Social Capital and Well-Being of Small-Scale Fishers in the West Coast Island of Peninsular Malaysia

GAZI MD. NURUL ISLAM[1,*], TAI SHZEE YEW[2], MUHAMMAD ABRAR UL HAQ[3]
[1]Graduate School of Business, Universiti Tun Abdul Razak, 50400 Kuala Lumpur, Malaysia
[2]Department of Economics, Universiti Tunku Abdul Rahman, Sungai Long Campus, Cheras 43000, Malaysia
[3]Department of Economics and Finance, College of Business Administration, University of Bahrain, Sakhir, Bahrain

*E-mail: gazi@unirazak.edu.my |Received: 28/06/2022; Accepted: 03/03/2023

E-ISSN: 2073-3720
https://doi.org/10.33997/j.afs.2023.36.1.004

Abstract

Poverty in small-scale fisheries is a global issue; most of the time, the solution to poverty is discussed through economic variables. Scholars highlight the contribution of social capital factors to the livelihoods of small-scale fishing communities and suggest that social aspects can be used as an alternative solution to reduce poverty. The concept of social capital has been extensively used to explain the relationship between social capital factors and well-being. The role of social capital in the well-being of small-scale fisher communities in Malaysia needs to be clarified. The current study investigates the contribution of various livelihood assets to the household income of small-scale fishers in Malaysia. Data for the survey were collected from 182 respondents from across multiple fishing villages on Langkawi Island, off the west coast of Peninsular Malaysia, using a structured questionnaire. The partial least square (PLS) technique was applied for statistical analysis. The study's empirical findings depict that social capital, trust, job experience, and financial capital are important factors contributing to fishers' household income. The results show that the contribution of social capital and trust factors are significant to household income, indicating that social factors are essential in improving the well-being of small-scale fisher households in Malaysia. Policy for livelihood improvement of small-scale fisheries in Malaysia needs to prioritise investments in financial, human, natural and physical capital assets.

Keywords: socioeconomic factors, trust, relationship, livelihood assets, small-scale fisheries

Introduction

Social capital factors such as social relationships, social networks, cooperation and trust contribute to the well-being of fishing communities and the sustainability of fisheries (Gutiérrez et al., 2011; Kamiyama et al., 2018; Bakker et al., 2019). Small-scale fishing communities in the coastal areas of Malaysia face several challenges, including environmental change, encroachment of commercial vessels in near-shore fisheries zone and declining fish catch (Islam, Noh, Sidique, et al., 2014), limited access to income and financial credit (Abu Samah et al., 2019). The fishing zone within five nautical miles from shore (zone A) has been reserved for artisanal fishers. The small-scale fishers in the coastal areas generally possess limited capital assets and resources, and their livelihoods primarily depend on fishing. They use small fishing boats equipped with outboard engines and use multiple fishing gears targeted to catch various fish species. During the monsoon between November and February, fishing activities are not possible, and fishers face an economic crisis (Islam, Noh, Sidique, et al., 2014; Islam et al., 2017).

Fishers' income from fishing has been declining due to the overexploitation of resources and pollution (Islam et al., 2017). Several studies have highlighted that various types of livelihood assets contribute to fishers' income and well-being. And several publications indicate that social capital can contribute to the livelihoods of small-scale fisheries

(Islam et al., 2011), positive impact on the community benefit during flood rehabilitation activities in Malaysia (Chan et al., 2019), positive livelihood impacts on urban residents (Jamil et al., 2020), and improve material and subjective well-being in the community (Boo et al., 2020).

Over the last decades, livelihood approaches have gained importance as a main analytical tool for livelihood analysis, particularly among rural people (Dai et al., 2019; Gichure et al., 2020; Yazdanpanah et al., 2021). Hua et al. (2017) have defined livelihoods as the means, activities and entitlements by which people make a living. Scholars highlight that social capital enhances community relation, networks, social structure and organisation (Bourdieu, 1986; Coleman, 1994; Putnam, 1995), producing tangible and non-tangible outcomes (Godoy et al., 2007; Minamoto, 2010). Furthermore, social capital supports communication, information exchange, and access to resources (Ishihara and Pascual, 2009), facilitate cooperation and trust in the community (Grootaert, 2008) and increase access to micro-credit for poverty alleviation (Islam et al., 2011).

Social capital plays an increasingly essential role in overall social and community development (Ellis and Bahiigwa, 2003; Udoh et al., 2017). Several studies have found that physical assets can support the livelihood of households (Islam, Sallu, Hubacek, et al., 2014; Priyadarshi et al., 2019; Ifejika et al., 2013; Hamad and Islam, 2022). Financial capital is essential for acquiring physical assets for fishers' livelihoods (Bajwa, 2015; Ibrahim et al., 2018). However, accessing financial capital by small-scale fishers is limited (Islam et al., 2011; Makame et al., 2018; Kalhoro et al., 2017). Human assets are the combination of capabilities, skills and knowledge which enable households and individuals to secure livelihood outcomes (Islam et al., 2011; Kleih et al., 2013; Islam, Yew, and Viswanathan, 2014). Natural capital can support a variety of economic and social outcomes (Chen et al., 2021), contributing to the impact on the fishers' livelihoods (Islam, Noh, Sidique, et al., 2014; Nawrotzki et al., 2015; Ellison et al., 2020). There is a lack of comprehensive study to understand the livelihood status of Malaysia's traditional coastal fishing communities on Langkawi Island. This paper presents the livelihood asset framework and structural equation modelling to examine the factors to understand how social capital factors enhance the well-being of small-scale fisher (SSF) households in Malaysia.

