

AN AGENT-BASED MODELLING APPROACH FOR ASSESSING ENTREPRENEURIAL INTENTIONS AND DEVELOPMENT STRATEGIES IN THE RURAL HOSPITALITY INDUSTRY

Yunfei Gu

University of Southampton
Y.Gu@soton.ac.uk

Prof. Bhakti Stephan Onggo

University of Southampton
B.S.S.Onggo@soton.ac.uk

Prof. Martin Kunc

University of Southampton
M.H.Kunc@soton.ac.uk

Dr. Steffen Bayer

University of Southampton
S.C.Bayer@soton.ac.uk

ABSTRACT

Rural hospitality and tourism (RHT) play a key role in rural revitalization, especially due to the impact of COVID-19, with more citizens choosing to travel to the countryside for a staycation. Local SMEs, especially family-owned enterprises, make up the majority of the RHT sector, not only providing services and products to satisfy tourists, but also helping with local employment. However, entrepreneurs operating in rural areas face many challenges in terms of capital, skills and education. Hence, it is important to explore the entrepreneurial intention (EI) of local people and how policies can support or change their behaviours. Current research on the RHT industry, rarely study the EI of local people, and the literature on rural entrepreneurship concentrates on developed countries. This study therefore uses agent-based modelling to explore how locals' EI in Chongming island (China) respond to the current impact of COVID-19, and whether policies will bring about changes on the supply side of RHT sector.

Keywords: Rural tourism, Rural entrepreneurship, Entrepreneurship intention, Agent-based modelling

1 INTRODUCTION

Rural tourism has been recognized as a tool to promote socio-economic growth, especially in a period of transition when traditional rural industries and agriculture were in recession (Chen, 2019; Iorio & Corsale, 2010; Oppermann, 1996). Supporting rural tourism is gradually becoming a popular choice for both developed and developing countries, as tourism can help to tackle local unemployment, increase income and economic diversification, and help to preserve local culture as well as increase local well-being (Rosalina et al., 2021; Sharpley, 2002; Su et al., 2019). As a host and provider of services to urban visitors, the rural hospitality and tourism sector (RHT) plays a key role in rural revitalisation (Reichel et al., 2000). Especially due to the impact of COVID-19, there has been a shift in the choice of tourist destinations, and rural tourism has become an important alternative during this period (Vaishar & Šťastná, 2022; Wen et al., 2020; Zhu & Deng, 2020). It can satisfy the public's need to travel during the epidemic and can also alleviate their anxiety about travelling (Zhu & Deng, 2020). For example, the scale of China's rural tourism reached 867 million visitors from January to May 2021, an increase of 55.5% from the previous year, making RHT the most significant contributor to the domestic tourism economy (China Tourism Academy, 2022).

While rural entrepreneurship is actively encouraged in countries around the world, businesses operating in rural areas, particularly in the tourism industry, face challenges in terms of capital, skills and education compared to similar urban businesses (Badulescu et al., 2016; Chen, 2019; Su, 2011). At the same time, local small and medium-sized enterprises (SMEs), especially family-owned enterprises,

make up the majority of the RHT sector (Ilbery et al., 1998). Hence, to revitalize the rural economy, it is important to understand the *entrepreneurial intention* (EI) of local people and how policies can support or change their behaviours. However, there is little literature on rural tourism entrepreneurship. As a result, tourism policy makers and operators are poorly informed about entrepreneurship in rural areas, especially on the supply side, with less emphasis on local EI and barriers to its operation (Ali & Yousuf, 2019; Pato & Teixeira, 2016; Solvoll, 2015). Furthermore, the existing literature mainly concentrates on developed countries such as UK, Spain, and Finland (Pato & Teixeira, 2016; Thirumalesh Madanaguli et al., 2021).

This research focuses on Chongming island, the third largest island in China, which has historically been a rural and remote area. In the early 21st century, Chongming Island began building an eco-island to promote rural eco-tourism and upgrade its traditional agro-industrial industries (Xie et al., 2019). The Covid-19 pandemic presented an opportunity for Chongming Island, as China's travel restrictions led to a surge in suburban and rural tourism (Zhu & Deng, 2020). Tourist numbers to Chongming Island increased by 199% in 2021 compared to 2018, while local businesses undertaking homestays and catering increased by 59% (Chongming District Bureau of Statistics, 2021). Hence, the aims of this research are to explore the impact of the pandemic on local EI, including whether it served as a catalyst or a hindrance to EI and the extent to which rural EI is influenced by community and peers, and to investigate the role of policy adjustments in encouraging entrepreneurship in RHT sector.

The objective of this paper is to present the conceptual model of an agent-based model (ABM) that can be used to explore the impact of pandemic, community and peer on rural EI. The design of the ABM is based on Esfandiar et al.'s (2019) model of entrepreneurial intention. We will also discuss the questionnaires that we will use to collect local attitudes towards entrepreneurship and other parameters needed for the ABM. As ABM is becoming increasingly popular in business and management research, particularly in innovation and family business studies (Onggo and Foramitti, 2021), it offers a unique advantage in studying heterogeneous populations. ABM allows agents to follow internal logic, interact in a dynamic system, and learn from the external environment (Onggo and Foramitti 2021; Bonabeau, 2002; Swinerd & McNaught, 2012; Vinogradov et al., 2020). This study contributes to the literature on rural entrepreneurship by examining the local EI under the influence of Covid-19 and assisting rural tourism planners in designing strategies to support local SMEs. It also offers new perspectives on the supply side of rural tourism, particularly in developing countries, by contributing to the development of the RHT sector and revitalizing rural economies.

