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Article

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Business management review

Provided in Cooperation with:

University of Dar es Salaam (UDSM)

Reference: Athumani, Haruna/Kanan, Ranger et. al. (2024). Institutional support's influence on green beekeeping adoption in resource-constrained Biharamulo Forest Reserve, Tanzania : the extended theory of planned behavior. In: Business management review 27 (2), S. 59 - 72.
<https://journals.udsm.ac.tz/index.php/bmr/article/download/6915/5280>.
doi:10.56279/bmrj.v27i2.6915.

This Version is available at:

<http://hdl.handle.net/11159/703083>

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Institutional Support's Influence on Green Beekeeping Adoption in Resource-Constrained Biharamulo Forest Reserve, Tanzania: The Extended Theory of Planned Behavior

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To cite this article: Athuman, H., Kanan, R. & Tinali, G. Z. P. (2024). Institutional Support's Influence on Green Beekeeping Adoption in Resource-Constrained Biharamulo Forest Reserve, Tanzania: The Extended Theory of Planned Behavior. *Business Management Review*, 27(2), 59-72. <https://doi.org/10.56279/bmrj.v27i2.6915>

Abstract

Green production practices are crucial for environmental conservation, yet scholarly research on green beekeeping remains limited. This study seeks to enhance the Theory of Planned Behavior (TPB) by developing an extended model of Institutional Support theory of Planned Behavior (ISTPB) to understand better beekeepers' behavior toward adopting green beekeeping practices. The model focuses on institutional support and its role in shaping individual behavior related to green beekeeping adoption. Using structural equation modeling (SEM), the study's empirical results show that institutional support and the three original TPB components, i.e., attitude, subjective norms, and perceived behavioral control, positively and significantly influence green beekeeping adoption. The extended ISTPB model demonstrates that institutional support impacts these TPB components and enhances the model's explanatory power. This research emphasizes the value of the ISTPB model in providing an understanding of green beekeeping adoption. It offers strategic recommendations for improving the implementation of green beekeeping practices within Tanzania's socioeconomic context.

Keywords: Institutional Support, Intention to Adopt Green Beekeeping Practices, Resource-Constrained Areas

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Introduction

Beekeeping significantly enhances individual livelihoods and contributes to national economies. At the individual level, it offers a sustainable source of income, particularly in rural areas with limited employment opportunities and resources (Zambrano et al., 2022). Beekeeping provides diverse revenue streams through the sale of honey, beeswax, propolis, and other bee-related products. Moreover, green beekeeping practices promote sustainability by reducing environmental impact and supporting ecosystem health (Zambrano et al., 2022). Its low initial investment and compatibility with other agricultural practices make beekeeping an accessible and complementary livelihood option (Hinton, Schouten, Austin, & Lloyd, 2020). Nationally, beekeeping fosters biodiversity and enhances agricultural productivity through pollination, while the export of bee products generates foreign exchange earnings (Puranik, Akbar, & Ghagane, 2023). Promoting green beekeeping aligns with environmental conservation goals, contributing to ecological balance and long-term sustainability (Hinton et al., 2020; Zambrano et al., 2022).

Despite these benefits, traditional beekeeping methods persist, often harming the environment and biodiversity. Practices such as using fire during honey harvesting or applying chemicals to manage bees degrade resources and compromise honey quality (Nowak & Nowak, 2023). These unsustainable methods hinder access to lucrative markets that prioritize high-quality and environmentally friendly products, limiting beekeepers' income and reducing the honey industry's contribution to national GDP (Nowak & Nowak, 2023; Pocol, Šedík, Brumá, Amuza, & Chirsanova, 2021). Although specific revenue data from beekeeping in Tanzania is unavailable, studies indicate widespread engagement in regions like Kilimanjaro, Tanga, and Tabora, involving an estimated 400,000 to 500,000 individuals (Said, Peter, & Nyakoki, 2022). This participation underscores beekeeping's socioeconomic importance and its potential for income generation and national economic growth (Katani & Ndelolia, 2020; Zambrano et al., 2022). However, these benefits are contingent on adopting sustainable practices to protect the ecosystems vital for beekeeping (Katani & Ndelolia, 2020).