Materials and Methods

Ethical approval

Approval for the study was obtained from Universiti Tun Abdul Razak Research Ethics Committee (Ref. UR/RMC/NIA/02/2018), and guidelines for research with human participants were strictly adhered to. Before the survey, the researchers informed the respondents that their identities would be anonymous. Thus, the respondents participated willingly in the study after they were made to understand the purpose of the study.

Measurement of social capital and other livelihood assets

In this study, household livelihood assets were measured using capital indices: the index for natural, financial, human, and physical capital, governance, trust and social capital were constructed using various factors as shown in Table 1.

The study sites

The data for the study was collected from seven fishing communities in Langkawi Island (Pulau Langkawi), a district in the state of Kedah located northwest of Peninsular Malaysia (Fig. 1). The islands are located 18 miles west of Peninsular Malaysia with approximately 65,000 inhabitants, including 2,900 fishers (Population Statistics, 2021). With a surface size of 32,000 hectares (Ghani et al., 2013), Langkawi Island is the largest island in the archipelago and the west coast of Peninsular Malaysia. This island has been tax-free since 1987 and has developed well since its declaration as a tourism city in 2001. Tourism has become the most important economic activity for island residents. Thousands of domestic and foreign tourists visit the islands yearly because of their high-quality coral reefs, diverse fish species, and sandy beaches. In Langkawi, there are seven recreational forests and three Geoforest parks; these national parks were declared the 52nd member of the UNESCO Global Geopark Network in 2007 and became the first global geopark in Southeast Asia.

The island is the largest producer of anchovies of the genus *Encrasicholina* and *Stolephorus* in Peninsular Malaysia and one of Kedah's most important fishing sites. The small-scale artisanal fishers in Langkawi operate small fibreglass boats with outboard engines (known as sampan) near shore areas. They use traditional fishing gears, including hook and lines, drift nets, gill nets and purse seine nets to catch different fish species. Some fishers migrate to the nearest city during the monsoon when fishing activities are closed for 3 months, from November to January.

Local fisher representatives updated the list of fishers obtained from the Department of Fisheries to ensure that the information was accurate. The sample respondents were randomly chosen from the list. Since fishers go fishing early in the morning and return late in the day, most interviews were conducted late afternoon or evening, and 182 fishers were interviewed from August 2019 to October 2019. The small-scale fishers in the study villages use different types of fishing gear (Table 2).

Table 1. Variables, items and the measurements used in the survey questionnaire for small-scale fishers in Langkawi Island.

1. Livelihood of small-scale fishers (scored 5 = strongly agree; 1 = disagree)
   - The main source of my income is fishing
   - The income from fishing is sufficient to cover daily expenditures
   - I engaged in tourism for an alternative source of income
   - The income generated from tourism activities is sufficient to cover our daily consumption
   - I sold assets to cover household expenditures during a hard time
   - I have set up a small business to supplement my household income
   - Household members are engaged in alternative employment for income.
2. Social capital indicators (scored 5 = strongly agree; 1 = disagree)
   - Relationship: Resolve social conflicts by negotiation and dialogue
   - Networks and connections: Fishers always discuss about fisheries management
   - Civic norms, shared norms and values: People respect each other in the community
   - Community involvement in voluntary activities: People support community programs in our area
   - Communication Networks/sociability: Most people are aware of fisheries rules (zoning, gear use)
   - Community participation: Fishers should involve in fisheries decision
3. Trust indicators (scored 5 = strongly agree; 1 = disagree)
   - Most villagers trust each other in financial matters
   - Social crimes have reduced in our village
4. Governance indicators (scored 5 = strongly agree; 1 = disagree)
   - Fishers should not be allowed to fish in any fishing sites they like
   - Fishers should not be allowed to use any gear they like
   - Fisheries rule-breaking is sometimes acceptable
   - Conflicts can be resolved locally
5. Physical capital indicators (value in Malaysian Ringgit)
   - Housing: value of house structure and furniture
   - Land own: value of homestead and another commercial land
   - Car/motorcycle: value of car, motorcycle and bicycle
   - Jewellery: value of gold jewellery and ornaments
   - Household savings: household fixed deposit and other savings.
6. Natural capital indicators (scored 5 = strongly agree; 1 = disagree)
   - Fisheries stocks in the fishing area have increased
   - Mangrove ecosystem provides a valuable fisheries habitat
   - Local people protect fisheries for the benefit of future generations
   - Fishers are knowledgeable about the sustainable use of fishery resources
7. Financial capital indicators (value in Malaysian Ringgit)
   - Households received credit from various sources in the past 12 months
   - Households' unpaid amount of credit received in the past 12 months
8. Human capital indicator (scored 5 = strongly agree; 1 = disagree)
   - Knowledge and skills: Fishers have vast experience in fisheries
   - Health: Fishers experience good health in the past 12 months

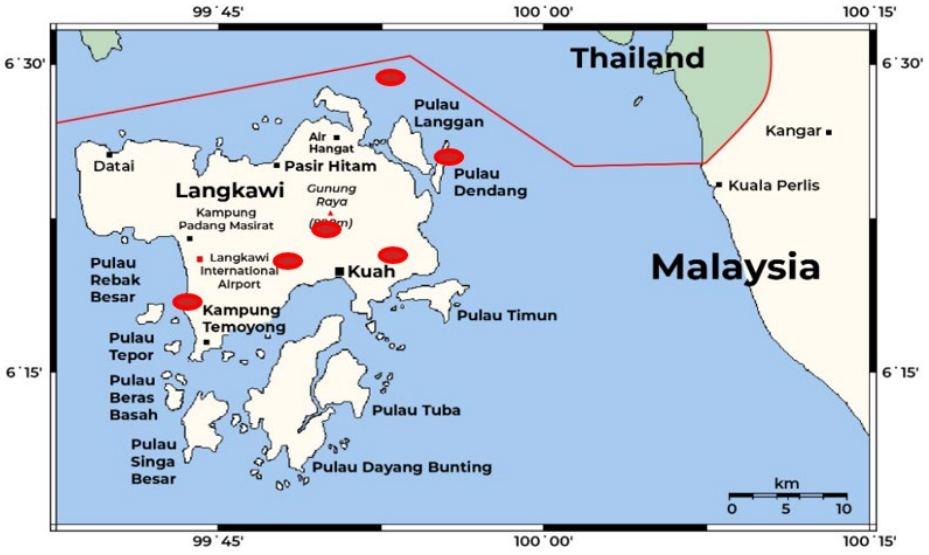

Fig. 1. Map of Langkawi, located in northern Peninsular Malaysia. Red dots represent the study villages located along the northeast and southeast coastal area of Langkawi (Source: Google Earth).

