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Building environmental risk resilience through microinsurance: Distribution channel assessment in India

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Abstract

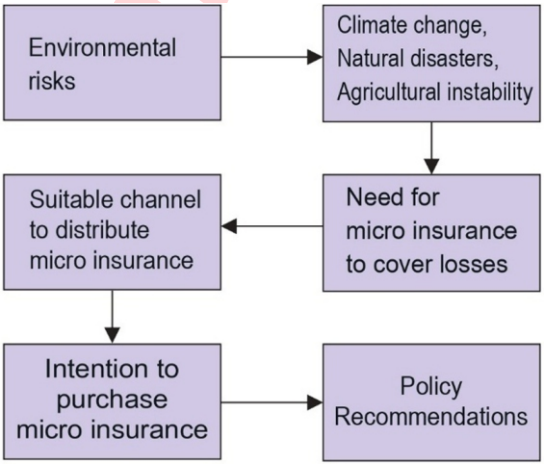
Aim: To examine the nexus between microinsurance and environmental risks, and highlighting the role of distribution channel to provide the risk coverage to vulnerable communities.

Methodology: SEM, or structural equation modelling, was used to evaluate the impact of suitable distribution channel on the willingness to buy micro insurance and explore the mediating effect of financial literacy. The developed model was tested using Smart PLS4.

Results: The findings reveal that distribution channel significantly impacts participants' willingness to purchase micro insurance with financial literacy acting as a mediator. The study also explains that the factors, trust, awareness and accessibility, leads to a suitable distribution channel.

Interpretation: The paper concludes that suitable microinsurance delivery mechanisms must integrate environmental risk management strategies, advocating for collaboration between government, insurance providers, and climate-resilient financial solutions to enhance coverage.

Key words: Common service centre, Distribution channel, Environment risks, Microinsurance, Structural equation modelling



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Introduction

Climate change and environmental degradation are increasingly exacerbating financial vulnerability among low-income populations. Severe weather conditions such as floods, droughts, and cyclones disrupt livelihoods, particularly in agriculture-dependent communities. Microinsurance, as a financial tool, offers a protective mechanism against these climate-induced shocks. However, traditional and informal insurance channels fail to adequately address the environmental vulnerabilities of at-risk communities. Building trust is essential to enable cooperation between low-income consumers and insurers, but it can be challenging since it may be lacking on both sides (Mhella, 2023).This study explores sustainable distribution channel to penetrate microinsurance, emphasizing its role in mitigating environmental risks and fostering climate resilience. The COVID-19 pandemic has caused the insurance industry to face new operational resilience issues, shifts in consumer behaviour, regulatory and supervisory relief, and an expansion in digital channels and payments (Jena, 2023).To significantly increase microinsurance penetration in India, the obstacles must be addressed by focused education, Government intervention, and financial assistance in the form of subsidies (Cheraga, 2024).

Disasters like floods, droughts, and cyclones brought on by climate change have also made financial instability worse in low-income areas. Vulnerable people are increasingly concerned about climate hazards, which makes microinsurance a method for climate resilience as well as a financial tool.Therefore, instead of traditional and informal channels, new channels and technologies must be adopted at the bottom of pyramid. Sustainable distribution models must incorporate function of microinsurance in shielding vulnerable communities from climatic hazards. In order to promote financial resilience in the event of climate-related calamities, insurance companies and regulators should concentrate on creating technologically advanced, environmentally friendly insurance solutions. Thus, stakeholders (e.g., insurance firms, governments) must focus on factors impacting the low-income population's use of suitable distribution channels to reduce financial isolation.

Over the past decade or so, microinsurance instruments and organizations have grown substantially. Insurance Regulatory and Development Authority of India (IRDAI) had previously come up with two regulations in 2015 and 2019 to guide insurance companies for utilising services of Common Service Centres (CSC), Non-Government Organisations (NGO), Self Help Groups (SHG), Rural and Coop Banks in distribution of microinsurance. Because there are no formal insurance markets, the underprivileged invest a lot of time and resources in creating informal risk management networks, such as family, extended family and relationships with nearby and far-off communities and relatives (Cohen *et al.,* 2005). There are various strategies for commercial insurers to optimize current regulations to serve the impoverished. The primary barrier preventing the majority of people from achieving financial inclusion is lack of access (Churchill, 2007). An optimal delivery channel can close this gap to an extent by making insurance affordable and available to low-income families. Removing adverse preconceptions about insurance from potential customers is another major obstacle in providing microinsurance. Literature review done in the following section of the paper reveals the research gaps such as delivery channel for microinsurance, financial literacy for low-income population, willingness to buy micro insurance and socio-economic factors. Research on microinsurance is relatively lacking, despite its growing significance for society and business. Notwithstanding certain publications, there is still a significant knowledge vacuum on its theoretical advantages, disadvantages, actual efficacy, and the level of regulation it needs (Eling *et al.,* 2024). Global insurance companies have introduced disaster-linked insurance models in response to climate-related financial risks. According to the report of The State of Food Security and Nutrition in the World, low-income households may be able to reduce their financial losses by using parametric insurance models, where payouts are triggered by predetermined climate catastrophes like cyclones or droughts. For example, Bangladesh and Kenya have effectively adopted agricultural microinsurance associated with sustainable farming methods (FAO,2022). By incorporating climate risk factors into microinsurance plans, India can follow comparable examples.

