPB and ANT sensitised study has thus helped to criticise the proposed generality of the Unified Theory of Technology Acceptance and Use (UTAUT) as a technology acceptance model, as influences such as power dynamics, personal characteristics, lack of time, technical limitations and breakdowns are absent from the UTAUT (Tomic et al., 2023). Previous studies on similar topics were reviewed to identify relevant concepts and constructs to be included in the questionnaire. The aim of the questionnaire was to determine the respondents' level of knowledge of the concepts. It is named and corresponds to the ethical protocol of free and informed consent. It contains eight statements that are presented to the respondents. They are asked to indicate their

perception on a Likert scale from 1 to 5 for each of these claims. According to Júnior (2014), the Likert scale measures agreement on a scale of 1 to 5, which determines whether the respondent fully or partially disagrees, fully or partially agrees or is indifferent to certain claims related to topics of interest to the interviewer. The validity and reliability of the questionnaire was ensured by having the questionnaire reviewed by tourism experts. Their feedback was taken into account to ensure that the questionnaire correctly captured the constructs of interest.

The questionnaire was made available via Google Forms so that interested persons can access it via the link provided. The data collected through this link was processed using the Excel software, which graphically represents an attitudinal trend, and then a critical analysis of the responses received is carried out.

In this study, the random sampling strategy was used, where participants were selected based on their availability and willingness to participate (Johnson & Christensen, 2014). This strategy was chosen due to its practicality and accessibility. Despite the limitations of convenience sampling in terms of generalizability, efforts were made to ensure diversity in the sample by targeting individuals from different demographic backgrounds and geographic regions (Bornstein et al. 2017). After collecting the data, an analysis was carried out based on the elaboration of a radar chart in which the different opinions of agreement or disagreement with the claims presented in the form were presented based on the respondents' answers. The subsequent analysis of the reliability of the consultation form was carried out using the Cronbach's alpha test, which makes it possible to determine the lower limit of the internal consistency of a group of variables or items. The result corresponds to the expected correlation between the scale used and other hypothetical scales, so that it is possible to obtain the veracity and validation of the concepts presented. After collecting the data, an analysis was carried out based on the elaboration of a radar chart that illustrated the different opinions of agreement or disagreement with the claims presented in the form based on the respondents' answers. The subsequent analysis of the reliability of the consultation form was carried out using the Cronbach's alpha test. Microsoft Office Excel 2007 and SPSS for Windows (Statistical Package for the Social Sciences) version 21 were used to statistically analyze the findings of the TPB and ANT framework of the study. Microsoft Bilnut version 2.01 was used to calculate the behaviors and attitude towards the hybrid digital currency PCoin. To determine factors associated with behaviors and attitude towards the hybrid digital currency PCoin with various static tests were used with a threshold of significance: $p < 0.05$. In addition, for the study of realibility of those questionnaires we used the Cronbach Alpha test with the following reliability thresholds: 1) Excellent reliability, if $\alpha \geq 0.90$; 2) High reliability, if $0.70 \geq \alpha < 0.90$) ; 3) Moderate reliability, if $0.50 \geq \alpha < 0.70$; and 4) Low reliability if $\alpha < 0{,}50$ (Kennedy et al, 2019).

4. Results and Discussion

The analysis carried out in this study is based on Habermas' view. According to Bettine (2021), Habermas deals with the concept of communication without coercion, establishes a relationship with the concept of communicative rationality, and presents the concept of action regulated by norms and the constitution of legitimately regulated interpersonal relations.

From the application of the theory of communicative action discussed by Juergen Habermas, which results from the process of deepening beyond scientific interpretations to reach collective results, tools are used to improve the discourse in interpretation and ensure understanding.

4.1. Social vulnerability as perceived by the social actors

As demonstrated in this work, it is possible to establish a link between the population of Porto Velho and notions of social vulnerability, considering that residents are exposed to dishonorable socioeconomic and social conditions, including precarious health, climate change as a consequence of human actions, and other indicative aspects of Marques Leão et al. (2014). This is evident from the studies of Gonçalves (2014) depicts the socio-environmental vulnerability indicator in the municipality

of Porto Velho combined with the social, infrastructure and housing indicator, the environmental exposure indicator and the health indicator, resulted in the social vulnerability indicator, where 33 out of 67 neighborhoods are classified as critical. After consultation with stakeholders, the diagram shown in Figure 2 depicts the social vulnerability as perceived by the social actors.