2 LITERATURE REVIEW

2.1 Rural Entrepreneurship

Rural entrepreneurship has been a subject of interest for over a century, but researchers have not yet agreed on a universal definition (Kulawiak et al., 2022). Early research has typically defined rural entrepreneurship in two perspectives: as the image of the traditional entrepreneur with characteristics such as independence and innovation, and as the creation of new firms and jobs (Vaillant & Lafuente, 2007; Wortman, 1990). However, these two perspectives fail to account for the complexity of the rural environment and its differences from urban entrepreneurship (Fortunato, 2014). Instead, a more representative definition views rural entrepreneurship as the creation of a new organization that introduces a new product, serves or creates a new market, or utilizes a new technology in a rural environment (Wortman, 1990). Researchers increasingly recognise that entrepreneurship should be situated within the nature of localised business activities (Schoonhoven & Romanelli, 2001). Rural entrepreneurs are seen as living in rural settings and communities, and they are influenced by rural social characteristics and networks (Stathopoulou et al., 2004).

Rural entrepreneurship has been researched for over twenty years. It has been dominated by economic-related studies especially on the macro policy level, analysing obstacles and challenges (Kulawiak et al., 2022). However, research from a micro perspective is lacking, with existing studies focusing on demographic and psychographic profiles of entrepreneurs, their skill levels, and rural firm characteristics (Pato & Teixeira, 2016). Furthermore, research has primarily focused on the United States and European countries, with less attention paid to low-income countries (Pato & Teixeira, 2016).

Besides, when it comes to RHT sector, entrepreneurship has received relatively limited attention (Thirumalesh Madanaguli et al., 2021). Therefore, more research is needed on the supply side of RHT, especially from the perspective of individuals to analyse barriers and support for development, the characteristics of entrepreneurs, and business performance (Thirumalesh Madanaguli et al., 2021).

2.2 Entrepreneurship Intention

As a crucial stage in the formation of business activity, EI has been studied for over 35 years (López-Fernández et al., 2016). Entrepreneurship arises from individual intention and subsequent actions, so entrepreneurial activities are also considered intentionally planned behaviours (Krueger & Carsrud, 1993; McMullen & Shepherd, 2006). Hence, intention-based models have gained more attention because they are theoretically grounded and explain individual thinking and motivation (Esfandiar et al., 2019). Among the various behavioural models, two widely recognised ones are Shapero's model (Shapero & Sokol, 1982) and Theory of Planned Behaviour (TPB) (Ajzen, 1991). Shapero's entrepreneurial event suggests that launching a new venture requires three key prerequisites, namely propensity to act and perceptions of desirability and feasibility (Shapero & Sokol, 1982). In the TPB model, intentions are triggered by an attitude toward the behaviour, subjective norms and perceived behavioural control (Ajzen, 1991). Both of these behavioural theories have been widely used in different industries over the years.

To describe EI more comprehensively, Krueger (2009) developed a comprehensive model of EI by combining the TPB and Shapero's model (Figure 1). This model includes a new metric, collective effectiveness, which accounts for the influence of the surrounding collective environment and colleagues on intentions, as individual capabilities may sometimes be insufficient to achieve success (Esfandiar et al., 2019; Krueger, 2009). To further understand the relationship between intention and action, Esfandiar et al. (2019) developed a new Entrepreneurial implementation intention model (see Figure 2). In their model, personal desirability is described in terms of attitudes toward entrepreneurship. Intention is described as entrepreneurial goal intentions (EGIs), which capture whether they have goals in the business, while the implementation intention is their determination to start a business. Their studies shows that there is a strong impact of EGIs on implantation intention. Also, social norms are found not to influence the EGI, whereas desirability is the main determinant of EGI, followed by self-efficacy, feasibility, opportunity, attitude, and collective efficacy. While research on EI has been studied for years, the analysis is centred around students' EI (Dolhey, 2019; Gurel et al., 2010). However, little is known about local EI in rural areas, particularly in the RHT industry. Given the significance of revitalising the RHT sector for the local economy, it is crucial to comprehend how local EI is affected by the COVID-19 pandemic.

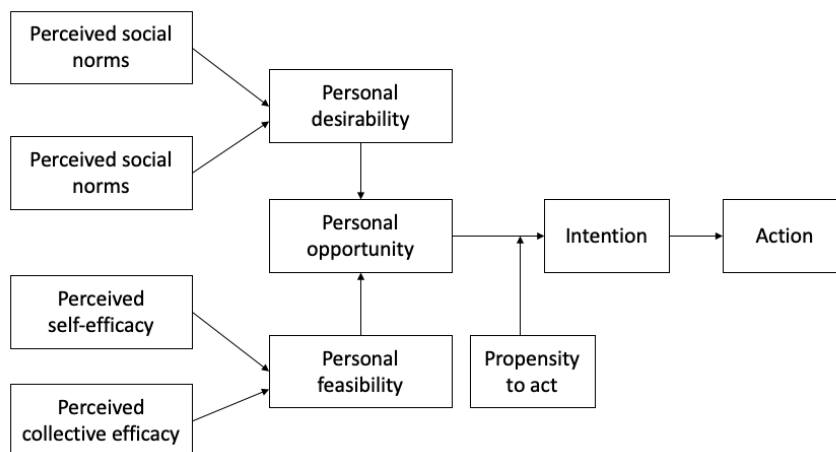


Figure1 Entrepreneurial intention model (adopted from Krueger, 2009)