Institutional support is essential for promoting sustainable practices in beekeeping, addressing the environmental challenges posed by traditional methods. Such support helps stakeholders transition to green beekeeping by providing resources, training, and incentives (Kumari, Bharti, & Tripathy, 2021; Gajardo-Rojas et al., 2022). For example, Sustainable Venture Enterprises in the Biharamulo Forest Reserve has trained over 650 beekeepers in green practices, supplied eco-friendly equipment, and emphasized the benefits of sustainability, including improved honey quality and market access (Kimario, Botha, Kisingo, & Job, 2020; Zambrano et al., 2022). These initiatives aim to transform harmful practices into environmentally responsible methods that conserve resources and enhance socioeconomic outcomes (Pocol et al., 2021; Said et al., 2022).

Theoretical frameworks such as the Resource-Based View (RBV) offer insights into the factors influencing green beekeeping adoption. RBV highlights the strategic importance of resources, including institutional support, in shaping perceptions and enabling sustainable practices (Penrose, 1959; Pocol et al., 2021). However, a disconnect between intention and practice remains, as low adoption rates persist despite advocacy for green beekeeping (Zambrano et al., 2022). This gap underscores the need to investigate how institutional support impacts the adoption of green beekeeping practices, particularly in Tanzania's Biharamulo Forest Reserve.

This study aims to explore the influence of institutional support on the adoption of green beekeeping practices in Biharamulo. By examining how institutional resources and training affect local beekeepers' transition to sustainable practices, this research seeks to address existing gaps and inform strategies to enhance beekeeping's environmental and socioeconomic benefits. Understanding this influence is crucial for designing effective support mechanisms that ensure sustainable development and bolster the national economy (Katani & Ndelolia, 2020; Pocol et al., 2021; Said et al., 2022).

Literature

Theoretical Framework

Scholars have widely applied the theory of the Resource-Based View (RBV) to examine the influence of resources in terms of assets and capabilities on performing certain intentions. The theory, initiated by Barney (1991), explains the value of resources in enhancing firms' competitiveness. Although the theory has primarily provided a theoretical foundation for studies focusing on competitive advantages for firms, it is an appropriate framework to study the role of institutional support in shaping individual behavior toward green beekeeping adoption. Because with institutional support, individuals equipped with knowledge and skills through training or provided with financial assistance from external sources are more inclined to perform behaviors due to the support acquired from institutions (Eister & Msimango-Galawe, 2020). Thus, based on strategic literature (Gelbrich, Hagel, & Orsingher, 2021) and the RBV framework, we assume that institutional support significantly influences green beekeepers' practices to green practices. Although scholarly efforts have focused on utilizing the concepts of the Theory of Planned Behavior (TPB) to examine individual behavior performance (Nusairat et al., 2021; Soliman, 2021), little attention has been directed toward examining the role of institutional support in shaping individual behavior towards green beekeeping adoption.

The Theory of Planned Behavior (TPB), developed by Ajzen (1991) and built upon the Theory of Reasoned Action (TRA), is designed to predict individual behavior and is one of the most widely adopted models in social psychology. The TPB has been adopted in different fields to study individual behavior intention, including marketing, business management, psychology, education, and technology. Recently, scholars have applied TPB to examine individual behavior towards green activities in the environment ((Tunji-Olayeni, Kajimo-Shakantu, & Ayodele, 2024; Xu, Meng, Li, Chen, & Wang, 2024). For instance, Tunji-Olayeni et al. (2024) studied factors influencing the intention to adopt green construction in South Africa, while Xu et al. (2024) examined driving factors for farmers' agricultural production behavior in the multi-ethnic group in China. Although TPB has faced criticism for its limited predictive ability (Taghavi & Maharati, 2024), its founder, Ajzen (1991), proposed incorporating additional predictors to enhance its predictive power. Although researchers recognize institutional support as a driving force for enhancing individual behavior, little is known about the factors that influence individual behavior towards green beekeeping adoption. Since Pocol et al. (2021) posits that institutional support positively influence individual behavior while individual behavior positive affect adoption of strategies such as green beekeeping, a model that incorporate these two concepts is scant.