Table 2. Number of fishers and type of gear used in the seven fishing villages surveyed in Langkawi Island.

Fishing gear	Fishing village							
	Bukit Malut	Kuala Sg. Cenang	Belanca Pecah	Penarak	Kuala Melaka	Sungai Kilim	Tanjung Rhu	Total
Drift net	73	78	0	20	70	0	31	272
Hook and line	0	30	43	13	21	0	10	117
Drift/gill net	33	0	0	48	0	0	0	81
Recreational	0	0	0	0	0	90	90	180
Total	106	108	43	81	91	90	131	650
Study sample	24	33	18	29	32	21	25	182

Data collection and questionnaire

Using a structured questionnaire, this study used a quantitative approach to gather primary data from small-scale fisher households. The survey was conducted to determine the perceptions of local fishers on access to various assets and well-being in Langkawi. The structured questionnaire for the study contained two sections that covered multiple indicators: Section A covered respondents' household demographic information and Section B covered various livelihood assets to assess the well-being of small-scale fishers. This section consisted of 8 factors and 32 questions rated using the 5-point Likert scale, with 1-Strongly Disagree to 5-Strongly Agree as shown in Table 1. Before the survey, preliminary fieldwork was conducted to pre-test the questionnaire, and the comments were integrated into the final questionnaire. A group of experienced research team members conducted face-to-face interviews with selected fishers to collect the data.

Statistical methods

To investigate how social capital and other livelihood assets affect the well-being of fisher households, the researchers employed structural equation modelling (SEM) and analysed the data with the smart partial least squares (PLS) tool. To identify the strong and poor association between household livelihood asset factors, the researchers utilised bootstrapping in the SmartPLS tool. This also reveals the hypothesised relationship between the study constructs and the latent variables.

To determine the data's fitness, both convergent and discriminant validity were employed for all factors. The higher factor loadings value compared to the recommended threshold of 0.50 suggests convergent validity was applied. The square root of the variance extracted (AVE) higher than the correlations between constructs (Henseler et al., 2015) was used for discriminant validity. After determining the fitness of the structural model, the measurement model was estimated to examine the relationship between the latent variables and their measures. The bootstrap resampling process was used to evaluate hypotheses using the t-statistical test.

Results

Respondents' demographic characteristics

The survey data shows the average household size of 5, and 41 % with more than 5 people. The mean age of respondents was 49 years. Most respondents (51 %) have completed secondary education level. About 78 % of respondents are engaged in fishing as a primary source of income. Some fishers report engaging in tourism activities and business as a secondary occupation. About 42 % of the respondents have 11 to 30 years of experience in fishing, while other respondents with more than 30 years. The average household monthly income was MYR3138 (USD700). About 43 % of the respondents are involved in the recreational fishing and tourism business as an additional income-earning activity, as shown in Table 3.

Reliability and validity of model

The data analysis show that Cronbach's alpha value is 0.78, suggesting that all eight components were consistent and reliable (Table 4). The results indicate that the set of items of each factor is related as a group. The extracted average variance (AVE) was more than 0.50, indicating convergent reliability. The collinearity statistics (inner VIF values) of various factors suggest no multicollinearity among variables. The Rho_A reliability coefficients are greater than 0.7, which is acceptable.

Moreover, the discriminant validity test results are accepted because the estimated values of Heterotrait-Monotrait (HTMT) are 0.9, which is less than 1 (Table 5 and Table 6).

The model fit was also tested using a PLS-SEM analysis. The SRMR value is 0.078, and the NFI value is 0.651, showing the model fit. The outer model residuals represent the disparities between predicted and observed indicator values and are used to calculate the RMS theta score. The RMS theta value was 0.12, indicating the model fits (Table 7). Most of the indicators have yielded significant results, therefore, the overall model is well-fitting, and all the

Table 3. Socio-economic and demographic characteristics of respondents surveyed in Langkawi Island (n = 182).

Characteristics		N	Percent
Household size	up to 5 members	108	59.3
	6 and above	74	40.7
Age	18–30 Years	29	16.3
	31–45	46	25.6
	46–55	93	51.6
	56 and above	12	6.7
Education	No schooling	22	12.2
	Primary	21	11.7
	Secondary school	91	50.6
	Higher secondary and above	46	25.6
Employment status	Fulltime	594	81.1
	Part-time	31	4.2
	Own business	48	6.6
Occupation (primary)	Fisher	142	78.0
	Boatmen/recreational boat	32	17.6
	Other private services	8	4.3
Fishing experience	Up to 10 years	63	34.6
	11–30 years	77	42.3
	>31 years	42	23.0

Table 4. Construct reliability and validity of the final measurement model of social capital and well-being of small-scale fishers in Langkawi Island.