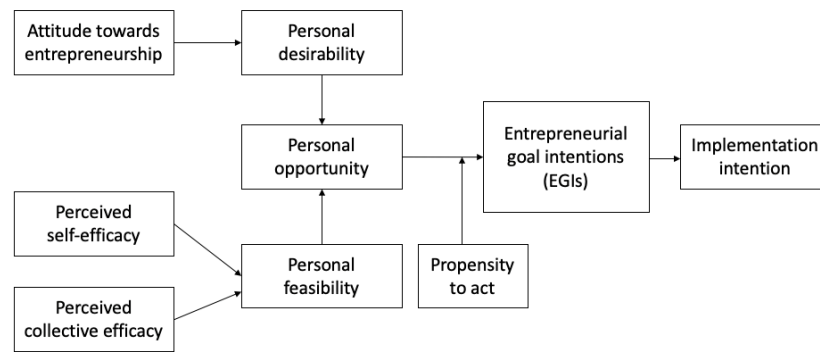


Figure 2 *Entrepreneurial implementation intention model (adopted from Esfandiar et al., 2019)*

3 RESEARCH METHOD

3.1 Agent-based Modelling and Simulation

ABM is a computational method for simulating the interaction of a group of agents to explore dynamic behavioural changes in complex systems (Siebers et al., 2010). Agents in ABM can make decisions based on a series of rules and logic, agents interact with each other, and their behaviour is also influenced by the environment (Bonabeau, 2002; Swinerd & McNaught, 2012). Hence, ABM has the ability to capture the emergent phenomena generated by individual entity interactions, and can simulate the behaviour of complex individual agents to make predictions from a microscopic perspective (Bonabeau, 2002; North & Macal, 2007). These characteristics make ABM appropriate for studying entrepreneurship in tourism, where agents (i.e., entrepreneurs and potential entrepreneurs) can exhibit heterogeneity in terms of their level of education, attitude to risk perception, and financial situation. ABM is widely used in business and management (Onggo & Foramitti, 2021), with applications in supply chain (Utomo et al., 2018), marketing (Negahban & Yilmaz, 2014) and human resource management (An, 2012). In the context of the impact of an epidemic, ABM is a powerful simulation tool that can provide decision analysis (Currie et al., 2020).

Moreover, ABM is increasingly being applied in the tourism industry to analyse the behaviour of tourists and the interactions between individuals (Baktash et al., 2022). ABM has been used to analyse visitor decision-making (Alvarez & Brida, 2019), risk management (Fan et al., 2019) and destination management (Pizzitutti et al., 2014; Student et al., 2020). One advantage of ABM over other modelling and data collection methods is that it can be integrated with theory in modelling and inform tourism decision makers and stakeholders through experimentation (Baktash et al., 2022; Lindkvist et al., 2020). However, most of the applications of ABM in the tourism industry have been cut from the perspective of tourists, with fewer studies analysing the supply side. Thus, this study will use ABM from a supply perspective to provide more information in destination management. The study will also follow the guidelines provided by Monks et al. (2019) on how to document a simulation study. Specifically, the guidelines are referred to as strengthening the reporting of empirical simulation studies (STRESS), which includes six components: objectives, logic, data, experiments, implementation, and code access (Monks et al., 2019).

3.2 Objectives

The ABM model aims to explore how local people's EI will respond under the current impact of Covid-19, and whether different policies will bring about changes on the supply side of rural tourism. Specifically, the model will try to answer the following questions: (1) whether the epidemic is a catalyst or a deterrent to local EI; (2) whether EI in rural areas is more influenced by community resources and surrounding practitioners; and (3) whether different policy adjustments and support would encourage rural residents to start businesses in the RHT sector. This work-in-progress paper presents the conceptual model of the entrepreneurial implementation intention as a foundation for future empirical work using ABM to test the effectiveness of policy adjustments on the supply side of rural tourism. The

model serves as a starting point; further refinement will be needed to better understand the complex dynamics of rural entrepreneurship under Covid-19. Additionally, we demonstrate the potential of ABM as a powerful tool to investigate such dynamics and encourage their further adoption in research on rural entrepreneurship and related areas.

3.3 Data Collection

In ABM, it is essential to capture the behaviour of agents accurately to build an effective model. Both primary and secondary data can be used to achieve this goal. Qualitative and narrative data can help identify the agents' behaviour, such as their rules, goals, and logic, while quantitative data can provide numerical measurements of behaviour, which can be used to validate the model (Baktash et al., 2022). In this study we therefore use questionnaires and interviews, as well as secondary data from different sources, such as local government websites and statistical department reports, to capture the logic and rules behind individuals' behaviour and the goals of their actions.

Between January and April 2022, we conducted a field study in Chongming Island. The field study aimed to understand the challenges and opportunities faced by entrepreneurs in the tourism industry on the island. We interviewed a total of 19 entrepreneurs who were actively involved in the industry, including hotel owners, tour operators, and local attraction providers. During the interviews, we asked the entrepreneurs about their experiences, perspectives, and business practices. The interviews provided valuable insights into the tourism industry in Chongming island. In addition to understanding the experiences of entrepreneurs in the tourism industry on Chongming, we are also interested in exploring the attitudes and willingness of local residents to start their tourism-related business. To achieve this, we have designed a questionnaire that is being distributed online to residents of the island, the questionnaire is provided in the Appendix. This questionnaire aims to explore individuals' attitudes towards entrepreneurship in the tourism industry. It includes questions on basic information, attitudes towards entrepreneurship, perceived self-efficacy and collective efficacy, as well as questions specifically for those who have started their own tourism-related business. Survey data collection is still ongoing.

Based on the interview, secondary data and – once completed – questionnaire responses, we will be able to create a diverse group of agents for our ABM model. These agents will be heterogeneous in terms of their education level, attitudes towards risk perception, financial situation, and motivations for starting a tourism-related business. By incorporating this diversity into the model, we will be able to simulate the behaviour of agents with different characteristics.

3.4 Model Logic

The model is designed based on Esfandiar et al. (2019)'s entrepreneurial implementation intention model (Figure 3). There are three main elements that influence the EI, namely, attitudes towards entrepreneurship (ATE), perceived self-efficacy (PSE) and perceived collective efficacy (PCE).