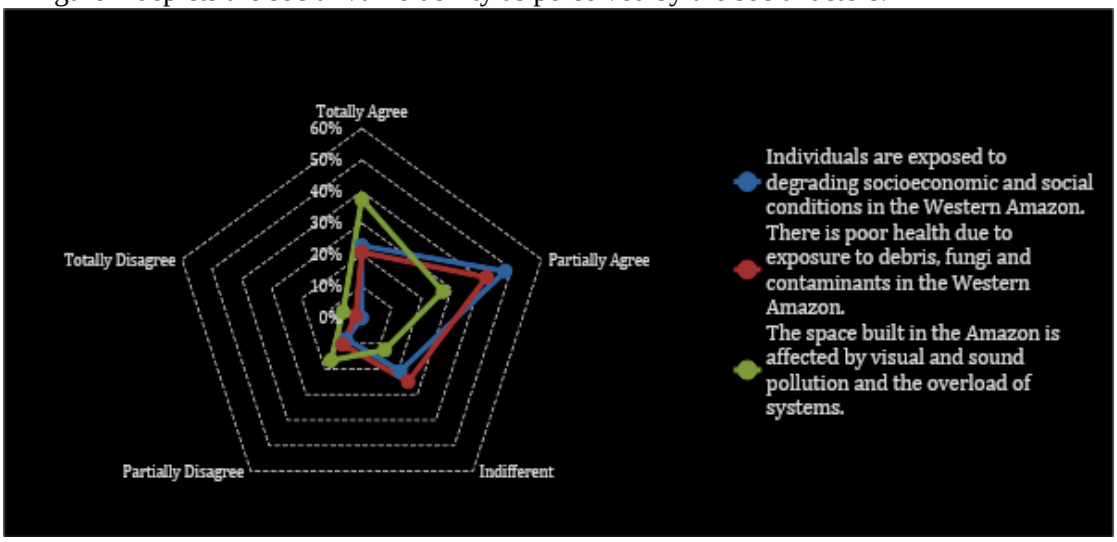

Fig.2: Social vulnerability as perceived by the social actors.

As shown in Figure 2, most respondents fully agree that the population of the Western Amazon is exposed to degrading socioeconomic and social conditions and perceives their health as precarious due to exposure to dirt, fungi, and pollutants. Through this study, it is possible to identify the reality of the inhabitants of Porto Velho and their behavior in a fragile environment such as the Amazon. The result is that this issue has three focal points that reach the socio-environmental, socio-economic and socio-cultural reality that dominate the affected masses shows that the Cronbach's Alpha coefficient is 0.51.

4.2. Socio-environmental reality and structural conflicts

Marques Leão et al. (2014) study focused on social vulnerability, as residents are exposed to precarious socioeconomic and social conditions. According to Benevides et al. (2021), the main aspects of vulnerability in Porto Velho are a consequence of the lack of public security that has existed for decades. The resident lacks specialized units to combat homicides, property crimes, and femicides.

Some activities can be overcome by measures to implement social innovations to create jobs and regional education to awaken regional pride and personal and regional collective growth. But respondents are also indifferent to norms and rules, living freely in the region of dense forests, where the absence of the state prevails depicted in the figure 3.