Hypothesis Development

This study grounds itself in the Theory of Planned Behavior (TPB) and the Resource-Based View (RBV) theory. The RBV positively associates with the three TPB variables: attitude, subjective norm, and perceived behavioral control. We assume that the benefits derived from institutional support enhance the interaction between TPB variables and green beekeeping adoption.

Institutional Support, Attitude, and Green Beekeeping Adoption

In the Theory of Planned Behavior (TPB), attitude represents an individual's positive or negative evaluation of performing a particular behavior. Those with a positive attitude towards a behavior are more likely to intend to perform that behavior. In contrast, those with a negative attitude are less likely to do so (Vamvaka, Stoforos, Palaskas, & Botsaris, 2020). Individual attitude is significant in describing, predicting, and influencing behavioral performance (Singh & Kaur, 2021), such as adoption. Similarly, institutional support influences individuals' decision-making (Gwanyemba & Kilonzo, 2023) and stimulates their attitude toward performing behaviors (Ansah, 2021). Prior findings show a positive relationship between institutional support and individual attitude (Lukman et al., 2021; Zhao et al., 2020), but a positive personal attitude influences behavioral performance (Li & Wu, 2020). Li and Wu (2020) found that tourists' positive attitude towards pro-environments influences their decision to engage in tourism activities in China

Ansah (2021) conducted a study examining the role of social support in influencing the help-seeking behavior of patients with Benign Prostatic Hyperplasia (BPH) at homeopathic clinics in the Greater Accra Region of Ghana. The research utilized a cross-sectional survey method and convenience sampling and analyzed the data using multiple regression techniques. The findings revealed a statistically significant association between the level of social support and the help-seeking attitudes of BPH patients, suggesting that greater social support is associated with more positive help-seeking behaviors. In a different context, Ali et al. (2020) investigated farmers' attitudes toward the use of pesticides and found that positive attitudes significantly contribute to the widespread adoption of these chemicals. The study demonstrated that when farmers perceive pesticides as beneficial for crop protection and yield enhancement, they are more likely to intend to use and integrate these chemicals into their agricultural practices. This favorable perception drives the adoption of pesticides, illustrating how positive attitudes toward new technologies and methods can facilitate their acceptance and integration into regular farming practices.

Khoza and Msimango-Galawe (2021) found that organizational support significantly enhances employees' attitudes toward their relationships at work. When organizations actively provide resources, recognition, and encouragement, employees tend to develop more favorable attitudes towards their colleagues and work environment. This support fosters a more collaborative and positive atmosphere, improving interpersonal relationships and overall job satisfaction. A supportive organizational culture thus plays a crucial role in strengthening employee engagement and fostering a healthy work environment. However, Nilsson, Fielding, and Dean (2020) found that individual positive attitudes toward environmental conservation significantly enhance environmentally friendly practices. When people have a favorable view of conservation, they are more likely to convert these attitudes into actions like recycling, reducing waste, and supporting sustainable initiatives. This positive attitude motivates individuals to engage in behaviors that benefit the environment

(Tian, Zhang, & Li, 2020). The research highlights that while positive attitudes are important, their impact is truly realized when they lead to actual behavioral changes. Fostering a positive view of environmental conservation raises awareness and motivates individuals to adopt and maintain eco-friendly practices, leading to significant conservation outcomes (Pocol et al., 2021). Based on previous findings, this section proposes the following two hypotheses:

H1: Institutional Support positively influences beekeepers' attitudes.