The equation for ATE is shown in Equation (1). Variable attitudes (AT) is an indicator of whether local people are subjectively interested in or discouraged by entrepreneurship. Variable risk perceptions (RP) is an indicator of whether local people still have confidence in the RHT sector under the influence of epidemic. The two variables combined represent the attitudes of the local people towards entrepreneurship. We use five point scale to measure AT and RP. For example, if an agent has a very positive and optimistic attitude of entrepreneurship, this agent will have an AT score of 5. Similarly, if the agent also feels very positive about future risks, then the RP is also 5. The data for these two variables is collected from interviews and questionnaires.

$$ATE = AT * RP \quad (1)$$

The second part is perceived self-efficacy (PSE), where we use the education level (EL) and available resources (AR) to capture the ability of locals to start a business. These two variables are collected using both primary data and secondary data from the official statistic reports. Equation (2) shows the calculation of PSE. We also use the five point scale to measure EL and PSE. Since each agent may have a different sensitivity to the indicator (Fan et al., 2019), we add a random coefficient β_1 to

represent agent's sensitivity to the two capabilities. β_1 is a random number between 0 to 1, where 0 indicates that the agent is completely insensitive to the indicator and 1 indicates that it is extremely sensitive to it.

$$PSE = \beta_1 * EL * AR \quad (2)$$

The last component is perceived collective efficacy (PCE). We use the number of people in the agent's community who are already engaged in the RHT sector (CE), and the resources available to the local community (ACR) as representatives. The data for these two variables are collected from government websites. EL and AR are also measured using the five point scale (Equation (3)). Similarly, we use a random coefficient β_2 to demonstrate the different sensitivity levels of the agents. The final intention (IT) is the sum of the three components, and each element has a weight factor W , where the sum of the three weight factors is equal to 1 (Equation (4)).

$$PCE = \beta_2 * CE * ACR \quad (3)$$

$$IT = W_1 * ATE + W_2 * PSE + W_3 * PCE \quad (4)$$

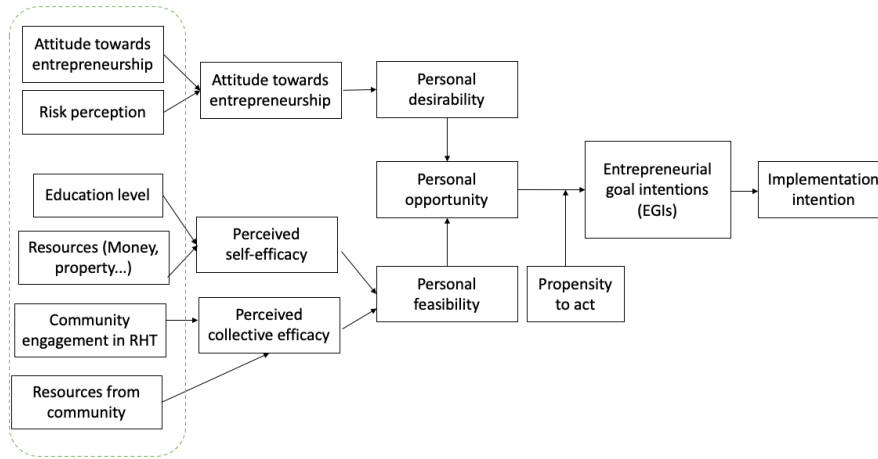


Figure 3 Extended entrepreneurial implementation intention model (adopted from Esfandiar et al., 2019)

Figure 4 shows a state chart of the ABM (using AnyLogic software). This conceptual model includes the following elements:

Agents: The agents in the model represent both existing entrepreneurs and potential entrepreneurs in the tourism industry at Chongming Island. They are characterised by various attributes such as their level of education, attitude towards risk and financial situation. The agents' decisions are influenced by their individual attributes and the actions of other agents in the model.

Environment: The model is set in the context of the RHT industry in Chongming Island, with various environmental factors affecting the agents' decisions. These may include government policies, infrastructure, competition, and external events such as pandemics or natural disasters.

Interactions: The agents interact with each other and the environment through various channels, such as collaborations, competition, learning, and information exchange. These interactions can shape the agents' attitudes, behaviour, and decision-making processes.

Agent states: Based on their characteristics and interactions, the agents can move into four agent states: 'Locals who are not entrepreneurs', 'Not Interested', 'Become an Entrepreneur', and 'Existing Local Entrepreneur'.

Expected outputs: The model can produce various results such as, the number of local entrepreneurs likely to start up in the future, the level of competitiveness of the industry, the economic and social impact of entrepreneurship, and the factors that promote or hinder entrepreneurial activity.

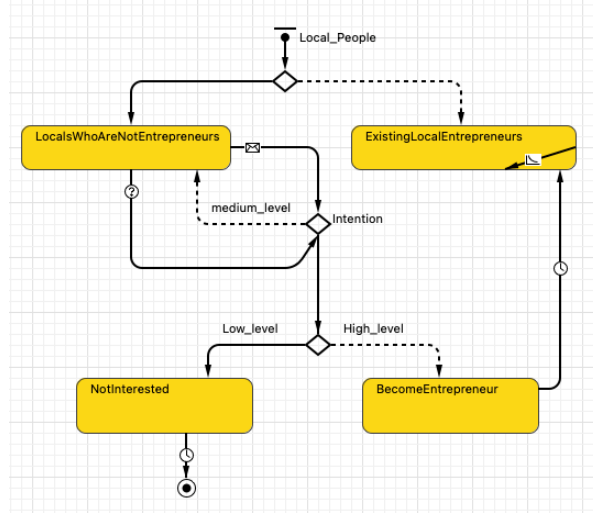


Figure 4 ABM state chart

3.5 Experimentation

The entry point is all residents in Chongming, and as each person enters the simulation they will be divided into two categories. The first being locals who are not currently tourism entrepreneurs, and the second being those who are already working in tourism entrepreneurship. Each agent's characteristics, such as education level and perceived risk level, will follow different distributions based on the collected data and will be assigned to each agent when entering the model. The proportion of the two states will be determined based on the entrepreneurs data in Chongming island.