Factors	Cronbach's alpha	rho_A	Average variance extracted (AVE)	Composite reliability	Collinearity statistics (Inner-VIF)
Financial credit	0.771	0.776	0.685	0.867	3.077
Fishers' experience	1.000	1.000	1.000	1.000	2.096
Governance index	0.680	0.697	0.606	0.821	2.340
Natural capital	0.782	0.784	0.696	0.873	2.927
Physical capital	0.792	0.800	0.707	0.878	2.810
Social capital	0.783	0.786	0.698	0.874	3.725
Trust index	0.731	0.736	0.653	0.849	3.383
Livelihood of small-scale fishers	0.879	0.881	0.624	0.908	-

Table 5. Discriminant validity (Fornell-Larcker criterion) assessing the degree of shared variance between the latent variables of the final model of social capital and livelihood of small-scale fishers in Langkawi Island.

Variables	FC	GOVI	LSF	NC	PC	SC	TRUI
Financial credit	0.827						
Governance index	0.655	0.778					
Livelihood of small-scale fishers	0.709	0.680	0.790				
Natural capital	0.685	0.583	0.723	0.834			
Physical capital	0.702	0.639	0.653	0.681	0.841		
Social capital	0.677	0.681	0.806	0.717	0.723	0.836	
Trust index	0.733	0.652	0.742	0.737	0.630	0.735	0.808

FC = Financial credit, FshEx = Fishers' experience, GOVI = Governance index, LSF = Livelihood of small-scale fishers, NC = Natural capital, PC = Physical capital, SC = Social capital, TRUI = Trust index.

significant constructs included in the model have indicated strong reliability and validity.

Results of the structural model

The model was created by connecting 9 variables to 9 pathways to examine the hypothesised relationship between the factors, as discussed in Section 2.2. Reflective constructs were utilised in the measurement model, as illustrated in the diagram (Fig. 2). Thus, the model is in good shape and can proceed with path coefficients analysis.

The model's R^2 was 0.850, indicating that household

Table 6. Heterotrait-Monotrait Ratio measuring the similarity between latent variables of the final model of social capital and livelihood of small-scale fishers in Langkawi Island.

Variables	FC	FshEx	GOVI	LSF	NC	PC	SC	TRUI
FC	-							
FshEx	0.611							
GOVI	0.883	0.669						
LSF	0.856	0.892	0.855					
NC	0.891	0.683	0.773	0.871				
PC	0.900	0.599	0.844	0.779	0.866			
SC	0.879	0.764	0.915	0.971	0.917	0.916		
TRUI	0.979	0.688	0.915	0.927	0.976	0.829	0.980	-

FC = Financial credit, FshEx = Fishers' experience, GOVI = Governance index, LSF = Livelihood of small-scale fishers, NC = Natural capital, PC = Physical capital, SC = Social capital, TRUI = Trust index.

Table 7. Goodness of Model Fit (PLS-SEM) measuring how well do the observed data correspond to the fitted model of social capital and livelihood of small-scale fishers in Langkawi Island.

Model Fit	Values
Squared Euclidean distanced (dULS)	1.999
Standardised root mean square residual (SRMR)	0.078
rms Theta	0.170
Normed fit index (NFI)	0.651
Chi-square	2047.038

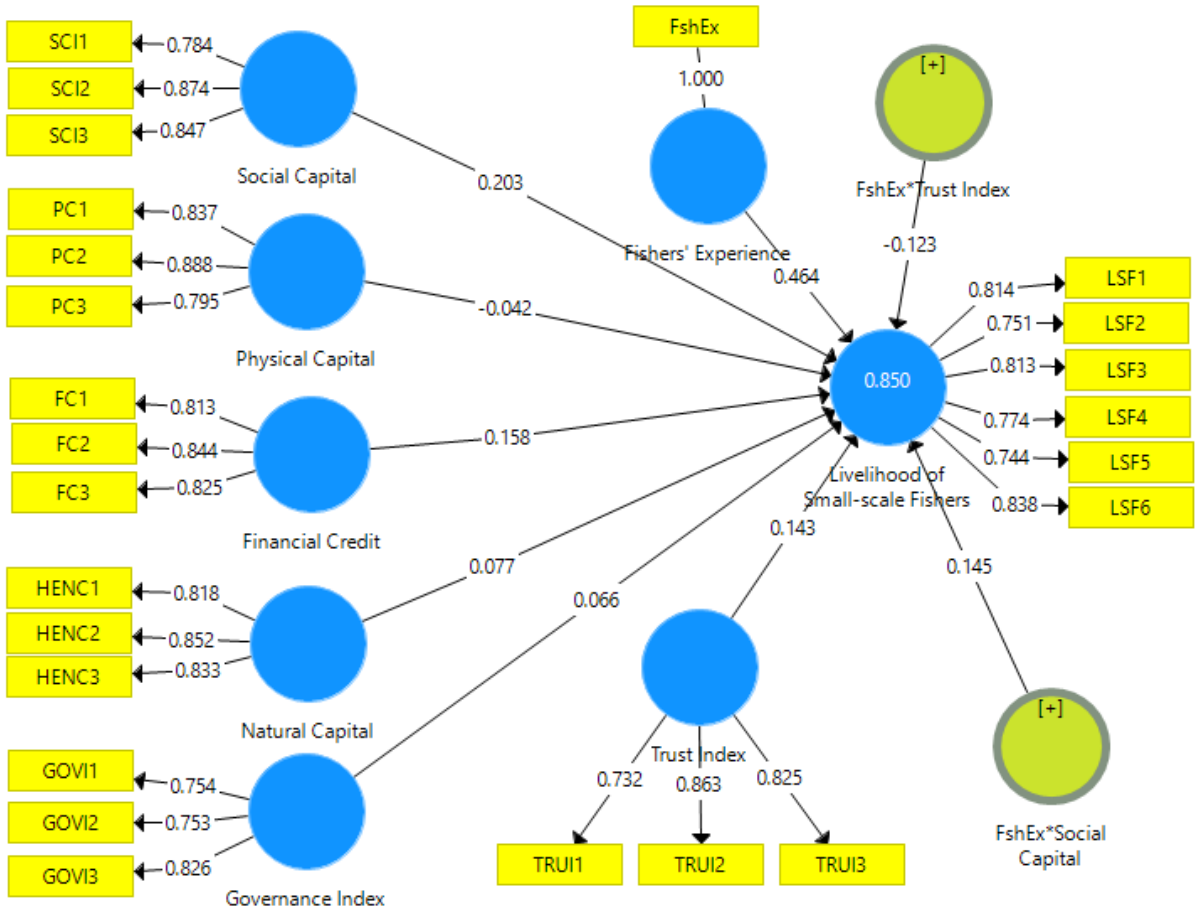

Fig. 2. Structural model evaluation of social capital and livelihood of small-scale fishers in Langkawi Island.