H2: Beekeepers' attitudes positively influence green beekeeping adoption

Institutional Support, Subjective Norms, and Green Beekeeping Adoption

The Theory of Planned Behavior (TPB) identifies Subjective Norms (SN) as a key concept that highlights the impact of social influence on individual behavior (Roh, Seok, & Kim, 2022). Subjective Norm refers to the perceived social pressure from others that can affect one's decisions and actions (Hasan & Suciarto, 2020). In behavior performing, SN is characterized by the social-psychological pressure experienced by one's social environment (Roh et al., 2022). For beekeepers, this pressure may arise from institutional support and peer information about the effectiveness of such support. This social-psychological pressure can significantly guide beekeepers toward adopting green beekeeping practices. Moreover, factors such as total harvesting, profit gains, and other socioeconomic benefits can amplify this pressure, increasing the likelihood that beekeepers will choose to implement sustainable practices.

Roh et al. (2022) found that Green Product Value (GPV) significantly impacts consumers' subjective norms by shaping their perceptions and expectations about eco-friendly products' social acceptability and desirability. When consumers recognize the value of green products, they often feel a social pressure to conform to environmentally responsible behavior, influenced by the prevailing norms within their social circles or society. This influence on subjective norms is crucial because they guide individuals' behaviors and decisions, making them more likely to engage in sustainable practices (Hasan & Suciarto, 2020). When individuals adjust their behavior to align with socially accepted norms, their commitment to green practices becomes more pronounced (Gong, Han, Li, Yu, & Reinhardt, 2019). This heightened dedication encourages the broader adoption of eco-friendly behaviors and boosts support for green products, reinforcing a positive environmental sustainability cycle (Hasan & Suciarto, 2020). As a result, this shift in behavior and subjective norms can have a ripple effect on specific industries, such as beekeeping, by positively influencing beekeepers to adopt green beekeeping practices (Aji, Berakon, & Riza, 2021). This alignment with environmentally friendly norms can lead to more sustainable and responsible beekeeping, further supporting the health of ecosystems and the broader environmental movement.

According to Zhuang, Hou, Feng, Lin, and Li (2021), positive subjective norms profoundly influence individual adoption of new technology in China, demonstrating how social approval and perceived desirability impact technological uptake. In China, where social and cultural dynamics heavily influence personal decisions, individuals are more inclined to embrace new technologies when they perceive that such adoption is endorsed and encouraged by their peers and societal leaders (Huang, Teo, Sánchez-Prieto, García-Peñalvo, & Olmos-Migueláñez, 2019). This phenomenon occurs because individuals often seek validation and alignment with social expectations, leading them to adopt technologies that are perceived as socially desirable (Zhuang et al., 2021). When new technologies are associated with positive social perceptions, endorsements from influential figures, or alignment with cultural trends,

individuals are more motivated to integrate these technologies into their lives (Roh et al., 2022). Consequently, the presence of favorable subjective norms not only boosts confidence in adopting new technologies but also accelerates their widespread acceptance and integration into everyday practices. Based on previous findings, this section proposes the following two hypotheses:

H3: Institutional Support positively influences beekeepers' Subjective Norms.

H4: Beekeepers' Subjective Norms Positively Influence Green Beekeeping Adoption

Institutional Support, Perceived Behavior Control and Green Beekeeping Adoption

Influencing both intention and behavior, Perceived Behavioral Control (PBC) is a key concept in the Theory of Planned Behavior (TPB), which relates to how individuals perceive the ease or difficulty of performing a behavior (Ajzen, 1991). For beekeepers, this involves evaluating the ease or difficulty of adopting green beekeeping practices, such as implementing sustainable techniques, reducing synthetic chemicals, and enhancing environmental stewardship within their operations (Hasan & Suciarto, 2020). This assessment encompasses various factors, including the availability of resources, financial constraints, knowledge and skills related to green practices, and the level of support or barriers encountered in their beekeeping environment (T. Chen et al., 2020). PBC reflects beekeepers' belief in their ability to effectively manage and execute these green practices, impacting their expectations of success or failure (Hasan & Suciarto, 2020). This belief is crucial because it affects their motivation to adopt environmentally friendly methods, as PBC is perceived as a measure of voluntary control over behavior (Roh et al., 2022).