Agents who are at 'Locals who are not entrepreneurs' state will have the chance to generate strong EI and become a local entrepreneur. This transition can be triggered in two paths. The first path is influenced by the existing local tourism entrepreneurs, affecting the agent's perceptions through their friends, relatives or neighbour entrepreneurs. One thing to note is that this influence can be positive, increasing the agent's intention, or it can be negative, de-motivating the agent. The second path is triggered by conditions that calculate the strength of an agent's intention based on variables such as risk perception, education level, and available resources. The EI of each agent is calculated in the 'Intention branch'. The intention will be divided into three different levels: low, medium, and high. Agents with medium-level intention will move back to the 'Locals who are not entrepreneurs' state, where they still have the opportunity to change their minds. Agents with low or high-level intention will move to the 'Not Interested' or 'Become an Entrepreneur' state, respectively. Research suggests that new entrepreneurs can have a significant impact on the EI of people in their social networks (Liñán & Chen, 2009). This is because people tend to be more likely to take advice and follow the example of those they trust and have a close relationship with. As a result, it is possible that these new local entrepreneurs may influence their friends, family members, or neighbours to consider starting a business themselves. This could be particularly impactful in rural areas where social networks are often tightly knit (Huggins & Thompson, 2015). Thus, when individuals become entrepreneurs, their influence can spread randomly throughout their social networks, creating a ripple effect of EI and behaviours (Greve & Salaff, 2003).

4 CONCLUSIONS

This paper demonstrates the potential of ABM in understanding the complex and multifaceted factors that influence the EI of local residents in the RHT sector on Chongming island. Through providing a conceptual ABM model, we aim to simulate the behaviour of heterogeneous agents, including both existing entrepreneurs and potential entrepreneurs. Although the data collection is still ongoing, our preliminary findings suggest that the factors that influence EI are complex and multifaceted, with individual characteristics as well as environmental factors, all playing a significant role. Moving forward, we plan to use the questionnaire results to calibrate and validate our model. We also plan to

conduct sensitivity analysis to examine the robustness of the model and explore different scenarios, such as changes in government policies or external economic shocks. We expect to provide valuable insights and recommendations for policymakers and industry stakeholders, as well as academics interested in entrepreneurship, tourism, and agent-based modelling. In summary, this study provides an approach to understanding the EI of residents in a tourism destination. The findings will contribute to the existing literature on tourism entrepreneurship in rural areas, applications of ABM, and can also inform policy and industry decision-making.

A APPENDIX: QUESTIONNAIRE ON THE INTENTION OF RESIDENTS TO START THEIR OWN TOURISM-RELATED BUSINESSES ON CHONGMING.

Section 1: Basic Information

- 1.1) Please provide your gender? [Male] [Female] [Non-binary] [Prefer not to say]
- 1.2) Please provide your age range:? [18-24] [25-34] [35-44] [45-54] [55 or older]
- 1.3) Please provide your education level? [Junior high school degree or below] [High school degree] [Some college or associate degree] [Bachelor's degree] [Graduate degree or above]
- 1.4) Have you started your own tourism-related business? [Yes] [No]
- If Yes, please skip to Section 5
- If No, please continue to the next question.
- 1.5) Have you ever considered starting your own tourism-related business? [Yes] [No]

Section 2: Attitude towards entrepreneurship

- 2.1) How much do you agree with the following statement: "Entrepreneurship is a desirable career choice for me.":
[Strongly disagree] [Disagree] [Neutral] [Agree] [Strongly agree]
- 2.2) How much do you agree with the following statement: "Entrepreneurship is a risky career choice.":
[Strongly disagree] [Disagree] [Neutral] [Agree] [Strongly agree]
- 2.3) How much risk do you associate with starting your own tourism-related business?
[Very Low] [Low] [Moderate] [High] [Very High]
- 2.3) In your opinion, how has the COVID-19 pandemic affected the level of risk associated with starting your own tourism-related business?
[Decreased Risk] [No Change] [Increased Risk] [Unsure/No Opinion]
- 2.4) What do you consider to be the risks associated with starting a tourism-related business? Please select all that apply.
 - a) financial risks (e.g., lack of funding, debt)
 - b) Market risks (e.g., lack of demand, competition)
 - c) Operational risks (e.g., staffing, supply chain disruptions, lack of knowledge and training)
 - d) Regulatory risks (e.g., licensing, legal compliance)
 - e) Force majeure (e.g., natural disasters, other pandemics)
 - f) Other (please specify): _____

Section 3: Perceived self-efficacy

- 3.1) How much do you agree with the following statement: "I feel confident in my ability to start and run a tourism-related business." [Strongly disagree] [Disagree] [Neither agree nor disagree] [Agree] [Strongly agree]
- 3.2) How much do you think your education/training/specialist knowledge will influence you on starting and running a tourism-related business? [Not at all] [Slightly] [Moderately] [Very much] [Completely]
- 3.3) Do you feel that your level of education has prepared you to start and run a business? [Yes] [No]
- 3.4) How much do you think the availability of resources (e.g., money, property) will influence your perceived self-efficacy in starting and running a tourism-related business? [Not at all] [Slightly] [Moderately] [Very much] [Completely]
- 3.5) Do you have access to financial resources (e.g., savings, loans) to start a business? [Yes] [No]

Section 4: Perceived collective efficacy

4.1) Have any of your friends, family members, or neighbours started their own tourism-related business on the island? [Yes] [No]