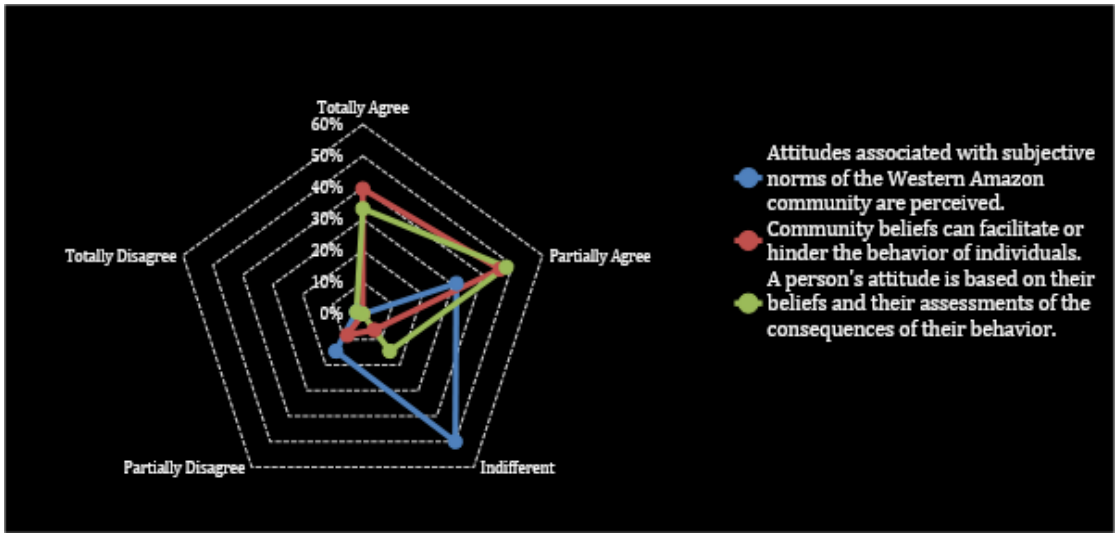

Fig..3: Respondent's perception of planned behavior and social norms.

The figure 3 shows that most respondents are indifferent to subjective norms among them in the community, and most strongly agree that their beliefs can facilitate or hinder their behavior shows that the Cronbach's Alpha coefficient is 0.54. They evaluate the consequences in a relative way, and therefore they partially agree on these same evaluations that they make of their surroundings.

4.3. Managing sustainability activities to protect the environment

The structural reality in the daily life of the inhabitants of Porto Velho has been affected by the construction of two dams for the construction of two hydroelectric power plants that supply the states located in the south of Brazil. This impact was studied by the Academy of Rondônia through the Innovation and Technology Management Research Group. It shows that families began to starve while being forced to abandon their daily lives, traditionally based on artisanal fishing and the extraction of residues from the Amazon forest. Almost a decade ago, studies by Ribeiro and Moret (2014) already denounced the negative impact on the economic and cultural conditions of these families in Portovelhia: structural unemployment due to the migration of labor for the construction of hydroelectric plants. The study by Virgulino et al. (2012) indicates that the new inhabitants were forcibly forced to abandon their productive activities and the generation of a sustainable income, as they were deprived of their traditional productive livelihood; their indigenous habits and customs were destabilized, as shown by the stakeholders' perceptions in Figure 4 below.

