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How do autonomy and inquisitiveness play roles in sustainable development? Implications from matrilineal Island Palau

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How do autonomy and inquisitiveness play roles in sustainable development? Implications from matrilineal Island Palau

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Abstract

Sustainable development goals (SDGs) have become common missions for humanity all over the world. However, little is known about what types of people or societies are likely to achieve SDGs or to steadily follow the paths. This research considers that generativity and wellbeing shall be necessary and salient indicators people in societies must enhance for achieving SDGs, hypothesizing that people with high autonomy (being independent & resisting social pressure) and inquisitiveness (adaptability to new social and/or environmental changes) tend to be generative and happy. To empirically examine the hypothesis, we analyze people's generativity and wellbeing as essential elements of SDGs and statistically characterize them in relation to autonomy and inquisitiveness with the data from questionnaire surveys and experiments of 413 residents in matrilineal Island Palau. We choose Palau as the field, because rapid social and environmental changes are ongoing from traditional to modern societies and a wide variation of people is expected to be observed compared to any field in other nations, even with small sample size. Two main results are obtained. First, the analysis identifies the importance of inquisitiveness in that people with high inquisitiveness tend to be generative. Second, people's wellbeing is high as they are generative, autonomous and inquisitive, demonstrating two influential roles of inquisitiveness on happiness as direct and indirect determinants through a mediator of generativity. Overall, the results suggest that autonomy and inquisitiveness contribute to people's generativity and wellbeing even in tradition-oriented societies, such as Palau, and their improvements are considered specific paths for materializing SDGs.

Keywords: Autonomy; inquisitiveness; generativity; wellbeing; SDGs; Palau

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Nomenclature

LGS Loyola generative scale

OSH Overall subjective happiness

SDGs Sustainable development goals

SEM Structural equation modeling

SHS Subjective happiness Scale

SVO Social value orientation

SWB Subjective wellbeing

USD US dollar

1 Introduction

Sustainability has become a key issue in protecting our planet and future generations, together with growing concerns for globalism, capitalism and environmental problems (Ostrom, 2009, Sen, 2013, Piketty, 2014). Therefore, sustainable development goals (SDGs) are established and advocated as the missions for humanity, now being a slogan for sustainability all over the world (United Nations, 2015, 2019, WHO, 2019). The literature argues that generativity (a concern and commitment for next generations) and wellbeing are highly associated with one another, being essential

predictors for sustainability or SDGs (Shahrier et al., 2016, 2017, Timilsina et al., 2019, Shahen et al., 2019, Hirose and Kotani, 2022). That is, people shall be sustainable when they are generative and happy in their daily life. Other researchers claim that autonomy (being independent & resisting social pressure) and inquisitiveness (adaptability to new social and/or environmental changes) are fundamental personal elements to characterize people's wellbeing and sustainability (Ryan and Deci, 2000, De-Juanas et al., 2020, Xie et al., 2020, Boiman-Meshita and Littman-Ovadia, 2022, Hirose and Kotani, 2022). For example, people in tradition-oriented societies are usually reluctant to accept something and someone different or new (low inquisitiveness) and tend to follow indigenous rules without expressing their opinions (low autonomy) for maintaining sustainability in their communities (Savells, 1991, Simon, 1997, Kizilhan, 2014, Watson, 2018, Dewi and Suyasa, 2019, Watson, 2019). In this paper, we consider that such autonomy and inquisitiveness shall be highly concerned with sustainability, addressing these factors to be important determinants for generativity and wellbeing.

Erikson (1963) introduces the concept of generativity and defines it as concerns of establishing and guiding successive generations. Generativity is associated with bearing and raising children, but is not limited to the domain of parenthood (Kotre, 1996, Rossi, 2001, McAdams, 2013). Various activities and behaviors spanning helping, guiding and teaching something useful to young generations are also considered expressions of generativity (McAdams, 2001). Generativity scales have been developed to measure people's behaviors and concerns (i.e., the Loyola generativity scale (LGS) and the generative behavior checklist (GBC)) (McAdams et al., 1993, McAdams, 2001, Hofer et al., 2008). By employing these scales, the literature establishes that generativity in relation to psychological and sociodemographic factors, such as age, types of societies and value orientations, is highly associated with sustainability or SDGs (Shahen et al., 2019, Timilsina et al., 2019, Shiel et al., 2020, Hirose and Kotani, 2022).

Maslow (1954) introduces a life satisfaction theory based on psychological need gratification processes. Life satisfaction, an indicator of wellbeing, is defined as an evaluation of overall human life (Huebner et al., 2005, Diener, 2009), and the scales have been developed to measure people's

subjective wellbeing (SWB), for example, the subjective happiness scale (SHS), the satisfaction with life scale (SWLS) and so on (see, e.g., Diener et al., 1999, Lyubomirsky and Lepper, 1999). Following these works, some literature establishes that age, gender, income, generativity, relationships, personality traits and value orientations are important determinants for people's SWB (Welsch, 2006, Zidansek, 2007, Leung et al., 2011, Bibi et al., 2015, Meisenberg and Woodley, 2015, Magnani and Zhu, 2018, Au et al., 2020). Past studies have also empirically examined the relationship between wellbeing, generativity and social preferences, attracting attention in the emergence of problems on sustainability and finding some mixed results for associations among these three factors (Layous et al., 2012, Dunn et al., 2014, Rudd et al., 2014, Aknin et al., 2015, Morselli and Passini, 2015, Timilsina et al., 2019, Shahen et al., 2019).

Autonomy is known to indicate the extent to which people view themselves as being independent and resisting social pressures as well as the enthusiasm or psychological freedom that people feel in carrying out an activity and in choosing (De Charms and Carpenter, 1968, Hackman and Oldham, 1976, Deci and Ryan, 2000). Therefore, autonomy is considered one of the most valuable orientations for people to be intrinsically motivated to do activities for enjoyment (Gagné, 2003, Chekola, 2007). The measures have been developed as the subscale of several psychological tests, such as the general causality orientations scale, Ryff's psychological wellbeing scales and Iowa developing autonomy inventory (Deci and Ryan, 1985, Jackson and Hood, 1985, Ryff, 1989). Gagné (2003) examines the questionnaire data with 121 Canadian college students and finds that autonomy is positively related to engagement in people's satisfaction and prosocial behaviors. Baard et al. (2004) analyze the data of 59 American workers and present that autonomy is essential in work motivations and satisfactions. Overall, autonomy influences the establishment and maintenance of relations with surrounding people, work motivations and satisfactions (Greeley and Tinsley, 1988, Taub, 1995, Kafka and Kozma, 2002, Baard et al., 2004, Charry et al., 2020, López-Pérez and Zuffianò, 2021).