Given that institutional support empowers beekeepers with the necessary skills, knowledge, and financial resources, they are more likely to perceive green beekeeping practices as manageable and beneficial, thus increasing their inclination to adopt them (Gong et al., 2019). This support can come in various forms, including training programs, workshops, subsidies, and grants, which help beekeepers understand and implement sustainable practices effectively (Aji et al., 2021). As beekeepers gain confidence in the reliability and availability of institutional support, they will find the transition to green practices easier and more feasible (Hasan & Suciarto, 2020). This ease of adoption, facilitated by comprehensive institutional backing, enhances their perception of the benefits associated with sustainable beekeeping (Aji et al., 2021). Consequently, robust institutional support will significantly influence beekeepers' willingness to adopt and integrate environmentally friendly methods into their operations, fostering a more sustainable and environmentally conscious beekeeping industry.

Makai and Dóry (2023) evidence from the Western Transdanubia Region indicates that perceived support from universities, including access to resources, mentoring, and a supportive environment, positively impacts students' entrepreneurial intentions. This support enhances their Perceived Behavioral Control (PBC), making them more capable of overcoming obstacles and managing entrepreneurial ventures (Tian et al., 2020). Consequently, a strong university support system and a favorable entrepreneurial environment enhance students' confidence and willingness to start and manage their businesses. Similarly, robust institutional support such as training, resources, and a supportive environment can improve beekeepers' Perceived Behavioral Control (PBC) regarding green beekeeping practices (Hasan & Suciarto, 2020). This increased confidence and perceived ease of adopting sustainable methods encourage beekeepers to integrate environmentally friendly

practices into their operations, just as strong support systems boost entrepreneurial intentions (Gong et al., 2019; Roh et al., 2022). Based on previous findings, this section proposes the following two hypotheses:

H5: Institutional Support has a positive and significant influence on beekeepers' Perceived Behavior Control

H6: Beekeepers' Perceived Behavior Control Positively Influence Green Beekeeping Adoption

Research Methodology

The study is based on a quantitative method with a deductive approach to test the hypothesized relationships. The study intended to examine the the role of institutional support in the relationship between the three concepts of the theory of planned behavior and the adoption of green beekeeping practices in Biharamulo Forest Reserve. Data were collected from beekeepers in Biharamulo Forest Reserve in Tanzania's Kagera Region from July to September 2023. This period coincides with the most favorable weather conditions and the peak nectar flow from flowering plants, resulting in higher honey production (Kimario et al., 2020). During this time, nearly all beekeepers pass through the Biharamulo main gate with permits to enter the reserve for harvesting. At this gate, we gave self-administered survey questionnaires to 312 respondents to complete at their convenience. By the end of September 2023, we collected 266 responses, yielding a response rate of 85%. After thoroughly cleaning the data by checking for non-responses, missing values, and outliers to ensure data integrity and reliability, we qualified 229 responses for data analysis.

The survey instrument consisted of three sections. The first section determined whether respondents had utilized support initiatives from Sustainable Venture Enterprises; responses were excluded if they had not. The second section collected demographic information, including gender, age, education level, and beekeeping experience. The final section featured measurement items for constructs adapted from prior studies, covering attitude, subjective norms, perceived behavioral control, institutional support, and green beekeeping adoption. Variables were operationalized using a 7-point Likert scale ("1 = strongly disagree" to "7 = strongly agree"), which is preferred for technology adoption studies (Azhar et al., 2022). Measurement items for Institutional Support (IS) were sourced from Yi (2021), Subjective Norms (SN) and Attitude (AT) from Hamid and Mohamad (2020), and Green Beekeeping Adoption (GBA) from L. Chen et al. (2023). Slight modifications were made following a comprehensive literature review. The questionnaire was validated by three academic experts in beekeeping, and a pilot study with 12 beekeeping group leaders at the Biharamulo Forest Reserve's main gate was conducted. Results from the pilot study were excluded from the final analysis.