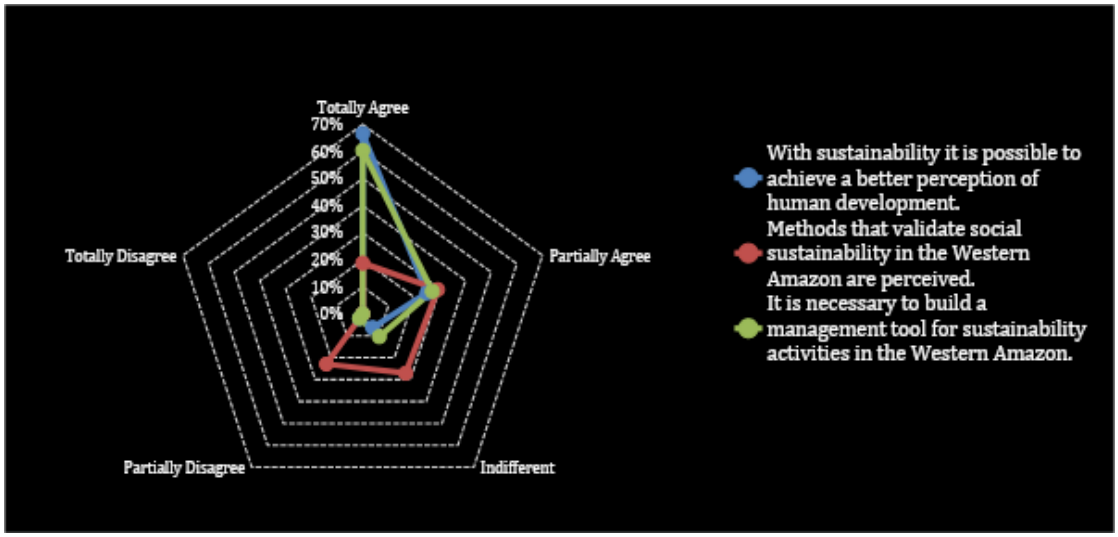

Fig.4: Respondent's perception of sustainability and environmental protection

The Graph 4 reveals that more than half of the respondents agree that it is necessary to build a tool for managing sustainability activities in the Western Amazon to protect the environment shows that the Cronbach's Alpha coefficient is 0.70.

4.4. Sociocultural reality in favor of social innovation

According to Graça (2017), innovation requires a deep understanding of social emergencies, the ability to connect with the silence of the universe and create a new prototype. To maintain a harmonious relationship between the natural world and society. Pedro Filho (2015) points out the tense dualism in Stockholm in the 1970s that continues today, between developers at all costs and defenders of the environment who are above development. At that time, the theory of economic development that interpreted capitalism ignored environmental components, whether renewable or not; there was no pressure from human activities on the environment to reach a critical state.

Economic development, from the biosphere to future generations, raises the question of ethical responsibility towards nature and people. For Hans Jonas, in studies by Moreira (2016), it is the principle of responsibility, where all people have a direct responsibility to nature.

As discussed in Pedro Filho (2015), the theory of ecological development was developed by Canadian Maurice Strong in the early 1970s. It does not allow for a separation between environment and development, while requiring compliance with three basic criteria. They are: social justice, ecological prudence and economic efficiency; common sense in the use of local resources without overexploitation of nature Sustainable development focuses on creating a harmonious relationship between labor and capital. Sustainability is viewed by Benevides (2020) as multidimensional and includes three interrelated areas: environmental, social, and economic concerns. These three areas form the basis of sustainability and are referred to as its three pillars.

Graça (2017) examines the growing needs of the population. In an international context that is constantly expanding. A sustainability model must provide for physical and emotional well-being and make demands that go beyond basic needs. Silva (2015) points out that the concept of social sustainability can be understood as a goal aimed at improving the quality of life of a population. It also aims to provide people with full citizenship rights, including access to dignity and self-esteem. Access to social goods and services such as health, transportation, education, housing, and recreation is unequal when the economic gap between people is too wide. Silva (2015) also shows that organizations exist to

fulfill the desires of a particular culture as well as the intentions of a particular belief system, which consists of multiple elements that must be controlled to ensure the execution of strategic plans. It also demonstrates the need for reliable methods to evaluate and monitor the management of protected areas. Inefficient production methods and high population density contribute to the generation of large amounts of waste, which has harmful consequences such as environmental pollution and the spread of diseases. The lack of government policies prevents the cultural valorization of the region, a situation that could be overcome through courses and workshops to qualify the Amazonian population in tourism and hospitality depicted in the figure 5.