Inquisitiveness is a concept to express adaptation & acceptance of something and someone different and/or new, and is essential for people to gain creativity, fulfillment and viewpoints (Hi-

rayama and Kusumi, 2004, Black, 2005, Bardone and Secchi, 2017, Watson, 2018). For example, an inquisitive person tends to start communications with others by asking good questions (Kashdan et al., 2009, Silvia and Kashdan, 2009, Kashdan et al., 2011, Hagtvedt et al., 2019, Watson, 2019). There are several inquisitiveness scales, and some studies demonstrate that an inquisitive person effectively learns something and engage with people regardless of their background, positions and roles, creatively solving certain problems in the case studies of nursing and schooling (Yeh, 2002, Kawashima and Petrini, 2004, Hirayama and Kusumi, 2004, Hogan and Hogan, 2007, Secchi and Adamsen, 2017). Hirose and Kotani (2022) also examine the questionnaire data with 400 Japanese adults and find that inquisitiveness is crucial in enhancing both generativity and wellbeing. Overall, inquisitiveness is established to be a vital element in promoting people's creativity and performances in some domains (Blank and Covington, 1965, Baldwin and Moses, 1996, Black, 2005, Cluver, 2010, Hirose and Kotani, 2022).

No previous researches have addressed how generativity and wellbeing are characterized by cognitive, noncognitive and sociodemographic factors, such as autonomy and inquisitiveness as well as by one another within a single analytical framework. Building upon the previous literature, this research argues people's generativity and wellbeing as essential elements of SDGs and characterizes them in relation to autonomy and inquisitiveness with the data from questionnaire surveys and experiments of 413 residents in matrilineal Island Palau. Specifically, we pose the open questions of "how do autonomy and inquisitiveness play roles in people's generativity?" and "how do autonomy and inquisitiveness affect people's wellbeing possibly through an interplay with generativity?" It is hypothesized that people with high autonomy (being independent & resisting social pressure) and inquisitiveness (adaptability to new social and/or environmental changes) tend to be generative and happy. To empirically examine the questions and hypothesis through conducting survey experiments, we choose Palau as the field, because rapid social and environmental changes are ongoing from traditional to modern societies and a wide variation of people is expected to be observed as compared to any other nation, even with small sample size.

2 Study regions

We conduct questionnaire surveys and experiments in the Republic of Palau (figure 1). Palau is an archipelago consisting of more than 700 islands (only 12 of which are inhabited). Palau has a population of approximately 20 000, with roughly two-thirds of the inhabitants living on Koror Island (OPSP, 2016). This island country possesses the same culture, language and religious variation, except for economic development. Palau had been originally characterized by a strong ascribed-hierarchical social ranking system where matrilineal descent determined social status, inheritance, clan structure, residence and land tenure (Collier et al., 1999, Yuping, 2012). People have shifted their lifestyles from subsistence ones to modern economy ones and begun to live in heterogeneous communities where the level of economic development differs by the areas. Specifically, the rural areas of Palau remain intact as compared to the urban center of Koror where a majority of people live, and some economic factors, such as tourism, have become the most influential to form the social fabric of the country (Collier et al., 1999).

Koror is the main commercial city representing an urban area (7°20′39″N, 134°28′53″E and see figure 1) (Watson et al., 1994, Collier et al., 1999). The population and total land area of Koror are 11 444 and 8 km^2, respectively (OPSP, 2016). Two islands are considered rural areas: (i) Babeldaob and (ii) Peleliu. Babeldaob with the land area of 334 km^2 is located at 7°31′49″N, 134°33′53″E, consisting of ten districts (Koshiba et al., 2014). We choose two of them, Ngarchelong and Ngaraad (figure 1), because these two districts are far from Koror and possess different features as rural areas, such as having enough local workers and intact nature. The population and total land area of Ngarchelong (Ngaraard) are 316 (413) and 10 km^2 (34 km^2), respectively (OPSP, 2016, Carlisle and Gruby, 2019). Peleliu is an isolated island at 7°00′45″N, 134°15′01″E (figure 1). The population and total land area of Peleliu are 484 and 13 km^2, respectively (OPSP, 2016). Literature demonstrates that prosociality differs between rural and urban areas in Nepal and Bangladesh (Shahrier et al., 2016, 2017, Shahen et al., 2019). Therefore, we decide to collect the samples from urban and rural areas, controlling for such possibilities in statistical analyses.

[Figure 1 about here.]

3 Materials and methods

Participants

We chose three regions for our study, because they are expected to possess a wide variety of people with sufficiently different sociodemographic and geographical characteristics. We administered the questionnaire surveys and experiments to 413 participants in the study regions. As of measurements for the main variables in the analyses, the Loyola generativity scale (LGS), the subjective happiness scale (SHS), the autonomy subscale, the inquisitiveness subscale and social value orientations (SVOs) are employed to represent participants' generativity, happiness, autonomy, inquisitiveness and social preferences. Due to our budget and time constraints, the maximum sample size is limited to have about 400 for this study. We collect 211 and 202 participants in Koror and two rural islands of Peleliu (100) and Babeldaob (102), respectively by recruiting them by random sampling procedures. The questionnaire surveys and experiments had been conducted from March to September in 2019.

In Koror, we randomly selected the household numbers and recruited a sufficient number of participants by sending them invitation letters. Then, we conducted the questionnaire surveys and experiments in several state government facilities. In Babeldaob, we chose Ngarchelong and Ngaraad where many residents work inside their states. We randomly selected the household numbers in these areas and recruited a sufficient number of participants by sending them invitation letters, conducting the questionnaire surveys and experiments in some schools and state government offices. Likewise, in Peleliu, we follow the same procedures for recruiting participants. We finally recruited 100 participants and conducted the questionnaire surveys and experiments in schools and local government offices. The questionnaire surveys and experiments are prepared in English, because local experts say that it is easier for many participants to describe their beliefs and behaviors in English than local languages. The research assistants support participants when

they have difficulty understanding the contents in surveys and experiments. The mean age among participants is 41.82 years with the standard deviation $= 14.23$ ranging between 19 and 90 years.