4.2) If yes, how much influence did they have on your interest in starting your own tourism-related business? [No influence] [Little influence] [Some influence] [Significant influence] [Major influence]

4.3) To what extent do you agree or disagree with the following statement: "Seeing family members, friends, or neighbours start their own businesses makes me more confident in my ability to start a tourism-related business."
[Strongly agree] [Somewhat agree] [Neither agree nor disagree] [Somewhat disagree] [Strongly disagree]

4.4) Do you think there are enough resources available in the community to support new tourism-related businesses? [Yes] [No]

4.5) To what extent do you agree or disagree with the following statement: "If there is enough support from the community, I would be more confident in my ability to start a tourism-related business."
[Strongly agree] [Somewhat agree] [Neither agree nor disagree] [Somewhat disagree] [Strongly disagree]

4.6) What types of support do you think the community could provide to help you start a tourism-related business? (select all that apply)

- a. Business training and education
- b. Mentorship and guidance from experienced entrepreneurs
- c. Marketing and promotional assistance
- d. Networking and colorations with other entrepreneurs
- e. Other (please specify)

Section 5: Experience as an Entrepreneur

5.1) How long have you been running your tourism-related business? [Less than 1 year] [1-3 years] [3-5 years] [More than 5 years]

5.2) How did you finance your business start-up costs? (Multiple answer)
[Personal savings] [Bank loan] [Grants or government funding] [Investors or venture capital] [Crowdfunding] Other (please specify)

5.3) Would you encourage a friend or family member to start their own tourism-related business?
[Definitely not] [Unlikely] [Neutral] [Likely] [Definitely]

REFERENCES

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Ali, A., & Yousuf, S. (2019). Social capital and entrepreneurial intention: Empirical evidence from rural community of Pakistan. *Journal of Global Entrepreneurship Research*, 9(1), 64. <https://doi.org/10.1186/s40497-019-0193-z>
- Alvarez, E., & Brida, J. G. (2019). An agent-based model of tourism destinations choice. *International Journal of Tourism Research*, 21(2), 145–155. <https://doi.org/10.1002/jtr.2248>
- An, L. (2012). Modeling human decisions in coupled human and natural systems: Review of agent-based models. *Ecological Modelling*, 229, 25–36. <https://doi.org/10.1016/j.ecolmodel.2011.07.010>
- Badulescu, D., Giurgiu, A., Istudor, N., & Badulescu, A. (2016). Rural tourism development and financing in Romania: A supply-side analysis. *Agricultural Economics (Zemědělská Ekonomika)*, 61(No. 2), 72–82. <https://doi.org/10.17221/94/2014-AGRICECON>
- Baktash, A., Huang, A., de la Mora Velasco, E., Jahromi, M. F., & Bahja, F. (2022). Agent-based modelling for tourism research. *Current Issues in Tourism*, 1–13. <https://doi.org/10.1080/13683500.2022.2080648>
- Bonabeau, E. (2002). Agent-based modeling: Methods and techniques for simulating human systems. *Proceedings of the National Academy of Sciences*, 99(suppl_3), 7280–7287. <https://doi.org/10.1073/pnas.082080899>

- Chen, Z. (2019). A Study on the Problems and Countermeasures of the Development of Rural Ecotourism in China. *Journal of Advances in Economics and Finance*, 4(1). <https://doi.org/10.22606/jaef.2019.41006>
- China Tourism Academy. (2022, July 5). *National cultural consumption data report for the first half of 2022*. <http://www.ctaweb.org.cn/cta/gzdt/202208/a07f12fc72b4466483a5302dbfb82495.shtml>
- Chongming District Bureau of Statistics. (2021). *Chongming Statistical Yearbook 2021*.
- Dolhey, S. (2019). A bibliometric analysis of research on entrepreneurial intentions from 2000 to 2018. *Journal of Research in Marketing and Entrepreneurship*, 21(2), 180–199. <https://doi.org/10.1108/JRME-02-2019-0015>
- Esfandiar, K., Sharifi-Tehrani, M., Pratt, S., & Altinay, L. (2019). Understanding entrepreneurial intentions: A developed integrated structural model approach. *Journal of Business Research*, 94, 172–182. <https://doi.org/10.1016/j.jbusres.2017.10.045>
- Fan, C., Gong, L., & Li, H. (2019). An agent-based model approach for assessing tourist recovery strategies after an earthquake: A case study of Jiuzhai Valley. *Tourism Management*, 75, 307–317. <https://doi.org/10.1016/j.tourman.2019.05.013>
- Fortunato, M. W.-P. (2014). Supporting rural entrepreneurship: A review of conceptual developments from research to practice. *Community Development*, 45(4), 387–408. <https://doi.org/10.1080/15575330.2014.935795>
- Greve, A., & Salaff, J. W. (2003). Social Networks and Entrepreneurship. *Entrepreneurship Theory and Practice*, 28(1), 1–22. <https://doi.org/10.1111/1540-8520.00029>
- Gurel, E., Altinay, L., & Daniele, R. (2010). Tourism students' entrepreneurial intentions. *Annals of Tourism Research*, 37(3), 646–669. <https://doi.org/10.1016/j.annals.2009.12.003>
- Huggins, R., & Thompson, P. (2015). Entrepreneurship, innovation and regional growth: A network theory. *Small Business Economics*, 45(1), 103–128. <https://doi.org/10.1007/s11187-015-9643-3>
- Iorio, M., & Corsale, A. (2010). Rural tourism and livelihood strategies in Romania. *Journal of Rural Studies*, 26(2), 152–162. <https://doi.org/10.1016/j.jrurstud.2009.10.006>
- Krueger, N. (2009). Entrepreneurial Intentions are Dead: Long Live Entrepreneurial Intentions. In A. L. Carsrud & M. Brännback (Eds.), *Understanding the Entrepreneurial Mind* (pp. 51–72). Springer New York. https://doi.org/10.1007/978-1-4419-0443-0_4
- Krueger, N. F., & Carsrud, A. L. (1993). Entrepreneurial intentions: Applying the theory of planned behaviour. *Entrepreneurship & Regional Development*, 5(4), 315–330. <https://doi.org/10.1080/08985629300000020>
- Kulawiak, A., Suliborski, A., & Rachwał, T. (2022). Research on Rural Entrepreneurship in Terms of the Literature: Definition Problems and Selected Research Issues. *Quaestiones Geographicae*, 41(2), 7–19. <https://doi.org/10.2478/quageo-2022-0020>
- Liñán, F., & Chen, Y. (2009). Development and Cross-Cultural Application of a Specific Instrument to Measure Entrepreneurial Intentions. *Entrepreneurship Theory and Practice*, 33(3), 593–617. <https://doi.org/10.1111/j.1540-6520.2009.00318.x>
- Lindkvist, E., Wijermans, N., Daw, T. M., Gonzalez-Mon, B., Giron-Nava, A., Johnson, A. F., van Putten, I., Basurto, X., & Schlüter, M. (2020). Navigating Complexities: Agent-Based Modeling to Support Research, Governance, and Management in Small-Scale Fisheries. *Frontiers in Marine Science*, 6. <https://www.frontiersin.org/articles/10.3389/fmars.2019.00733>
- López-Fernández, M. C., Serrano-Bedia, A. M., & Pérez-Pérez, M. (2016). Entrepreneurship and Family Firm Research: A Bibliometric Analysis of An Emerging Field. *Journal of Small Business Management*, 54(2), 622–639. <https://doi.org/10.1111/jsbm.12161>
- McMullen, J. S., & Shepherd, D. A. (2006). Entrepreneurial Action And The Role Of Uncertainty In The Theory Of The Entrepreneur. *Academy of Management Review*. <https://doi.org/10.5465/amr.2006.19379628>
- Monks, T., Currie, C. S. M., Onggo, B. S., Robinson, S., Kunc, M., & Taylor, S. J. E. (2019). Strengthening the reporting of empirical simulation studies: Introducing the STRESS guidelines. *Journal of Simulation*, 13(1), 55–67. <https://doi.org/10.1080/17477778.2018.1442155>
- Negahban, A., & Yilmaz, L. (2014). Agent-based simulation applications in marketing research: An integrated review. *Journal of Simulation*, 8(2), 129–142. <https://doi.org/10.1057/jos.2013.21>