The insurance regulatory and development authority of India (IRDAI) has implemented policies to expand microinsurance reach, yet penetration remains low. Additionally, studies (Eling *et al.,* 2024; Yan *et al.,* 2021) suggest that integrating climate risk insurance into microinsurance frameworks can enhance its appeal to vulnerable populations. For example, index-based weather insurance for farmers and disaster insurance for flood-prone regions are crucial components of a sustainable microinsurance model. As per the annual report of IRDAI (2023-24), microinsurance accounted for only 1.30 percent of the total life insurance business.This highlights the lack of proper penetration of the microinsurance sector in India.To integrate the efforts of all stakeholder involved in microinsurance, the regulatory framework must have efficient coordination mechanisms (Yarumba *et al.,* 2024).

Attention must be paid to product design and distribution to enhance the market need for microinsurance. More in-depth research on product design and distribution channel types can be done, which will undoubtedly aid in the microinsurance inclusion (Insurance Regulatory and Development Authority of India, 2020). On similar lines to IRDAI, Utami *et al.* (2024) also highlighted the need for affordable pricing and expanding the array of insurance benefits, as well as addition of different avenues of communication and media, enormous sales initiatives carried out in collaboration with communities, social institutions, and microfinance institutions. Recent research underscores that financial literacy influences insurance uptake (Uddin, 2017).

There isn't sufficient evidence, though, that increased demand for insurance is a direct result of increased literacy.

However, lower prices brought about by randomly dispersed discount coupons have an instantaneous, favourable effect on the uptake (Takahashi *et al.,* 2016). It is also observed that voluntary demand for microinsurance from people has been less, doubting the viability of it as a useful risk management tool. A variety of other problems, such as price, quality, trust, and the liquidity issue, also seem to be important factors contributing to the underpenetration of microinsurance, even while lack of knowledge about insurance lowers demand (Platteau *et al.,* 2017). Study shows that the majority of rural population lack basic financial literacy, and to assist the rural people in gaining the requisite financial literacy, policymakers or non-governmental organizations (NGOs) should set up village or community-level institutions with bankers and government representatives (Twumasi *et al.,* 2022). In China, a study was carried out to investigate how financial literacy impacts the demand for life insurance. The research confirms that enhanced financial literacy can be a boost to counter the low uptake of insurance (Wang *et al.,* 2021). The study conducted in Vietnam examined the degree to which several factors influence the financial literacy of impoverished rural residents. The findings imply that financial literacy is influenced by the elements such as financial behaviour, financial attitude, and financial knowledge.

Additionally, the study found that age, income, and educational attainment have an effect on financial literacy, but gender has no significant impact (Khuc *et al.,* 2022). Another study states that savings of the consumer, low service charges and affordable and simple insurance products are important parameters leading to financial inclusion (Agarwal *et al.,* 2012; Wairimu *et al.,* 2015; Yan *et al.,* 2021). According to Hernández *et al.* (2022), age, gender, marital status, educational attainment, income, residence, region, household position, number of dependents, working conditions, job position, financial wealth, and financial experience all significantly affect financial literacy levels. The government may find such information useful for legislation, and insurance companies may find it useful for creating customized products and non-governmental organizations (NGOs) to be able to tap into the excluded population (Uddin, 2017). Assessing financial literacy levels in different demographic and socio-economic factors allow policymakers to identify gaps and design a successful strategy for financial education (Dewi, 2022). Additionally, it is discovered that respondents' age, gender, educational attainment, and training area all have an impact on their financial understanding (Cossa *et al.,* 2022). The present study also demonstrates that while developing a conceptual model, socio-economic factors like age and work experience should be examined (Bernard *et al.,* 2016).