Measures

We use the Loyola generativity scale (LGS) to measure a "generative concern," being the most commonly used one in the literature (see, e.g., McAdams and Aubin, 1992, Peterson and Duncan, 1999, McAdams et al., 2001, Lawford et al., 2005, Schoklitsch and Baumann, 2012, Jones and McAdams, 2013, Newton et al., 2014, De Espanés et al., 2015). The LGS scale contains a list of 20 questions, of which 6 questions are reverse ones. Another popular scale for generativity is the generative behavior checklist (GBC) that measures "generative behaviors" in the past two months (McAdams et al., 1993, Schoklitsch and Baumann, 2012). The LGS and the GBC are established to display positive associations, demonstrating consistency between people's generative concerns and behaviors (McAdams et al., 1993). We have decided to employ the LGS in the surveys, because we realize that some questions in the GBC shall be too difficult for participants with different cultures in Palau to answer due to the fact that they never experience the situations, chances and experiences.

The LGS items include question statements, such as (1) "I try to pass along the knowledge I have gained through my experiences," (2) "I have important skills that I try to teach others," (3) "I feel as though I have made a difference to many people," (4) "I have made and created things that have had an impact on other people," (5) "I have made many commitments to many different kinds of people, groups and activities in my life" and (6) "I do not volunteer to work for a charity." Here, question (6) is considered the reverse one. Participants choose one of four options for each statement. The "zero," "one," "two" or "three" scores indicate how often the statement applies to participants (e.g., "zero" if the statement never applies, "three" if the statement applies very often or nearly always). We compute the reverse score (e.g., zero, one, two and three are interpreted to become three, two, one and zero, respectively). The generativity score for each participant is calculated to be the summation of the scores for all 20 items. The theoretical range is between 0

and 60, calculated to be the summation of the scores from the LGS questions — Cronbach alpha for this scale as 0.90 in our sample.

We use the happiness scale with a four-item measurement developed by Lyubomirsky and Lepper (1999) where each item is rated on a 7-point Likert scale. The first question in the scale reports individual "absolute self-rated happiness" by stating "In general, consider myself," and its anchors are "not a very happy person" and "a very happy person." The second item reports individual relative happiness as compared to that of peers by stating "Compared to my peers, I consider myself," and its anchors are "less happy" or "more happy." It is called "peer relative happiness." The third and fourth items correspond to general descriptions of a happy and/or unhappy person where participants choose which description represents themselves. In the items, "Some people are generally very happy. They enjoy life no matter what is going on, getting the most of everything. How much does this sentence describe you?" On the other hand, "Some people are generally very happy. Although they are not depressed, they never seem as happy as they might be. How much does this sentence describe you?" The anchors are "not at all" and "a great deal," called "general subjective happiness" and "general subjective unhappiness," respectively. The average of all items is called "overall subjective happiness (OSH)," while the fourth is reversely coded. We have decided to employ OSH as "subjective wellbeing (SWB)" in the analyses for the purpose of comparison with literature.

We use the autonomy subscale of the Ryff psychological scale (Ryff, 1989). Examples of items are (1) "I am not afraid to voice my opinions, even when they are in opposition to the opinions of most people," (2) "My decisions are not usually influenced by what everyone else is doing," (3) "I tend to worry about what other people think of me," (4) "Being happy with myself is more important to me than having others approve of me," (5) "I tend to be influenced by people with a strong opinion," (6) "I have confidence in my opinions, even if they are contrary to the general consensus," (7) "It is difficult for me voice my own opinion on controversial matters," (8) "I often change my mind about decisions if my friends or family disagree" and (9) "I judge myself by what I think is important, not by the values of what others think is important." Items are rated

from 1 = "Strongly disagree" to 5 = "Strongly agree." Items of (3), (5), (7) and (8) are reverse questions. The reverse score is calculated by taking one, two, three, four and five to be five, four, three, two and one, respectively. The theoretical range is between 9 and 45 — Cronbach alpha for this scale as 0.77 in the present sample.

We use the inquisitiveness subscale of the critical thinking disposition measures developed by Hirayama and Kusumi (2004). This subscale consists of ten items, including (1) "I want to interact with people with various ways of thinking and learn a lot from them," (2) "I want to keep learning new things throughout my life," (3) "I like to challenge new things," (4) "I want to learn about various cultures," (5) "Learning how foreigners think is meaningful to me," (6) "I am interested in people who have a different way of thinking," (7) "I want to know more about any topic," (8) "I want to learn as much as possible, even if I do not know if it is useful," (9) "It is interesting to discuss with people who have different ideas than me" and (10) "I want to ask someone if I do not know." Items are rated from 1 = "Strongly disagree" to 5 = "Strongly agree." The theoretical range is between 10 and 50 — Cronbach alpha for this scale as 0.92 in the present sample. This subscale is established as a reliable measurement to influence people's behaviors and attitudes in many important contexts, such as intergenerational communications and disaster management (Nakagawa, 2016, Hirose and Kotani, 2022).

We use social value orientations (SVOs) in the triple dominance game developed by Van Lange et al. (1997) to characterize participants' social preferences. The SVO game is reliable and reflects a stable personality trait of how people evaluate interdependent outcomes for themselves and others in social environments (Van Lange et al., 1997). This method categorizes individual value orientations into four types; "competitive," "individualistic," "prosocial" and "unidentified," depending on their choices in the questions. In one question, participants choose one option among three options, option (1): you get 480, and the other gets 80, option (2): you get 480, and the other gets 480 and option (3): you get 540, and the other gets 280. In this example, option (1) represents a competitive orientation that maximizes the point gap between themselves and the other ($480 - 80 = 400$). Option (2) is a prosocial orientation that maximizes the joint outcome ($480 + 480 = 960$). Option

(3) is an individualistic orientation that maximizes their outcome of 540, being indifferent to the outcome of the other.