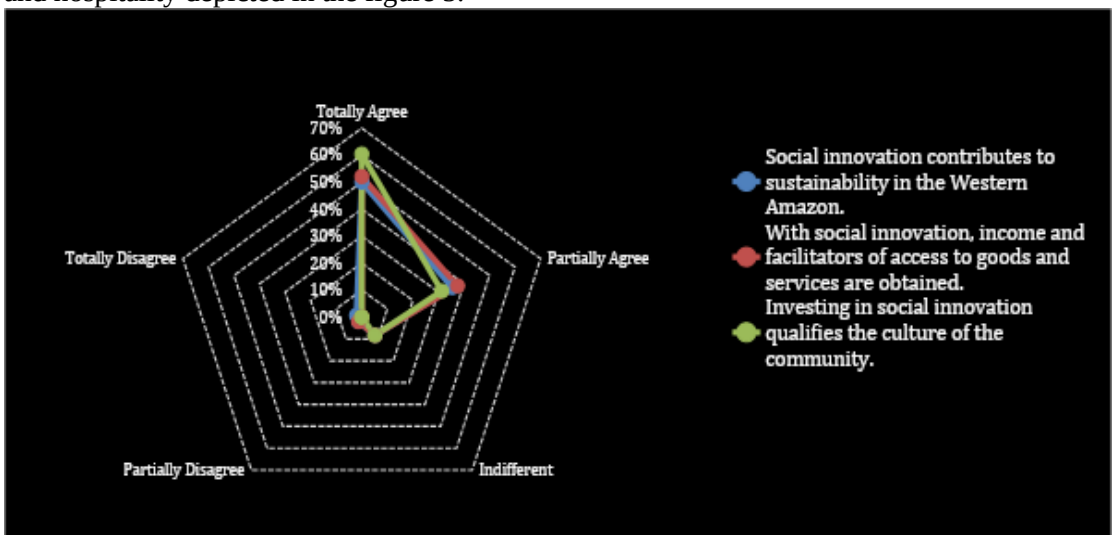

Fig.5: Respondent's perception of social innovation.

As shown in the figure 5, respondents strongly agree that social innovation can enhance community culture shows that the Cronbach's Alpha coefficient is 0.51.

4.5. Virtual currencies and collaborative design

According to Cunha Filho (2019), he argues that virtual currencies cannot be considered money because they are not printed and their value can be volatile. Many people praise the anonymity of digital currencies, and the economic market believes that digital currencies can revolutionize the world, mainly due to the aspect that their supply is limited. Design is interdisciplinary and has a collaborative origin. According to Fontoura (2011), one of the main characteristics of a design project is the involvement of numerous knowledge from different fields. As defined by Fiksel (1996), eco-design is the systematic consideration of project performance against environmental, health, and safety objectives throughout the life cycle of a product or process to make it eco-efficient. Charter (2001) believes that ecodesign can help companies reduce the environmental impact of products, optimize raw material and energy consumption, improve waste management, and reduce production costs. .

Therefore, as UNE (2003) points out, ecodesign leads to an approach that incorporates environmental criteria into all phases of the product or service project in order to achieve results with low environmental impact throughout the life cycle of the product. It is important to look at the technical concept of participatory design, where the public is asked to help design a product, designers are encouraged to model it, and public feedback is solicited to improve the product, as shown in Figure 6 below.

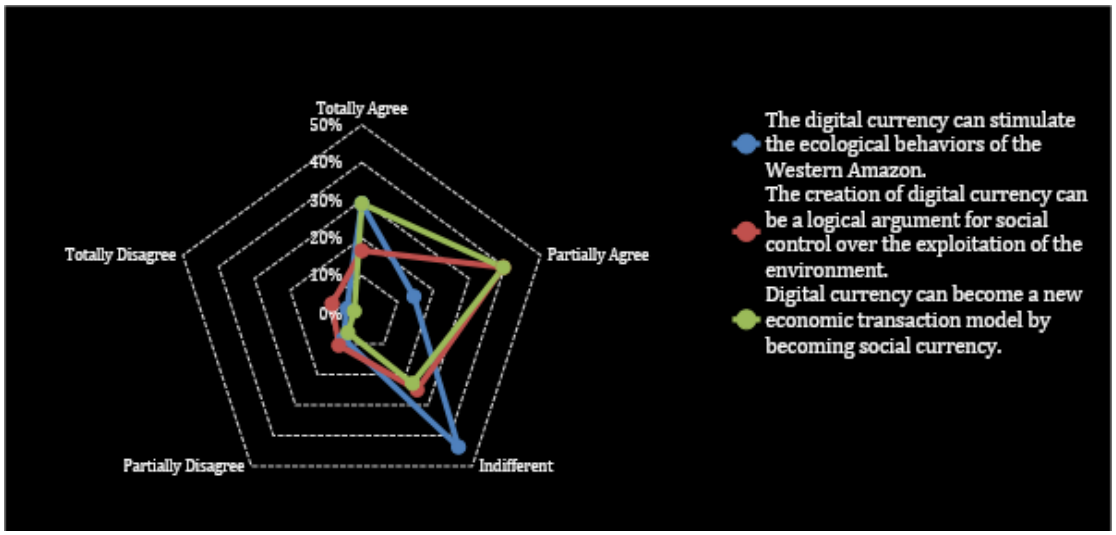

Fig.6: Perception of the respondent regarding the creation of digital currency.