Results

Measurement Model

The measurement model analysis in PLS-SEM studies is assessed through Confirmatory Composite Analysis (CCA), which evaluates both the factors and their underlying variables (measurement models). Additionally, CCA examines the relationships between constructs (structural model), ensuring that the theoretical framework accurately represents the data and interactions within the model, as proposed by (Howard & Nitzl, 2020; Napitu, Simanjuntak, & Amal, 2021). This dual evaluation process ensures a comprehensive assessment of the

model's accuracy and robustness. By rigorously assessing the validity and reliability of the measurement model, researchers can determine if the study data aligns precisely with the applied theories, thereby providing a strong foundation for subsequent analysis and interpretation (Massawe, Mbura, & Thomas, 2023). This method confirms the theoretical framework and enhances the credibility and generalizability of the study's findings, making it a critical stopping step in PLS-SEM research.

To ensure model quality, composite reliability, generally above 0.70, indicates good internal consistency among the items within a construct. On the other hand, Average Variance Extracted (AVE) values above 0.50 suggest that the construct explains more variance than is due to measurement error, ensuring that the construct is well-represented by its items. Cronbach's Alpha values above 0.70 are considered acceptable, indicating reliable constructs. The factor loadings must be greater than 0.70, indicating strong correlations between observed variables and their underlying latent constructs. Discriminant validity was assessed using the heterotrait-monotrait ratio of correlations, where values less than 0.85 indicate that constructs are distinct or different. Finally, convergent validity was confirmed with AVE values above 0.50, suggesting that constructs expected to be related are indeed correlated.

The researcher established Convergent validity since the AVE values exceeded 0.5, showing that each concept in the study accounts for more than half of its factors' variance. Discriminant validity was also confirmed, with the Heterotrait-Monotrait Ratio (HTMT) values for the five concepts below 0.85. For reflective variables, HTMT indices under 0.85 indicate discriminant validity when the path model is clear (Hair, 2019). Table 1 demonstrates that the highest HTMT index is 0.702, suggesting that the constructs' discriminant validity is at a satisfactory level and that the quality of the measurement model is adequate.

Table 1: Discriminant Validity on Heterotrai-Monotrait Ratio (HTMT)

Variables	AT	GBA	IS	PBC
AT				
GBA	0.608			
IS	0.652	0.702		
PBC	0.439	0.583	0.314	
SN	0.574	0.644	0.537	0.412

Notes: The HTMT indices are less than 0.85, confirming the establishment of discriminant validity

Evaluating collinearity was essential since its presence could introduce biases in the path coefficients (Kock, 2015). Collinearity may skew the statistical relationships between variables, leading to incorrect conclusions (Sabri, Zarei, & Harland, 2019). Therefore, as required, the results reveal that the highest inner VIF (Variance Inflation Factor) value is 1.33, significantly below the accepted threshold of 3. This indicates the absence of multicollinearity issues. Consequently, the lack of multicollinearity permits further analysis without concerns about biased path coefficients or compromised result validity (Hair et al., 2020). The low VIF value verifies that the independent variables are sufficiently distinct, ensuring the robustness and reliability of subsequent analyses (Hair et al., 2020).