livelihood factors explain 85 per cent of the variation in small-scale fisher's livelihoods (Table 8). Each path representing a hypothesis connects two latent variables in the structural model. There was a significance level for all hypothesised associations based on the value of path coefficients and their t-statistics (Table 8).

The results of the study show that all the hypotheses developed to examine the relationship between the variables were accepted, except for the relationship between physical capital and livelihood of small-scale fishers, as shown in Table 8. The results suggest that access to various assets positively impacts the livelihood of small-scale fishers. Access to household physical assets is negatively related to small-scale fishers' livelihood. The findings show that household physical assets, such as fishing equipment, negatively influenced on livelihoods (β = -0.042; P = 0.376). The results also show that experience has a strong negative moderating effect between the trust index and the livelihood of small-scale fishers (β = -0.123 and P = 0.003), which indicates that fishers experience moderates the relationship between trust and livelihoods.

Table 8. Path analysis, measuring direct and indirect relationship between household assets and livelihoods of fishers in Langkawi Island.

Variable for path analysis	Beta coefficient	Standard deviation	t-Statistics	*P*- Values	Inner VIF	Relationship
Financial credit	0.158	0.053	2.987	0.003	3.077	Accepted
Governance index	0.066	0.035	1.884	0.060	2.340	Accepted
Natural capital	0.077	0.039	2.009	0.045	2.927	Accepted
Physical capital	-0.042	0.047	0.886	0.376	2.810	Rejected
Social capital	0.203	0.044	4.592	0.000	3.725	Accepted
Trust index	0.143	0.047	3.029	0.002	3.383	Accepted
Fishers' experience	0.464	0.040	11.675	0.000	2.096	Accepted
FshEx*social capital	0.145	0.048	3.002	0.003	3.348	Accepted
FshEx*trust index	-0.123	0.041	2.990	0.003	3.566	Accepted
Pre-moderation R-Square	0.844	R-Square adjusted		0.841		
Post-moderation R-Square	0.850	R-Square adjusted		0.846		

Note:
In column one, variables for path analysis show the causal relationship between the household assets and livelihood of small-scale fishers in Langkawi.
FshEx*social capital is representing a moderating relationship of social capital between fisheries experience and livelihood of small-scale fishers.
FshEx*trust index is representing a moderating relationship of trust index between fisheries experience and livelihood of small-scale fishers.

Discussion

Results from the study show that small-scale fishers in Langkawi Island have greater access to social capital. Among the social capital factors, relationships, networks and community participation were the dominant variables that contributed to fishers' household's well-being. Most fisher households were affiliated with cooperative societies and other tourism business-oriented voluntary organisations. Fishers participated in various activities such as safeguarding their boats, managing tourism activities, protect marine resources through surveillance provided by the fishers. The Department of Fisheries and Fisheries Development Authority provide training for cage culture, tourism business and additional management support to the local fishers.

The results suggest that small-scale fishers are more cooperative, have strong networks with the government and other local institutions and develop social relationships. The results are similar to past studies where traditional fishers could improve their livelihoods by mobilising social relationships with government agencies and local communities (Islam, et al., 2011). Other studies support the findings that social capital and fisheries cooperative empowerment have a good and significant effect on the livelihoods of the fisheries community in Indonesia (Yuliarmi et al., 2020). The success of community development programs in Malaysia has been influenced by the relational and cognitive components of social capital elements (Zainoddin et al., 2020).

Although trust is one of the key determinants of social capital, the evidence of the past research is mixed. The results indicated that trust, a proxy of a social capital factor, was necessary for small-scale fisheries

to increase household incomes. The local fishers need to increase relationships and trust in the society that may facilitate links with economic, social and government institutions that could support livelihoods. In Bangladesh, members of community-based organisations were not trustworthy in lending and borrowing matters in the community (Islam et al., 2011). While in West Sumatra, Stanford et al. (2014) discovered that investing in social capital, such as leadership and trust, successfully improved livelihood outcomes. In Korea, social networks, trust, and norms increase employees' happiness (Jung, 2020), and according to Zou et al. (2018), social capital is vital for determining a sustainable community.

The results of the study suggest that the model used can forecast the relationship between livelihood asset factors and fisher's well-being by analysing seven hypotheses (H_1 to H_7) of direct influence and two hypotheses (H_8, H_9) of moderating effect. The study's findings indicate that access to financial credit from formal and informal sources have significantly contributed to fisher households' income. The importance of financial wealth in explaining the fishers' livelihoods cannot be overstated. The results confirm that only a quarter of the respondents had access to financial loans from banks and other informal credit sources, such as relatives, friends and neighbours in the study area.

The fishers in the study area lack access to financial credit. About half of the credit recipients reported having access to bank loans and receiving MYR45000 (USD10055) per person. In contrast, 43 % of fishers received MYR2200 (USD492) from informal sources such as friends, relatives and fish traders. The results suggest that the fishers engaged in tourism activities and business have relatively more access to bank credit, while most fishers have limited access to financial credit.