In relation to the topic, Graph 5 states that for most respondents shows that the Cronbach's Alpha coefficient is 0.51, digital currency can become a new model of economic transaction by transforming it into a social currency that stimulates ecological behaviors and is based on arguments that facilitate control over the exploitation of the environment. This confirms the studies of Kelly (2009), in which the author states that the construction of a system requires an investigation of the cognitive processes, the mechanisms responsible for learning and analysis, as well as concepts such as adaptation, effectiveness, connectivity, convergence and feedback. Therefore, according to Cialdini & Sagarin (2005), accompanied by Jacobim (2020), we use knowledge in the field of IS design, psychological knowledge of methods and techniques to exert a social influence, knowledge of behavioral economics according to Kahneman (2003) and Smith (2005), and go deeper into Goal Framing Theory, described by Hameed & Kahn (2020).

This results in virtual practices to create a creative economy focused on tourism in the city of Porto Velho, representing design as collaborative and mediating, based on the compilation of ideas and solutions from the collaborative community and its specificities. Co-design is defined differently in the literature by Sanders et al. (2008): In practice, it is a constant movement, mindset, and toolkit in which the creativity of designers and those not trained in design collaborate in the design development process. Co-design is a process triggered by design that uses creative and participatory methods that can promote environmental and economic benefits and reduced production costs for companies.

The main objective of this study is to prepare the assumptions of the PCoin cybernetic system that imply the pro-environmental attitudes and behaviors of the inhabitants of the city of Porto Velho. The objective is to identify the needs of the inhabitants, to shape their proecological behaviors and thus to study what the solutions should be in order to design a cybernetic system that effectively incorporates the attitudes and behaviors for the benefit of all the inhabitants of the city. The co-design of this project is participatory from the beginning and aims to involve people in the whole process of creation, from the stakeholders to the potential users of the system.

At this point, we will apply the world-renowned World Caffee method, created by Juanita Brown and David Isaacs, who conduct research and organizing processes and dialogs. Co-design the PortoCityCoin system and see how it can shape pro-environmental attitudes and behaviors. This project aims to observe the behavior of participants, using action research methodology, in order to improve the data that will feed into the implementation of the Greencoin system.

4.6. Perception of tourists regarding the use of digital currencies

Tourism services include a variety of services, including food, entertainment, transportation, and lodging. These services are intended to provide basic infrastructure and public services in an area. This is because each tourist has a different reason for coming to the place and how they perceive the attractions they perceive. When building a tourist attraction, it is important to stand out from the competition. In order to create a tourist attraction for which there is too much demand, it is necessary to take into account the conditions of access and infrastructure; combining these aspects into a package creates a "tourist product" that is sold as a whole and can be viewed by many different sectors from different origins and destinations.

Keane (1997) affirms that there are options, experiences, and trust when purchasing a product. When buying a product, consumers can see the quality of the product before buying it.

Considering that the municipality of Porto Velho has a wide range of natural attractions that can be used as tourist attractions without formal support, and has a rich cultural and historical heritage, it is expected that by understanding the potential of these attractions, people can promote their open-mindedness to expand the scope of these attractions, as shown in Figure 7 below.