This game contains nine questions, each of which consists of three options for oneself and the other in a pair of participants. In each question, one option corresponds to one of the following orientations, i.e., "competitive," "individualistic" and "prosocial." Each participant is asked to choose one option as the most preferred in each item, finally generating nine option choices. Participants are classified as prosocial, individualistic or competitive, respectively, if they make six or more options with that orientation. Otherwise, they are categorized as "unidentified." The SVO game was conducted as experiments because we paid actual monetary payments to participants based on their choices by randomly arranging a pair (you and the other). Specifically, participants are informed that we randomly match two participants as a pair, and the more experimental points one participant gets from their own and partner's nine choices of options in the SVO game, the more real money they will earn with some exchange rate (2000 points with 1 USD). Participants are motivated to seriously take part in the SVO game, considering their opportunity costs and revealing their social preferences. One session with $30 \sim 40$ participants took 20 minutes, and they are paid 4.09 USD on an average in the experiments.

Data analysis

With the data of the above variables, we first characterize generativity in relation to autonomy and inquisitiveness, holding other factors fixed. Second, we characterize subjective wellbeing (SWB) in relation to autonomy, inquisitiveness and generativity, controlling other factors fixed. Although some researchers claim that it is desirable to take panel data for identifying the causality between two variables or relations among several ones, we employ cross-sectional data following the analytical framework of some previous studies (Tkach and Lyubomirsky, 2006, Warner and Vroman, 2011, Salavera et al., 2020). These studies argue that cross-sectional data analysis is acceptable to confirm the effects among variables following some proper statistical procedures. Due to budget and time constraints, we could not collect the panel data. Instead, we conduct our

research by collecting and analyzing cross-section data. To answer questions 1 and 2, we apply ordinary least squares (OLS) regression and median regression models to characterize generativity and SWB as dependent variables, respectively, in relation to other vital independent variables as described in figure 2, enabling the identification of important determinants. For characterizing generativity, the regression model is specified as

$$\text{generativity}_i = \alpha_0 + \alpha_1 \cdot \text{autonomy}_i + \alpha_2 \cdot \text{inquisitiveness}_i + \alpha_3 \cdot \text{SVO}_i + \boldsymbol{\alpha}_4 \cdot \mathbf{x}_i' + \epsilon_i, \quad (1)$$

where $\mathbf{x}_i$ is a vector of sociodemographic independent variables including household income, marital status, family type, education and gender from participant i. The associated coefficients of $\alpha_0, \alpha_1, \alpha_2, \alpha_3$ and $\boldsymbol{\alpha}_4$ are the parameters to be estimated, and ϵ_i is a disturbance term. In equation (1), parameters α_1 and α_2 are of particular interest to statistically examine question 1. For characterizing SWB, the model is

$$\text{SWB}_i = \beta_0 + \beta_1 \cdot \text{autonomy}_i + \beta_2 \cdot \text{inquisitiveness}_i + \beta_3 \cdot \text{generativity}_i + \beta_4 \cdot \text{SVO}_i + \boldsymbol{\beta}_5 \cdot \mathbf{x}_i' + \varepsilon_i \quad (2)$$

where SWB_i stands for participant i's subjective wellbeing.[1] The coefficients, $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4$ and $\boldsymbol{\beta}_5$, are parameters to be estimated and ε_i is a disturbance term. In equation (2), parameters β_1, β_2 and β_3 are of particular interest to statistically test question 2.

We use the median regression to statistically analyze the determinants of SWB in place of parametric mean-based regressions, when observations of SWB in the samples are considered nonnormally distributed and/or skewed. The literature claims that median or quantile regressions are more appropriate than parametric mean-based ones, such as ordinary least squares (OLS) regression, yielding robust estimations against the boundary values and/or outliers, especially when the dependent variable is bounded on a certain support range, nonnormally distributed and skewed

[1] Generativity is a measurement to be taken on the basis of the participants' experiences and life-long cognition. On the other hand, SWB is a measurement to be taken when participants express about their life at the moment of the questionnaire surveys. Therefore, reverse causality does not hold between SWB and generativity, and it is valid to take generativity as an independent variable for SWB.

(Hao and Naiman, 2007, Wooldridge, 2019). The highest spike of SWB is found between 5.5 and 5.8 points, and the distribution appears to be skewed on one side as shown in figure 4. We have run Shapiro-Wilk tests for the two dependent variables of generativity ($Z = 1.984, P < 0.024$) and SWB ($Z = 5.747, P < 0.001$) to check their normality with a null hypothesis that the variable is normally distributed. The results reject the null hypothesis for SWB. Therefore we apply the OLS regression for generativity with equation (1) and median regressions for SWB with equation (2), respectively.

To further confirm our regression results, we apply structural equation modeling (SEM) to examine the relationships, i.e., "paths," exist: (1) inquisitiveness $\rightharpoonup$ generativity, (2) inquisitiveness $\rightharpoonup$ SWB, (3) generativity $\rightharpoonup$ SWB. Specifically, the existence of three paths is examined to check that generativity is a mediator in the relationship between inquisitiveness and SWB, as graphically conceptualized in figure 3. To this end, the SEM is one of the effective approaches and enables us to test the existing paths among the three variables together with the direct and indirect effects of inquisitiveness, following the procedures (Gunzler et al., 2013, 2014, Venturini and Mehmetoglu, 2019). The SEM analysis computes a beta weight as a standardized coefficient (β), along with the associated statistical significance for each path. We can directly compare the magnitudes of standardized coefficients to estimate the relationships' relative strength, and the standardization is necessary to compare direct and indirect effects among different sets of paths in the same model (Fox, 1997, Cheung, 2009, Kwan and Chan, 2011).

[Figure 2 about here.]

[Figure 3 about here.]

[Figure 4 about here.]

4 Results

Tables 1 and 2 present the definitions of all variables used in the analysis and the summary statistics. Table 2 presents the summary statistics of participants' sociodemographic variables. The percentage of female participants in urban (rural) areas is 56 % (62 %). The mean age in urban (rural) areas is 40.56 (43.14). Concerning marital status, we divide this variable into two categories; "married" and "nonmarried." The percentage of married participants in urban (rural) areas is 62 % (73 %). This result is in line with the expectation because the percentage of married rural participants is 11 points higher than in urban ones. The percentage of extended family in rural participants (50 %) is slightly higher than that in urban ones (47 %). The mean of categorized household income is similar in urban and rural areas (1.99 and 1.89, respectively). The mean of categorized education is slightly high in urban areas (3.34) than that in rural ones (2.92), and the median in urban areas is 1 point higher than that in rural ones.