Hypotheses Test Results

Table 2 shows that six significant hypothesized relationships confirm the study's predictions. Institutional support has significantly influenced individual behavior toward adopting green beekeeping. It has the strongest impact on individual attitude, with a path coefficient of 0.511, followed by subjective norms at 0.447 and perceived behavioral control at 0.253. However, subjective norms influence individuals to adopt green beekeeping, followed by perceived behavioral control at 0.286 and attitude at 0.247. Overall, the adoption of green beekeeping is explained by more than 54.2% of the variance, with an influence coefficient of 0.542

Table 2: Summary of Hypothesis Testing

Path	Path Coefficient	Q ²	t-value	f ²	p-value	CI 95%
AT -> GBA	0.247	0.143	3.277	0.086	0.001	[0.122, 0.377]
IS_ -> AT	0.511	0.090	7.547	0.353	0.000	[0.397, 0.623]
IS_ -> PBC	0.253	0.312	2.899	0.249	0.003	[0.104, 0.396]
IS_ -> SN	0.447	0.121	6.744	0.068	0.000	[0.334, 0.561]
PBC -> GBA	0.286	0.307	4.171	0.129	0.000	[0.173, 0.407]
SN -> GBA	0.353	0.030	4.469	0.176	0.000	[0.212, 0.477]

Notes: Effect size values (f²) values > the threshold of small effect 0.02, p-values < 0.05, t-values > 1.65, Q² > zero, indicating model predictive relevance.

The smallest effect size (f²) of digital transformation is 0.068 for institutional support toward subjective norms, followed by 0.086 for attitudes and 0.129 for perceived behavioral control. Additionally, subjective norms have an effect size of 0.176, institutional support toward perceived behavioral control has 0.249, and institutional support towards attitude has 0.353. These values exceed the small effect size threshold of 0.02, indicating that the hypothesized relationships are significant and relevant to individuals' adoption of green beekeeping. The Q² values for institutional support and individual behavior towards green beekeeping are all greater than zero, confirming the predictive relevance of institutional support in shaping individual behavior towards green beekeeping. These values for the hypothesized relationships are well above the threshold of zero, indicating a high level of relevance.

Discussion of the Findings

The discussion of the study's findings highlights that institutional support, grounded in the Resource-Based View (RBV) (Penrose, 1959), has a positive influence on individual behavior, as guided by the Theory of Planned Behavior (TPB) by (Ajzen, 1991). This influence extends to key elements of TPB: attitude, subjective norms, and perceived behavioral control, all of which play crucial roles in adopting green beekeeping. The results underline the importance of institutional support in shaping favorable attitudes by providing the necessary resources and information that promote green beekeeping practices as previously proposed by (Ansah, 2021). Furthermore, institutional support strengthens subjective norms by fostering a community that values and encourages sustainable practices, thus creating a conducive social environment for adopting green beekeeping. Lastly, it enhances perceived behavioral control by offering the support needed to overcome potential obstacles, making individuals feel more capable of adopting green beekeeping. The study confirms the development of extended

theory of planned behavior using institutional support as an additional predictor in assessing the adoption of green beekeeping practices.

The three predictor variables from the Theory of Planned Behavior (TPB) collectively result in an R-squared value of 0.542, with a positive and significant direct relationship between institutional support (0.342) and green beekeeping adoption. These findings support the argument that institutional support significantly boosts the adoption of green beekeeping practices by providing essential resources, training, and incentives to beekeepers. Although the support from Sustainable Venture Enterprises (SVE) involves some costs, meaning that beekeepers must pay for the services at a reduced rate, this financial burden appears to limit their fully participation. However, despite this cost, respondents agree with the argument that institutional support positively and significantly influences their beekeeping practices. This highlights the critical role of SVE in fostering environmentally friendly behaviors. Drawing from the RBV and TPB, the findings reveal that institutional support significantly influences individual acceptance of green beekeeping by offering necessary resources. Thus, institutions foster both acceptance and motivation toward sustainable practices, while also cultivating a community that values and encourages green beekeeping, making these practices socially desirable.