Most of the loans were utilised for purchasing fishing boats, investment in business and medical expenses. Creating closer ties between fisher households and current credit providers such as banks, NGOs, and cooperatives may be the best method for adequate credit support. Past studies show that access to credit from informal sources such as NGOs, friends, relatives and other cooperatives could increase the income of the community-based organised fishers in Bangladesh (Islam, Yew, and Viswanathan, 2014).

The study results show that fishing is the main occupation for income of the fisher households. Traditional fishers are engaged in fishing as full-time income-earning activity by inheritance. However, about half of the respondents reported engaging in tourist activities such as tourist guides, tourist boat operators, small businesses, restaurants and chalets. The average income from tourism and business was significantly higher than from fishing. Fishers have limited access to the capital for investment in tourism boats and other equipment. The results indicate that fishers with long experience in fishing could significantly increase income from fisheries and tourism. Local organisations with adequate credit support from various institutions could be a viable approach to increase revenue from tourism. Therefore, the present study suggests that fishing skills and knowledge in fisheries are essential for fishers' livelihoods. The results of the study support the findings of past studies that fishers are relatively older in Malaysia, about 24 % of the fishers were more than 60 years old (Islam et al., 2014). Their per capita income from fishing was somewhat lower than the younger fishers involved in alternative employment such as tourism (Islam, Noh, Sidique, et al., 2014; Zainoddin et al., 2020).

The result of the study suggests that governance factors contribute to the income of fisher households. Local people have complied with the fisheries rules, were able to protect fisheries from commercial vessels, and resolved fisheries conflicts locally in the study sites. The results reveal that the active involvement of local fishers in resource management, awareness of fisheries regulation and compliance with fisheries rules are essential factors for governance. Effective participation of local fishers in the fisheries could protect resources and improve the well-being of fishers in Malaysia. The fisher cooperative members received good cooperation from the community people and local government authorities. Hence, they have successfully protected outside attempts to encroach into the fisheries.

The study results suggest that local fishers have increased access to participate in fisheries and adherence to fisheries regulations and resolve fisheries conflicts. The organised fishers can decide on fishing and tourism activities and thus control fishing and tourism activities in the study areas. The security of access to fisheries resources must be prioritised in future policy for successful small-scale fisheries governance in Malaysia.

The results suggest that natural capital substantially contributed to the income of fishers in the study sites. Langkawi's mangrove ecosystem-based fisheries habitats are very rich; various species are available, especially the anchovy, *Encrasicholina* and *Stolephorus* (ikan bilis), the main genus available in Langkawi water. Household income from fishing could be increased through the sustainable use of the fisheries on Langkawi Island. This finding of the positive impact of natural capital differs in other fisheries where fishing activities are restricted. Past studies found that natural capital has a negative impact on fishing income in Bangladesh, where organised fishers have imposed fishing restrictions to protect fisheries from overfishing (Islam, Yew, and Viswanathan, 2014). Similar evidence was reported in marine protected areas in Malaysia where fishing activities were prohibited (Islam et al., 2017).

Physical capital was a negative and non-significant predictor of household income. The results suggest that the fishers cannot retain their assets during crisis periods, such as fishing boats, boat engines, and other productive assets. Several studies report similar findings where fishers sold their holdings to meet basic requirements, such as food, house repairs, and health care, during the crisis (Islam, Yew, and Viswanathan, 2014). In Langkawi, fishers have reported that flooding and other climatic events occur almost yearly, causing people to buy, repair, and maintain their boats, house, and other vital assets. Access to physical capital assets was less insecure, particularly during the climatic hazard. There is a strong need for establishing a social safety net, especially for the poorest fishers. Fishers' income could be increased by creating safety net funds and providing support during the crisis.

Conclusion

This study examines the contributions of social capital and various livelihood assets to the well-being of small-scale fisher households in Langkawi. The study used structural equation modelling (SEM) and partial least squares (PLS) to examine the essential factors contributing to household well-being. Social capital, trust, human capital, and financial assets contributed significantly to household livelihoods and well-being. Natural capital and governance factors contributed moderately to household well-being.

The key findings of the study suggest that social capital and trust factors play an important role that may contribute to the livelihoods of the small-scale fisher households in Langkawi. Although fishing is the crucial earning activity, income from tourism has increased. The government and NGOs should promote community engagement in social activities through targeted fisheries and tourism development programmes.

Fishers access to financial credit and physical assets is critically important for their livelihood security during crisis. Establishing a social safety net for the livelihood security of the poor fishers should be prioritised. Creating alternative employment during the crisis would be a good option to secure their livelihoods.

The critical policy implication of this study is that the key agencies of fisheries management, government, NGOs and credit providers should encourage community participation in fisheries and tourism. This will enable local fishers to secure access to the various assets and fisheries resources for improving their well-being in Malaysia.

Acknowledgements

The authors are grateful for the financial support provided by the Research University Grants Scheme (RUGS), grant number 93598, Universiti Putra Malaysia. The authors would like to express their gratitude to the University of Waterloo for the in-kind support provided by the V2V Global Partnership funded through a Social Science and Humanities Research Council of Canada Partnership Grant.

Conflict of interest: The authors declare that they have no conflict of interest.

Author contributions: Gazi Md. Nurul Islam: Conceptualisation, investigation, data analysis and writing manuscript. Tai Shzee Yew: Conceptualisation, methodology, modelling, data analysis and writing manuscript. Muhammad Abrar ul Haq: Investigation, methodology, data analysis and editing.