Table 2 presents the summary statistics of participants' autonomy (see the "Cognitive variables" column). We compute Cronbach's alpha for this scale as 0.77, illustrating that the autonomy scale possesses acceptable internal consistency in our sample. The median score of autonomy is 29 points in both urban and rural areas, while the average scores of this are 29.45 and 30.02 points, respectively. Table 2 presents the summary statistics of participants' inquisitiveness in urban, rural and overall areas (see the "Cognitive variables" column). We compute Cronbach's alpha for this scale as 0.92, illustrating that the inquisitiveness scale also possesses acceptable internal consistency in our sample. The median score of inquisitiveness is 46 points in both urban and rural areas, while the average scores of inquisitiveness are 44.37 and 44.00 points, respectively. This result implies that the inquisitiveness between urban and rural participants is not much different.

Table 2 presents the summary statistics of participants' generativity (see the "Essential elements of SDGs" column). We compute Cronbach's alpha for this scale as 0.78, illustrating that the LGS scale possesses acceptable internal consistency in our sample. The median score of generativity in urban and rural areas is 38 and 37 points, while the average scores of generativity are 37.69 and 37.10 points, respectively. This result indicates that generativity between urban and rural

participants is not much different. Table 2 shows the summary statistics of subjective wellbeing (SWB) (see the "Essential elements of SDGs" column). Rural participants have higher SWB than urban and overall ones in the sample, to be higher for rural participants with an average of 5.40 points (SD $= 1.10$) than urban ones with an average of 5.16 points (SD $= 1.19$) and overall participants in the sample with an average of 5.28 points (SD $= 1.15$). The summary statistics of participants' SVOs are reported by focusing on the percentages of prosocial ones (see the "Noncognitive variables" column in table 2). The percentage of prosocial participants in urban areas (65 %) is more significant than that in rural ones (58 %). This result is in sharp contrast with similar studies conducted in Nepal and Bangladesh, showing that the percentages of prosocial participants are pretty different between urban and rural areas, and the rate of prosocial participants in urban areas is higher than that in rural areas (Shahrier et al., 2016, 2017, Timilsina et al., 2019).

[Table 1 about here.]

[Table 2 about here.]

To empirically examine question 1, we perform OLS regression in which generativity is taken as a dependent variable, and autonomy and inquisitiveness are taken as independent ones along with other factors, as described in equation (1). Table 3 reports the estimated coefficients $(\alpha_1, \alpha_2, \alpha_3, \boldsymbol{\alpha}_4)$ and their respective standard errors of the independent variables on generativity, along with statistical significance. Model 1 in table 3 contains autonomy, inquisitiveness, age and marital status as independent variables. Next, we gradually add prosociality, household income and other independent variables in models 2 and 3, building upon model 1. We first find that inquisitiveness and age are statistically significant with a positive sign at 1 % in a robust manner, irrespective of the models. The estimated coefficients of inquisitiveness (age) on participants' generativity range between 0.298 (0.126) and 0.318 (0.129) in models 1 to 3, implying that participants are likely to increase generativity (age) by the range when one unit (year) in their inquisitiveness (age) rises.

Second, household income exhibits 5 % statistical significance with a positive sign in models 2 and 3. The estimated household income coefficients in models 2 and 3 indicate that participants are likely to increase generativity by $1.139 \sim 1.141$ when one category in their household income rises. The other independent variables, such as autonomy, marital status, prosociality, gender, education, family type and residential area, are statistically insignificant, as shown in models 1 to 3 in table 3. We confirm that the main results qualitatively remain the same, irrespective of the various specifications of models other than models 1 to 3, such as the interaction terms among the variables. Overall, inquisitiveness and age are the main determinants of people's generativity.

[Table 3 about here.]

To empirically examine question 2, we perform the median regression in which SWB is taken as a dependent variable, and autonomy, inquisitiveness and generativity are taken as independent ones along with other factors, as described in table 4. Table 4 reports the estimated coefficients ($\beta_1, \beta_2, \beta_3, \beta_4, \boldsymbol{\beta}_5$) and their respective standard errors of independent variables on SWB along with statistical significances. Model 1 of table 4 contains autonomy, inquisitiveness and generativity as independent variables, and next, we gradually add family type, gender, age, prosociality, household income and other factors as independent variables in models 2 and 3, building upon model 1. We first find that autonomy is statistically significant with the positive sign at 1 % in a robust manner, irrespective of the models. The estimated autonomy coefficients in models 1 to 3 indicate that participants are likely to increase SWB by $0.056 \sim 0.062$ when one unit in their autonomy rises.

Second, we find that inquisitiveness exhibits 1 % and 5 % statistical significance with a positive sign in models 1 to 3. The estimated coefficients of inquisitiveness in models 1 to 3 indicate that the participants will likely increase their SWB by $0.026 \sim 0.030$ when one unit in their inquisitiveness rises. Third, generativity is statistically significant with the positive sign at 1 % in a robust manner, irrespective of the models. The estimated generativity coefficients on SWB range between 0.023 and 0.025 in models 1 to 3, implying that the participants are likely to increase their SWB by the range when one unit in their generativity rises. The family type also exhibits 1 % and 5 % statistical significance with a positive sign in models 2 and 3, implying that the participants in the

extended family tend to enhance their SWB by $0.244 \sim 0.325$, as compared with participants in a nuclear family. Gender exhibits 10 % statistical significance with a positive sign in models 2 and 3, implying that females positively influence SWB in our results. The other independent variables, such as age, prosociality, household income, education, marital status and areas, are statistically insignificant, as shown in model 3 in table 4. We confirm that the main results qualitatively remain the same, irrespective of the various specifications of models other than models 1 to 3, such as the interaction terms among the variables. Overall, autonomy, inquisitiveness and generativity are the main determinants of people's SWB.

[Table 4 about here.]