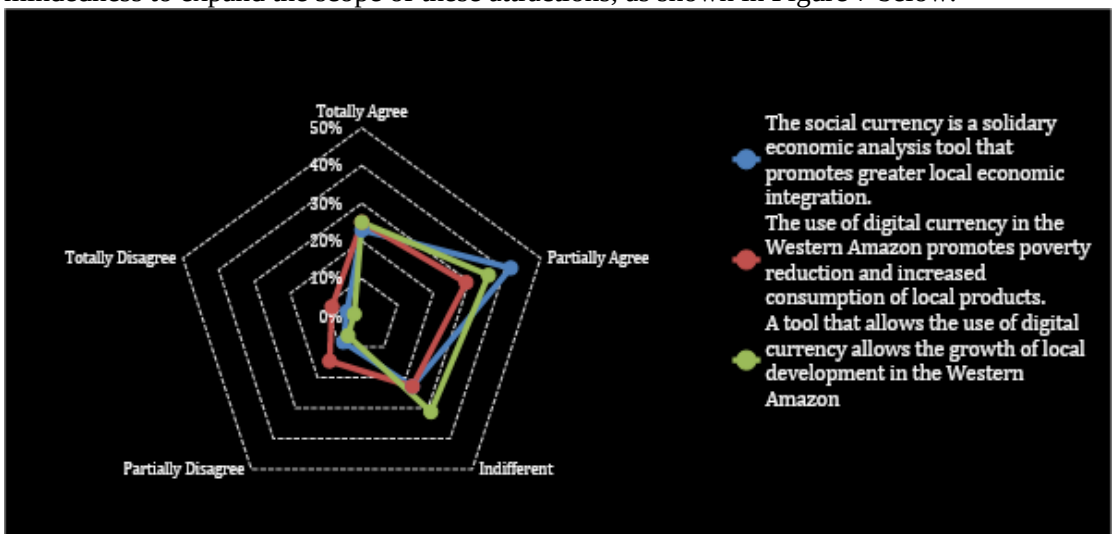

Fig.7: Perception of the respondent regarding the use of digital currency.

In view of the treaty in this topic of the task, figure 7, affirms that the social currency is a solidarity economic analysis tool that promotes greater local economic integration shows that the Cronbach's Alpha coefficient is 0.50.

5. Conclusion

In conclusion, the implementation of a localized gamified digital currency model for encouraging sustainable behavior in urban tourism holds tremendous potential for fostering positive environmental and community impacts. This innovative approach leverages gamification and digital currencies to engage both tourists and local residents in adopting sustainable practices, thereby contributing to the overall well-being of the urban environment. This initiative demonstrates that a holistic framework for positive change in urban tourism can be created by combining technology with community involvement and sustainable practices. Not only does the gamified model encourage eco-friendly behaviors, but it also provides a dynamic and enjoyable experience for participants, enabling them to integrate sustainable choices into their travel and lifestyle choices. Design can and should play an important role

in addressing social issues, according to Pazmino (2007) and Wandelry (2013). Moreover, design can facilitate inclusion in areas where designers and industry have not provided resources. For example, design can make resources available that improve the lives of culturally and economically vulnerable groups. Based on its localization, the model takes into account the unique challenges and opportunities of each community, tailoring it to the unique needs and characteristics of that environment. Through active participation and collaboration in achieving shared sustainability goals, this adaptability fosters a sense of ownership and connection among local residents.

Research, stakeholder engagement, and technological advancements will be crucial to refining and expanding this concept as it develops. Using data-driven insights and user feedback, gamified digital currencies can be continuously improved to promote sustainable behavior for years to come. As well as reducing the environmental impact of urban tourism, this initiative also empowers local communities, which makes it a success. By creating a positive feedback loop that reinforces sustainable practices, the model encourages local businesses, artists, and residents to participate in economic and social development. As a result, the localized gamified digital currency model represents a forward-looking and impactful strategy for steering urban tourism towards sustainability. In addition to fostering a sense of responsibility, community engagement, and enjoyment, this innovative approach can help preserve the urban environment for future generations by fostering responsibility, community involvement, and enjoyment of participating.

Researchers can consider gamifying urban tourism to promote sustainability as an innovative and promising idea. Future research can focus on enhancing and expanding the impact of your initiative by examining urban tourism's current state and impact on the environment. Using robust data analytics tools, the impact of the gamified model on sustainable behavior can be measured. In turn, this will contribute positively to urban tourism and the environment.

Acknowledgement

We like to express sincere thanks to GEITEC, Brazil for supporting with data.

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