- Onggo, B. S., & Foramitti, J. (2021). Agent-Based Modeling and Simulation For Business and Management: A Review and Tutorial. *2021 Winter Simulation Conference (WSC)*, 1–15. <https://doi.org/10.1109/WSC52266.2021.9715352>
- Oppermann, M. (1996). Rural tourism in Southern Germany. *Annals of Tourism Research*, 23(1), 86–102. [https://doi.org/10.1016/0160-7383\(95\)00021-6](https://doi.org/10.1016/0160-7383(95)00021-6)
- Pato, M. L., & Teixeira, A. A. C. (2016). Twenty Years of Rural Entrepreneurship: A Bibliometric Survey: Twenty years of rural entrepreneurship. *Sociologia Ruralis*, 56(1), 3–28. <https://doi.org/10.1111/soru.12058>
- Pizzitutti, F., Mena, C. F., & Walsh, S. J. (2014). Modelling Tourism in the Galapagos Islands: An Agent-Based Model Approach. *Journal of Artificial Societies and Social Simulation*, 17(1), 14. <https://doi.org/10.18564/jasss.2389>
- Reichel, A., Lowengart, O., & Milman, A. (2000). Rural tourism in Israel: Service quality and orientation. *Tourism Management*, 21(5), 451–459. [https://doi.org/10.1016/S0261-5177\(99\)00099-0](https://doi.org/10.1016/S0261-5177(99)00099-0)
- Rosalina, P. D., Dupre, K., & Wang, Y. (2021). Rural tourism: A systematic literature review on definitions and challenges. *Journal of Hospitality and Tourism Management*, 47, 134–149. <https://doi.org/10.1016/j.jhtm.2021.03.001>
- Schoonhoven, C. B., & Romanelli, E. (2001). *The Entrepreneurship Dynamic: Origins of Entrepreneurship and the Evolution of Industries*. Stanford University Press.
- Shapero, A., & Sokol, L. (1982). *The Social Dimensions of Entrepreneurship* (SSRN Scholarly Paper No. 1497759). <https://papers.ssrn.com/abstract=1497759>
- Sharpley, R. (2002). Rural tourism and the challenge of tourism diversification: The case of Cyprus. *Tourism Management*, 23(3), 233–244. [https://doi.org/10.1016/S0261-5177\(01\)00078-4](https://doi.org/10.1016/S0261-5177(01)00078-4)
- Siebers, P. O., Macal, C. M., Garnett, J., Buxton, D., & Pidd, M. (2010). Discrete-event simulation is dead, long live agent-based simulation! *Journal of Simulation*, 4(3), 204–210. <https://doi.org/10.1057/jos.2010.14>
- Solvoll, S. (2015). Tourism Entrepreneurship – Review and Future Directions. *Scandinavian Journal of Hospitality and Tourism*, 15, 120–137.
- Stathopoulou, S., Psaltopoulos, D., & Skuras, D. (2004). Rural entrepreneurship in Europe: A research framework and agenda. *International Journal of Entrepreneurial Behavior & Research*, 10(6), 404–425. <https://doi.org/10.1108/13552550410564725>
- Student, J., Kramer, M. R., & Steinmann, P. (2020). Simulating emerging coastal tourism vulnerabilities: An agent-based modelling approach. *Annals of Tourism Research*, 85, 103034. <https://doi.org/10.1016/j.annals.2020.103034>
- Su, B. (2011). Rural tourism in China. *Tourism Management*, 32(6), 1438–1441. <https://doi.org/10.1016/j.tourman.2010.12.005>
- Su, M. M., Wall, G., Wang, Y., & Jin, M. (2019). Livelihood sustainability in a rural tourism destination—Hetu Town, Anhui Province, China. *Tourism Management*, 71, 272–281. <https://doi.org/10.1016/j.tourman.2018.10.019>
- Swinerd, C., & McNaught, K. R. (2012). Design classes for hybrid simulations involving agent-based and system dynamics models. *Simulation Modelling Practice and Theory*, 25, 118–133. <https://doi.org/10.1016/j.simpat.2011.09.002>
- Thirumalesh Madanaguli, A., Kaur, P., Bresciani, S., & Dhir, A. (2021). Entrepreneurship in rural hospitality and tourism. A systematic literature review of past achievements and future promises. *International Journal of Contemporary Hospitality Management*, 33(8), 2521–2558. <https://doi.org/10.1108/IJCHM-09-2020-1121>
- Utomo, D. S., Onggo, B. S., & Eldridge, S. (2018). Applications of agent-based modelling and simulation in the agri-food supply chains. *European Journal of Operational Research*, 269(3), 794–805. <https://doi.org/10.1016/j.ejor.2017.10.041>
- Vaillant, Y., & Lafuente, E. (2007). Do different institutional frameworks condition the influence of local fear of failure and entrepreneurial examples over entrepreneurial activity? *Entrepreneurship & Regional Development*, 19(4), 313–337. <https://doi.org/10.1080/08985620701440007>