We perform the SEM analysis to reconfirm the regression results and check the main variables' effects on subjective wellbeing (SWB) through an interplay with generativity. We first analyze two direct effects from inquisitiveness to SWB (path A) and from generativity to SWB (path C in figure 3). We second analyze the direct effect from inquisitiveness to generativity (path B in figure 3), and an indirect effect from inquisitiveness to SWB through generativity (path $\hat{C}$ in figure 3). The analyses demonstrate the significance of path A and B ($\beta = 0.031, p < 0.000$ and $\beta = 0.328, p < 0.000$) as well as those of path C and $\hat{C}$ ($\beta = 0.027, p < 0.000$ and $\beta = 0.009, p < 0.001$). These results also display that the indirect path $\hat{C}$ from inquisitiveness to SWB plays a role through a mediator of generativity, gaining consistent results with the regressions. Overall, the SEM analyses reconfirm inquisitiveness and generativity as the main determinants for characterizing participants' SWB, as demonstrated in regression models.

We summarize the answers to the two open questions in the introduction section. As described in our conceptual framework in figure 2, it is posed that generativity and subjective wellbeing (SWB) as essential elements of SDGs are mainly characterized by the three factors, such as cognitive, noncognitive and sociodemographic factors. The first question is, "How do autonomy and inquisitiveness play roles in people's generativity?" Our answer to this question is that autonomy (α_1) has no robust effects on generativity. On the other hand, inquisitiveness (α_2) is the vital determinant regarding whether or not people possess a high level of generativity in figure 2.

Inquisitiveness is of utmost importance due to the regression and SEM analyses along statistical significance for enhancing people's generativity. The second question is,"How do autonomy and inquisitiveness affect people's wellbeing possibly through an interplay with generativity?" Our answer to this question is that autonomy (β_1), inquisitiveness (β_2) and generativity (β_3), directly and indirectly, affect SWB, demonstrating the importance of autonomy and inquisitiveness for people's generativity and wellbeing in figure 2. Overall, autonomy and inquisitiveness are fundamental determinants of generativity and wellbeing, which are the essential factors of sustainable development, and enhancing the two factors can be considered one important pathway of achieving the SDGs.

Palau is now considered one of the Pacific island leaders for SDGs (Friedlander et al., 2017, Wabnitz et al., 2018, Pilbeam et al., 2019). For example, the Palau Protected Areas Network (PAN), established in 2003, is the important country's policy agenda for achieving the goals of the Micronesia Challenge, that is, an initiative for sustainability along with preservation of its unique culture and biodiversity within the region (Friedlander et al., 2017, Pilbeam et al., 2019). Although our study demonstrates that autonomy and inquisitiveness are important determinants for SDGs (i.e., generativity and wellbeing), most countries including Palau have never paid attention to how to enhance people's autonomy and inquisitiveness in the current plans, policies and programs. Given this state of affairs, we suggest that the autonomy and inquisitiveness should be explicitly and practically incorporated into the SDG-related plans, policies and programs for making a bridge between the current societies and future sustainable ones as the crucial pathways of guiding people.

5 Conclusion

This research considers that generativity and wellbeing shall be necessary and salient indicators people in societies must enhance for achieving SDGs, hypothesizing that people with high autonomy (being independent & resisting social pressure) and inquisitiveness (adaptability to new social and/or environmental changes) tend to be generative and happy. To empirically examine

the hypothesis, we analyze people's generativity and wellbeing as essential elements of SDGs and statistically characterize them in relation to autonomy and inquisitiveness with the data from questionnaire surveys and experiments of 413 residents in matrilineal Island Palau. We choose Palau as the field, because rapid social and environmental changes from the tradition of matrilineal systems are ongoing and a wide variation of people is expected to be observed compared to any other field. Two main results are obtained. First, the analysis identifies the importance of inquisitiveness in that people with high inquisitiveness tend to be generative. Second, people's wellbeing is high as they are generative, autonomous and inquisitive, demonstrating two influential roles of inquisitiveness on happiness as direct and indirect determinants through a mediator of generativity. Overall, the results suggest that autonomy and inquisitiveness contribute to people's generativity and wellbeing even in tradition-oriented societies, such as Palau, and their improvements are considered practical and crucial paths for materializing SDGs.

We note some limitations of our research and directions for future research. Our survey is conducted in a tiny scale matrilineal society of Palau, an ethnically and culturally homogeneous community compared to the rest of the world. The same types of empirical studies should be conducted in different types of societies to generalize our findings. Moreover, as some studies have mentioned, it shall be better to collect and examine the panel data than the cross-section ones to confirm our findings for consistency and robustness along with median analyses (Cole and Maxwell, 2003, Maxwell et al., 2011). To this end, experimental methods in the fields shall be employed to collect the panel data and examine the possible causality among autonomy, inquisitiveness, generativity and wellbeing in a systematic ways. With these findings in mind, it is our belief that our research is the first study to empirically establish that autonomy and inquisitiveness are fundamental human attributes for generativity and wellbeing even in a tradition-oriented society, possibly leading to the materialization of sustainable development goals (SDGs).