References

Abu Samah, A., Shaffril, H.A.M., Hamzah, A., Abu Samah, B. 2019. Factors affecting small-scale fishermen's adaptation toward the impacts of climate change: reflections from Malaysian fishers. SAGE Open 9. https://doi.org/10.1177/2158244019864204

Bajwa, S.K. 2015. A study of the status of livelihood assets at household level: Evidence from Saidpur village. Department of Development Studies, Discussion paper 3. Pakistan Institute of Development Economics, Pakistan. https://www.pide.org.pk/pdf/DevStudies/discussionpaper/DiscussionPaper3.pdf

Bakker, Y.W., de Koning, J., van Tatenhove, J. 2019. Resilience and social capital: the engagement of fisheries communities in marine spatial planning. Marine Policy 99:132–139. https://doi.org/10.1016/j.marpol.2018.09.032

Boo, M.C., Yen, S.H., Lim H.E. 2020. Income and subjective well-being: a case study. Kajian Malaysia 38:91–114. https://doi.org/10.21315/km2020.38.2.4

Bourdieu, P. 1986. The forms of capital. In: Handbook of theory and research for the sociology of education, Richardson, J.G. (Eds.), Greenwood Press, New York, pp. 241–258. https://www.marxists.org/reference/subject/philosophy/works/fr/bourdieu-forms-capital.htm

Chan, N.W., Roy, R., Lai, C.H., Tan, M.L. 2019. Social capital as a vital resource in flood disaster recovery in Malaysia. International Journal of Water Resources Development 35:619–637. https://doi.org/10.1080/07900627.2018.1467312

Chen, Y., Tian, W., Zhou, Q., Shi, T. 2021. Spatiotemporal and driving forces of ecological carrying capacity for high-quality development of 286 cities in China. Journal of Cleaner Production 293:126186. https://doi.org/10.1016/j.jclepro.2021.126186

Coleman, J.S. 1994. Foundations of social theory. Harvard University Press, Cambridge, MA, USA, pp. 240–299. https://archiv.soms.ethz.ch/sociology_course/Lecture5/colemannorms.pdf

Dai, X., Wu, Z., Fan, Y., Li, B., Yang, Z., Nan, B., Bi, X. 2019. Characteristics and determinants of livelihood diversification of different household types in Far Northwestern China. Sustainability 12:64. https://doi.org/10.3390/su12010064

Ellis, F., Bahiigwa, G. 2003. Livelihoods and rural poverty reduction in Uganda. World Development 31:997–1013. https://doi.org/10.1016/S0305-750X(03)00043-3

Ellison, A.M., Felson, A.J., Friess, D.A. 2020. Mangrove rehabilitation and restoration as experimental adaptive management. Frontiers in Marine Science 7:327. https://www.frontiersin.org/article/10.3389/fmars.2020.00327

Ghani, N.A., Azmi, N., Puteh, D.H.A. 2013. The impact of the tourism industry on the community's well-being on Langkawi and Redang Islands, Malaysia. American-Eurasian Journal of Sustainable Agriculture 7:389–396. https://www.semanticscholar.org/paper/The-impact-of-the-tourism-industry-on-the-on-and-Ghani-Azmi/0cdf1dc1c9ad8fab8ddd050281385d40bbc80130

Gichure, J.N., Njeru, S.K., Mathi, P.M. 2020. Sustainable livelihood approach for assessing the impacts of slaughterhouses on livelihood strategies among pastoralists in Kenya. Pastoralism 10:26. https://doi.org/10.1186/s13570-020-00184-z

Godoy, R., Reyes-García, V., Huanca, T., Leonard, W.R., Olvera, R.G., Bauchet, J., Ma, Z., St. John, J., Miodowski, M., Rios, O.Z., Vadez, V., Seyfreid, C. 2007. The role of community and individuals in the formation of social capital. Human Ecology 35:709–721. https://doi.org/10.1007/s10745-006-9106-1

Grootaert, C. 2008. Social capital: The missing link? Working Paper No. 3. Social Development Department Publications, The World Bank, Washington, D.C., USA. https://documents1.worldbank.org/curated/en/902971468764409654/pdf/multi0page.pdf

Gutiérrez, N.L., Hilborn, R., Defeo, O. 2011. Leadership, social capital and incentives promote successful fisheries. Nature 470:386–389. https://doi.org/10.1038/nature09689

Hamad, W.A., Islam, G.M.N. 2022. The role of livelihood assets on the improvement of the livelihoods of fisher households in Zanzibar. American Journal of Environmental and Resource Economics 7:25–36. https://doi.org/10.11648/j.ajere.20220701.14

Henseler, J., Ringle, C.M., Sarstedt, M. 2015. A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science 43:115–135. https://doi.org/10.1007/s11747-014-0403-8

Hua, X., Yan, J., Zhang, Y. 2017. Evaluating the role of livelihood assets in suitable livelihood strategies: protocol for anti-poverty policy in the Eastern Tibetan Plateau, China. Ecological Indicators 78:62–74. https://doi.org/10.1016/j.ecolind.2017.03.009

Ibrahim, A.Z., Hassan, K., Kamaruddin, R., Anuar, A.R. 2018. Livelihood Assets and food security achievement: an empirical study of the coastal fishers in northern Peninsular Malaysia. Indian Journal of Public Health Research and Development 9:1383. https://doi.org/10.5958/0976-5506.2018.01645.5

Ifejika, P., Okunade, E., Ifejika, L., Asadu, A. 2013. Physical assets ownership of fisherfolk in fishing communities of Kainji Lake Nigeria: Implications for climate change. Journal of Agricultural Extension 16:92–103. https://doi.org/10.4314/jae.v16i2.8

Ishihara, H., Pascual, U. 2009. Social capital in community level environmental governance: A critique. Ecological Economics 68:1549–1562. https://doi.org/10.1016/j.ecolecon.2008.11.003

Islam, G.M.N., Noh, K.M., Sidique, S.F., Noh, A.F.M., Ali, A. 2014. Economic impacts of artificial reefs on small-scale fishers in Peninsular Malaysia. Human Ecology 42:989–998. https://doi.org/10.1007/s10745-014-9692-2