Given that external factors were found to positively and significantly influence individual behavior (Gwanyemba & Kilonzo, 2023; Kumar & Das, 2019), findings validate institutional support as a dominant component that influences the beekeeper in adopting green beekeeping practices. The positive and significant causal paths from institutional support to attitude (0.507), subjective norms (0.445), and perceived behavioral control (0.250) indicate a strong impact of institutional support on these factors. This implies that individuals highly value institutional support, fostering a culture that encourages and sustains positive attitudes. Additionally, it may be argued that individuals are more likely to perceive and adhere to subjective norms, as institutional support reinforces the importance of these social expectations and promotes conformity. It also enhances perceived behavioral control by providing the necessary resources, training, and guidance. To capitalize on these benefits, the government and stakeholders should ensure consistent funding, training, and infrastructure development for beekeeping. By engaging with these programs, applying the support to strengthen their attitudes, align with positive norms, and manage their behaviors effectively. This collaborative approach fosters a supportive environment that promotes the adoption practice of green beekeeping practices.

The perceived behavioral control in beekeeping (0.274) demonstrates a noteworthy impact on adopting green beekeeping practices, highlighting it as a dominant factor influencing adaptability. Additionally, a positive and significant causal path from attitude (0.247) further supports this influence, as evidenced by Vamvaka et al. (2020), confirming that both perceived behavioral control and attitude play crucial roles in facilitating the adoption of green beekeeping practices. In previous findings, perceived subjective norms were found to strongly predict individual outcomes (Baker-Eveleth & Stone, 2020; Zhuang et al., 2021). Subjective norms (0.263) imply that social expectations and pressures strongly influence individuals to engage in environmentally friendly beekeeping practices. Since all three components in the theory on planned behavior important predictor by exerting positive and significant relationship with individuals adopting green beekeeping practices, they are considered comprehensive factors in promoting sustainable practices. To promote the widespread

adoption of green beekeeping, the government and stakeholders should enhance favorable attitudes, supportive social expectations, and individuals' sense of control.

Conclusion

The present study intended to extend the theory of planned behavior by introducing institutional support to create a institutional support theory of planned behavior (ISTPB) model which provides suppoerior explanatory power in predicting green beekeeping practices among beekeepers in Tanzania. This findings highlights the effectiveness of institutional support, grounded in Resource View Theory (RBV), in evaluating individual behavior through the TPB framework. The results underscore the significance of green beekeeping incentives and environmental commitment within the ISTPB model. They also emphasize the crucial roles of positive attitudes, perceived behavioral control, and individual subjective norms in predicting the adoption of green beekeeping practices. However, while RBV and TPB have mainly been developed and applied in developed contexts, their application in the Tanzanian context highlights their relevance and impact in developing countries. The findings emphasize that strategic institutional support, which significantly influences attitudes, subjective norms, and perceived behavioral control, is critical for promoting green beekeeping practices. This adaptation demonstrates that these theories are adaptable and effective in shaping environmentally friendly behaviors in both established and emerging economies.

The findings emphasize the need for targeted support from policymakers and practitioners to advance and align resources in Tanzania effectively. The government and relevant stakeholders must develop and implement policies that promote technology adoption and provide comprehensive support, including financial assistance, training, and environmental awareness. This support should include initiatives such as grants or subsidies for technology upgrades and educational programs on sustainable practices. Establishing robust training programs and financial incentives will be essential for beekeepers to optimize their practices sustainably. By addressing these needs, policymakers can foster an environment that enhances the use of supportive initiatives, leading to significant improvements in green and sustainable beekeeping. This approach will enable beekeepers in Biharamulo and across Tanzania to manage their production more effectively, ultimately contributing to sustainable socioeconomic development.

This study addresses a crucial gap by providing evidence from a developing country context, where environmental challenges differ from those in developed economies. The positive relationship between institutional support and green beekeeping adoption in Tanzania highlights how technological infrastructure and cultural acceptance influence these practices. This insight is vital for adapting environmental conservation strategies in developing countries' conditions. Future research should explore institutional support in various contexts and sectors to uncover diverse insights. Additionally, using larger sample sizes and varied methods could deepen understanding of institutional support's impact, refining strategies for green adoption and offering broader implications for developed and developing regions.

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