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Figure 1: Map of Palau

Figure 2: Conceptual framework

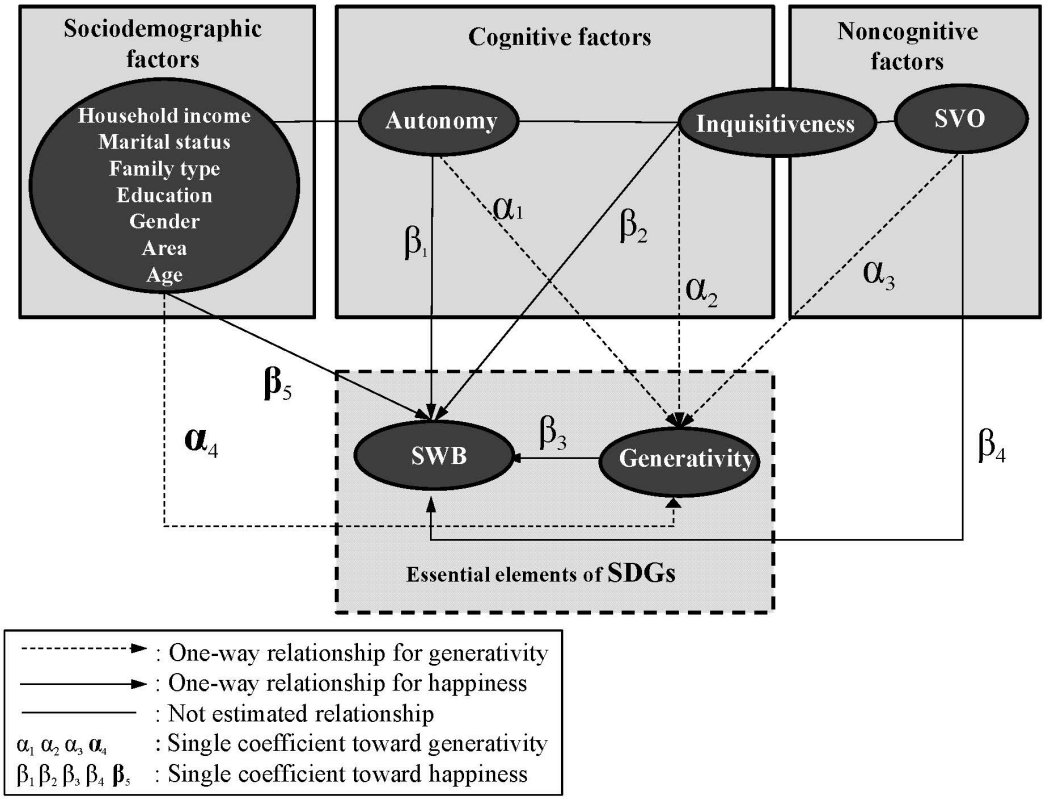


Figure 3: Mediating effects among inquisitiveness, generativity and SWB

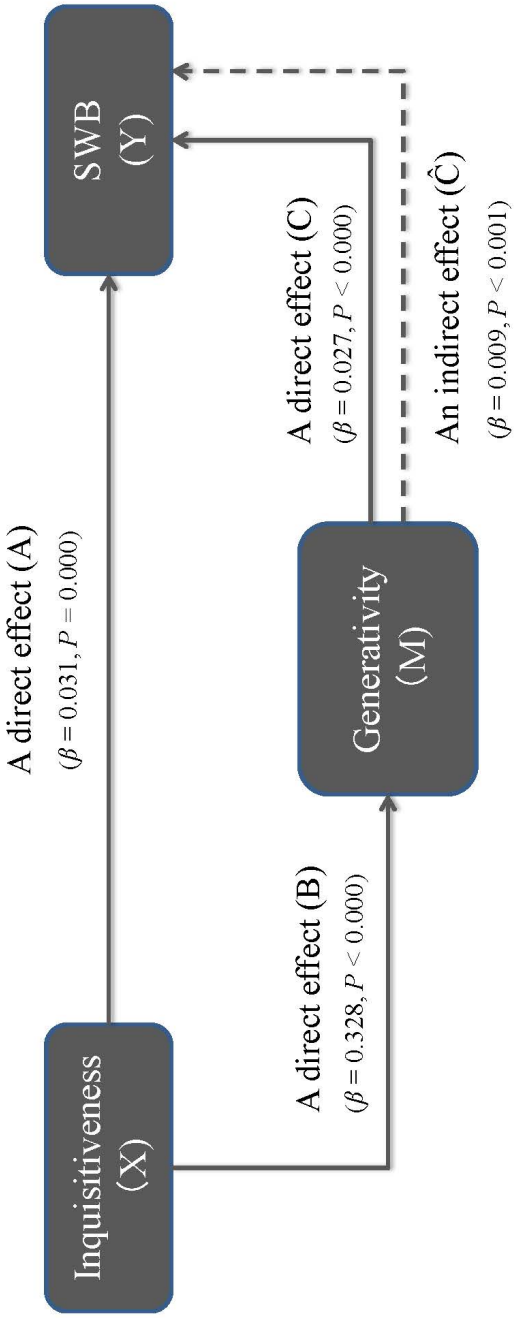
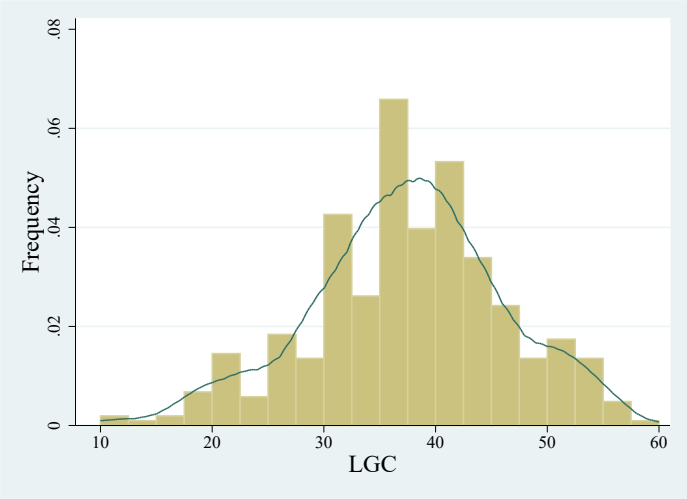


Figure 4: Histograms and kernel densities for generativity (LGC) and subjective wellbeing (SWB)

(a) Distribution of LGC



(b) Distribution of SWB

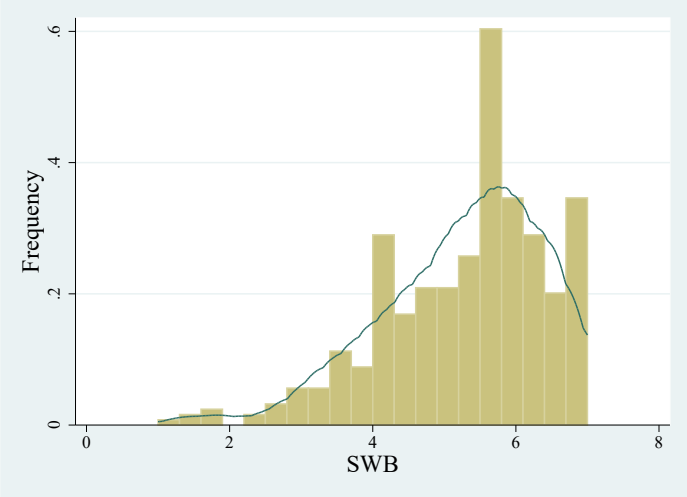


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Table 1: Variable definitions