Islam, G.M.N., Tai, S.Y., Kusairi, M.N., Ahmad, S., Aswani, F.M.N., Muhamad Senan, M.K.A., Ahmad, A. 2017. Community perspectives of governance for effective management of marine protected areas in Malaysia. Ocean & Coastal Management 135:34–42. https://doi.org/10.1016/j.ocecoaman.2016.11.001

Islam, G.M.N., Yew, T.S., Abdullah, N.M.R., Viswanathan, K.K. 2011. Social capital, community based management, and fishers' livelihood in Bangladesh. Ocean & Coastal Management 54:173–180. https://doi.org/10.1016/j.ocecoaman.2010.10.026

Islam, G.M.N., Yew, T.S., Viswanathan, K.K. 2014. Poverty and livelihood impacts of community based fisheries management in Bangladesh. Ocean & Coastal Management 96:123–129. https://doi.org/10.1016/j.ocecoaman.2014.05.004

Islam, M.M., Sallu, S., Hubacek, K., Paavola, J. 2014. Vulnerability of fishery-based livelihoods to the impacts of climate variability and change: Insights from coastal Bangladesh. Regional Environmental Change 14:281–294. https://doi.org/10.1007/s10113-013-0487-6

Jamil, N.F.A., Harith, N.H.M., Kamarunzaman, N.Z. 2020. Systematic literature review of urban poor livelihoods in Malaysia. Environment-Behaviour Proceedings Journal 5:317–323. https://doi.org/10.21834/ebpj.v5i14.2273

Jung, M.H. 2020. The effect of social capital on personal happiness: A focus on service industry employees. The Journal of Asian Finance, Economics and Business 7:291–299. https://doi.org/10.13106/JAFEB.2020.VOL7.NO1.291

Kalhoro, M.T., Mu, Y., Shah, S.B.H., Noman, M., Ali Kalhoro, M., Pavase, T.R., Soomro, M.A. 2017. Microfinance for fisheries and aquaculture, lessons for Pakistan from regional Asian countries. Lasbela University Journal of Science and Technology VI:213–222. https://www.researchgate.net/publication/322961414_Microfinance_for_Fisheries_and_Aqua

Kamiyama, R., Miyata, T., Ferrer, A.J.G., Kurokura, H., Ishikawa, S. 2018. Differences in the effects of social network, trust, and co-operation on fishery co-management. Marine Policy 87:314–320. https://doi.org/10.1016/j.marpol.2017.10.033

Kleih, U., Linton, J., Marr, A., Mactaggart, M., Naziri, D., Orchard, J.E. 2013. Financial services for small and medium-scale aquaculture and fisheries producers. Marine Policy 37:106–114. https://doi.org/10.1016/j.marpol.2012.04.006

Makame, M.O., Salum, L.A., Kangalawe, R.Y.M. 2018. Livelihood assets and activities in two east coast communities of Zanzibar and implications for vulnerability to climate change and non-climate risks. Journal of Sustainable Development 11:205. https://doi.org/10.5539/jsd.v11n6p205

Minamoto, Y. 2010. Social capital and livelihood recovery: post-tsunami Sri Lanka as a case. Disaster prevention and management 19:548–564. https://doi.org/10.1108/09653561011091887

Nawrotzki, R.J., Hunter, L.M., Runfola, D.M., Riosmena, F. 2015. Climate change as a migration driver from rural and urban Mexico. Environmental Research Letters 10:114023. https://doi.org/10.1088/1748-9326/10/11/114023

Population Statistics. 2021. Langkawi district, Malaysia - charts, map and location. https://www.citypopulation.de/en/malaysia/admin/kedah/0207__langkawi/ Accessed on 09 February 2023

Priyadarshi, S., Ojha, S.N., Sharma, A. 2019. An assessment of vulnerability of fishers' livelihood to coastal Odisha. Current World Environment 14:60–67. https://doi.org/10.12944/CWE.14.1.08

Putnam, R.D. 1995. Tuning in, tuning out: The strange disappearance of social capital in America. PS: Political Science and Politics 28:664. https://doi.org/10.2307/420517

Stanford, R.J., Wiryawan, B., Bengen, D.G., Febriamansyah, R., Haluan, J. 2014. Improving livelihoods in fishing communities of West Sumatra: More than just boats and machines. Marine Policy 45:16–25. https://doi.org/10.1016/j.marpol.2013.11.013

Udoh, E.J., Akpan, S.B., Uko, E.F. 2017. Assessment of sustainable livelihood assets of farming households in Akwa Ibom State, Nigeria. Journal of Sustainable Development 10:83. https://doi.org/10.5539/jsd.v10n4p83

Yazdanpanah, M., Tajeri, M.M., Savari, M., Zobeidi, T., Sieber, S., Löhr, K. 2021. The impact of livelihood assets on the food security of farmers in Southern Iran during the COVID-19 pandemic. International Journal of Environmental Research and Public Health 18:5310. https://doi.org/10.3390/ijerph18105310

Yuliarmi, N.N., Dunggio, M., Yasa, I.N.M. 2020. Improving public welfare

through strengthening social capital and cooperative empowerment. Cogent Business & Management 7:1841075. https://doi.org/10.1080/23311975.2020.1841075

Zainoddin, A.I., Amran, A., Shaharudin, M.R. 2020. The effect of social capital on the effectiveness of community development programmes in Malaysia. International Journal of Information and Decision Sciences 12:227. https://doi.org/10.1504/IJIDS.2020.108139

Zou, T., Su, Y., Wang, Y. 2018. Examining relationships between social capital, emotion experience and life satisfaction for sustainable community. Sustainability 10:2651. https://doi.org/10.3390/su10082651