- Vaishar, A., & Štátná, M. (2022). Impact of the COVID-19 pandemic on rural tourism in Czechia Preliminary considerations. *Current Issues in Tourism*, 25(2), 187–191. <https://doi.org/10.1080/13683500.2020.1839027>
- Vinogradov, E., Leick, B., & Kivedal, B. K. (2020). An agent-based modelling approach to housing market regulations and Airbnb-induced tourism. *Tourism Management*, 77, 104004. <https://doi.org/10.1016/j.tourman.2019.104004>
- Wen, J., Kozak, M., Yang, S., & Liu, F. (2020). COVID-19: Potential effects on Chinese citizens' lifestyle and travel. *Tourism Review*, 76(1), 74–87. <https://doi.org/10.1108/TR-03-2020-0110>
- Wortman Jr., M. S. (1990). Rural entrepreneurship research: An integration into the entrepreneurship field. *Agribusiness*, 6(4), 329–344. [https://doi.org/10.1002/1520-6297\(199007\)6:4<329::AID-AGR2720060405>3.0.CO;2-N](https://doi.org/10.1002/1520-6297(199007)6:4<329::AID-AGR2720060405>3.0.CO;2-N)
- Xie, L., Flynn, A., Tan-Mullins, M., & Cheshmehzangi, A. (2019). The making and remaking of ecological space in China: The political ecology of Chongming Eco-Island. *Political Geography*, 69, 89–102. <https://doi.org/10.1016/j.polgeo.2018.12.012>
- Zhu, H., & Deng, F. (2020). How to Influence Rural Tourism Intention by Risk Knowledge during COVID-19 Containment in China: Mediating Role of Risk Perception and Attitude. *International Journal of Environmental Research and Public Health*, 17(10), Article 10. <https://doi.org/10.3390/ijerph17103514>

AUTHOR BIOGRAPHIES

YUNFEI GU is a PhD candidate at Southampton Business School, the University of Southampton, UK. She obtained a Bachelor of Management degree in Tourism Management from Zhengzhou University in China and a MSc in Business Analysis with distinction from Warwick Business School, the University of Warwick. Her research interests lie in sustainable tourism development, strategic management and different simulation modelling methodology. Her email address is Y.Gu@soton.ac.uk.

STEPHAN ONGGO is a Professor of Business Analytics at Southampton Business School, the University of Southampton. He is a member of the Centre for Operational Research, Management Sciences and Information Systems (CORMSIS). His research interests lie in the areas of simulation modelling methodology (symbiotic simulation/digital twin, hybrid modelling, agent-based simulation, discrete-event simulation) with applications in supply chain, health care and disaster management. He is the associate editor for the Journal of Simulation and Health Systems. His website is <https://bsonggo.wordpress.com>. His email address is b.s.s.onggo@soton.ac.uk.

MARTIN KUNC is a Professor of Business Analytics/Management Science at Southampton Business School, the University of Southampton. Previously to becoming an academic, he was a consultant at Arthur Andersen. He has also had independent consulting projects in the media, pharmaceutical, financial services, consumer goods, cement and wine industries. He is a member of the Centre for Operational Research, Management Sciences and Information Systems (CORMSIS). He is interested in the intersection of management science, behavioural science and strategic management. He is interim Director of the Centre for Healthcare Analytics and is Editor-in-Chief of the Journal of the Operational Research Society. His email address is M.H.Kunc@soton.ac.uk

STEFFEN BAYER is a Lecturer in Business Analytics within Southampton Business School at the University of Southampton. He is the Programme Leader of the MSc in Business Analytics and Finance. He is a member of the editorial board of Operations Research for Health Care and a past president of the UK Chapter of the International Systems Dynamics Society. Steffen's main research interest is the planning of health services. His past work includes studies on stroke care, renal care, human resource planning and home-based technology supported health delivery. He uses a variety of approaches in his research including qualitative research, system dynamics, agent-based modelling and discrete event simulation. His email address is S.C.Bayer@soton.ac.uk