Variables	Descriptions
Autonomy	Autonomy is defined as the measurement by a subscale of Ryff psychological scale (Range is between 9 from 45)
Inquisitiveness	Inquisitiveness is defined as the measurement by a subscale of the critical thinking disposition scale (Range is between 10 from 50)
SVO	The "SVO" represents a dummy variable taking 1 when the participant is prosocial and otherwise, 0, based on SVO games.
Area	Area is that categorical variable of 0 and 1 where residencial area, rural areas, urban areas are coded as 0 and 1 respectively.
Gender	Gender is a dummy variable that takes 1 when the participant is female, otherwise 0.
Age	Age is defined as years of age.
Marital status	Marital status is a dummy variable that categorical variable of 0 and 1 where nonmarried (i.e., single, divorce or bereavement) and married are coded as 0 and 1, respectively.
Family type	Family type is that categorical variable of 0 and 1 where family type, nuclear family, extended family are coded as 0 and 1 respectively.
Household income	Household income per year in USD. Categorical variable of 1 to 6 with an interval, however where 1 presents as earning $0 < 9999$, and 2 presents as earning $10\,000 < 4999$, 3 presents as earning $25\,000 < 45\,999$, 6 represents as earning more than $100\,000$ per year.
Education	Education is categorical variables of $1, 2, 3, 4, 5$ and 6 where educational background, less than elementary school, high school, vocational school, associate, bachelor and more than master degree are coded as $0, 1, 2, 3, 4, 5$ and 6, respectively.
Generativity	Generativity is defined as the measurement of the Loyola generative scale (Range is between 0 from 60)
SWB	SWB is defined as as the measurement by subjective happiness scale (SHS), composed by the following four 7-point Likert scale questions; (1) the absolute self-related happiness, (2) the peer-related happiness, (3) the general subjective happiness, (4) the general subjective unhappiness. Overall subjective happiness (OSH) is the average of the four items calculated, while the fourth item is reversely coded. OSH presents SWB in this study

Table 2: Summary statistics of participants' sociodemographic information and major variables

	Urban areas					Rural areas					Overall				
	Mean	Median	SD[1]	Min	Max	Mean	Median	SD	Min	Max	Mean	Median	SD	Min	Max
Cognitive variables															
Autonomy	29.45	29	5.46	16	44	30.02	29	4.34	16	42	29.73	29	4.94	16	44
Inquisitiveness[2]	44.37	46	6.29	13	50	44.00	46	6.61	20	50	44.19	46	6.44	10	50
Noncognitive variables															
SVO (Prosocial)	0.65	1	0.48	0	1	0.58	1	0.49	0	1	0.62	1	0.49	0	1
Sociodemographic variables															
Gender (Female)	0.56	1	0.50	0	1	0.62	1	0.49	0	1	0.59	0	0.49	0	1
Age	40.56	38	13.66	19	90	43.14	43.5	14.73	19	88	41.82	41	14.23	19	90
Marital status (Married)	0.62	1	0.49	0	1	0.73	1	0.45	0	1	0.67	1	0.47	0	1
Family type (extended)	0.47	0	0.50	0	1	0.50	0.5	0.50	0	1	0.49	0	0.50	0	1
Household income	1.99	2	0.94	1	5	1.89	2	0.93	1	6	1.94	2	0.94	1	6
Education	3.34	3	1.39	1	6	2.92	2	1.18	1	6	3.14	3	1.31	1	6
Essential elements of SDGs															
Generativity	37.69	38	8.03	15	60	37.10	37	9.39	10	57	37.40	38	8.71	10	60
Subjective wellbeing (SWB)[3]	5.16	5.5	1.19	1.5	7	5.40	5.5	1.10	1	7	5.28	5.5	1.15	1	7
Sample size	$n = 211$					$n = 202$					$n = 413$				

[1] SD stands for standard deviation.
[2] Inquisitiveness is positioned across both cognitive and non-cognitive variables because of its characteristics, as shown in figure 2.
[3] SWB is overall subjective happiness (OSH).

Table 3: Results of OLS regression on generativity

Variable	Marginal effects on generativity		
	Model 1	Model 2	Model 3
Autonomy	0.096	0.073	0.077
	(0.088)	(0.087)	(0.088)
Inquisitiveness	0.318***	0.298***	0.298***
	(0.064)	(0.065)	(0.065)
Age	0.129***	0.126***	0.126***
	(0.030)	(0.030)	(0.030)
Marital status (base group = nonmarried)	1.911**	1.306	1.361
	(0.812)	(0.827)	(0.835)
Prosociality (base group = proself)		0.226	0.193
		(0.818)	(0.844)
Household income		1.139**	1.414**
		(0.475)	(0.476)
Gender (base group = male)		0.014	0.084
		(0.818)	(0.825)
Education		0.460	0.415
		(0.345)	(0.351)
Family type (base group = nuclear)			−0.249
			(0.807)
Area (base group = urban)			−0.658
			(0.820)

***significant at 1 %, **significant at 5 %, *significant at 10 %

Table 4: Results of median regression on SWB

Variable	Model 1	Model 2	Model 3
Autonomy	0.056***	0.058***	0.062***
	(0.014)	(0.013)	(0.013)
Inquisitiveness	0.030***	0.029**	0.026***
	(0.011)	(0.010)	(0.010)
Generativity	0.023***	0.023***	0.025***
	(0.008)	(0.008)	(0.007)
Family type (base group = nuclear)		0.244**	0.325***
		(0.129)	(0.121)
Gender (base group = male)		0.223*	0.233*
		(0.131)	(0.124)
Age			0.001
			(0.005)
Prosociality (base group = proself)			−0.122
			(0.127)
Household income			−0.032
			(0.072)
Education			−0.063
			(0.053)
Marital status (base group = nonmarried)			−0.106
			(0.126)
Areas (base group = urban)			0.181
			(0.123)

***significant at 1 %, **significant at 5 %, *significant at 10 %