The demand for insurance is influenced by a number of demographic factors, like income level, occupation, gender and education (Desrosiers, 2012; Jurek *et al.,* 2021; Ampaw *et al.,* 2018). The previous studies state that, microinsurance will thrive when four essential elements for its implementation are combined, namely, political support for mainstreaming, improved customer insurance literacy, technical assistance for self-administering the plans, and seed money availability (Dror, 2019). To support these findings, the key elements are identified to influence marginalised sections' propensity to purchase microinsurance. Based on this, the authors suggest that the implications of corporate governance increase the desire to buy microinsurance products. Additionally, in order of priority, the researchers suggested five governance implications: Benefits, ease of use, convenience, safety, and societal influence (Tam *et al.,* 2024). It is necessary to test and launch embedded, customized, and personalized insurance products in government marketplaces, which draw a large number of small suppliers and customers (Bhatia, 2024). The researchers also talk about the informal community-based organizations that could serve as microinsurance distribution routes. The primary link between the official and unstructured risk management systems is provided by brokers and intermediaries (Paek, 2020). The research to date reveals that the propensity to buy insurance impacts in surance penetration (Onofri *et al.,* 2020; Hamid *et al.,* 2011).

The researchers highlight that the knowledge about insurance is important, but so is being willing to buy it. According to the study, a consumer's propensity to buy insurance is influenced by their desire to use their resources to cover unforeseen expenses and their inclination to trade through a specific channel (Jurek *et al.,* 2021). According to the National Insurance Academy, the authors examine the Common Service Centre as a distribution model, various services it offers, how it operates and processes, and evaluate how the CSCs can be better utilized to enhance insurance inclusion. The study claims that the awareness about CSCs was quite level. A key component of financial inclusion is the ability of an efficient delivery channel to make financial services available to the rural populace (Singh *et al.,* 2021). Since this type of insurance is not (yet) popular in the target market, a survey was conducted to glance at the demand in which respondents stated whether they were aware of the channel and would be willing to purchase insurance through this channel. Potential demand was expressed in the propensity to purchase the product. The literature review helped the authors to understand the research gaps and to explore various factors of microinsurance penetration like distribution channel, demographic variables, financial literacy and propensity to buy insurance. With these factors, the conceptual modelwas developed.

In view of the above, objective of this study was to diagnose microinsurance demand through the channel, namely, common service centre (CSC).The paper also assessed various factors that ensure the suitability of the distribution channel and whether a mediating variable, financial literacy, would impact the intention to purchase microinsurance which would cover environmental losses at large.

Materials and Methods

Conceptual framework and hypotheses formulation: The research model was developed to assess whether low-income people would be willing to buy microinsurance to cover their

losses if it is distributed through a channel suitable to them and whether financial literacy would influence their intention to buy microinsurance. The factors, accessibility, awareness, and trust were taken into account in order to determine the suitability of distribution channel from the customers' point of view. The proposed model was tested using statistical analysis. Data from a sample of respondents was used to assess the relationships between the constructs as shown in Fig. 1.

Rationale for hypotheses development in the conceptual model: In order to observe the effects of becoming potential customers, which will affect both individual and societal well-being, this study uses financial literacy as a mediating variable and customer approval of various microinsurance distribution methods as a key construct. Thus, in the research model, the intention to buy microinsurance was a dependent variable, while the appropriate distribution channel (CSC) was an independent variable. This research framework was based on the idea that by using different institutions as delivery channels, microinsurance inclusion for the impoverished can be increased. From the customers' point of view, any delivery channel is acceptable and suitable depending on various factors such as access to the channel, trust about transacting with that channel, and most important, awareness about the channel and the services they offer (Merry *et al.,* 2014; Agarwal *et al.,* 2012; Yan *et al.,* 2021). Access can be enhanced and environmental impact can be decreased by incorporating green fintech technologies into microinsurance distribution. Access to prompt services provided by the delivery channel at suitable timings for the consumer, and the proximity is essential for the channel to function effectively. Consumer awareness regarding the existence and the services offered by the channel is necessary for it to be perceived as a suitable distribution channel. Consumer trust based on previous usage of the channel, the perception of services provided and trust to carry out various types of transactions are important parameters for a suitable delivery channel. Rural populations can access financial goods and services through efficient delivery channels, which is crucial for financial inclusion (Agarwal *et al.,* 2012;Wairimu *et al.,* 2015;Yan *et al.,* 2021). There is much variation in financial literacy across the population, hence economically backward groups are at disadvantage due to their lack of knowledge about financial products. One potential solution for low demand of life insurance is to increase financial literacy (Uddin, 2017; Stolper *et al.,* 2017). With all these variables, awareness, accessibility, trust, suitable distribution channel, financial literacy, and intention to buy microinsurance, the above conceptual model (Fig. 1) is hypothesised as: Awareness, accessibility and trust lead to suitability of the distribution channel, suitable distribution channel influences the willingness to buy microinsurance and financial literacy plays a role of mediator.

Study Design: An empirical exploratory research methodology was used to determine the reach and acceptability of the proposed distribution channel, the Common Service Centre

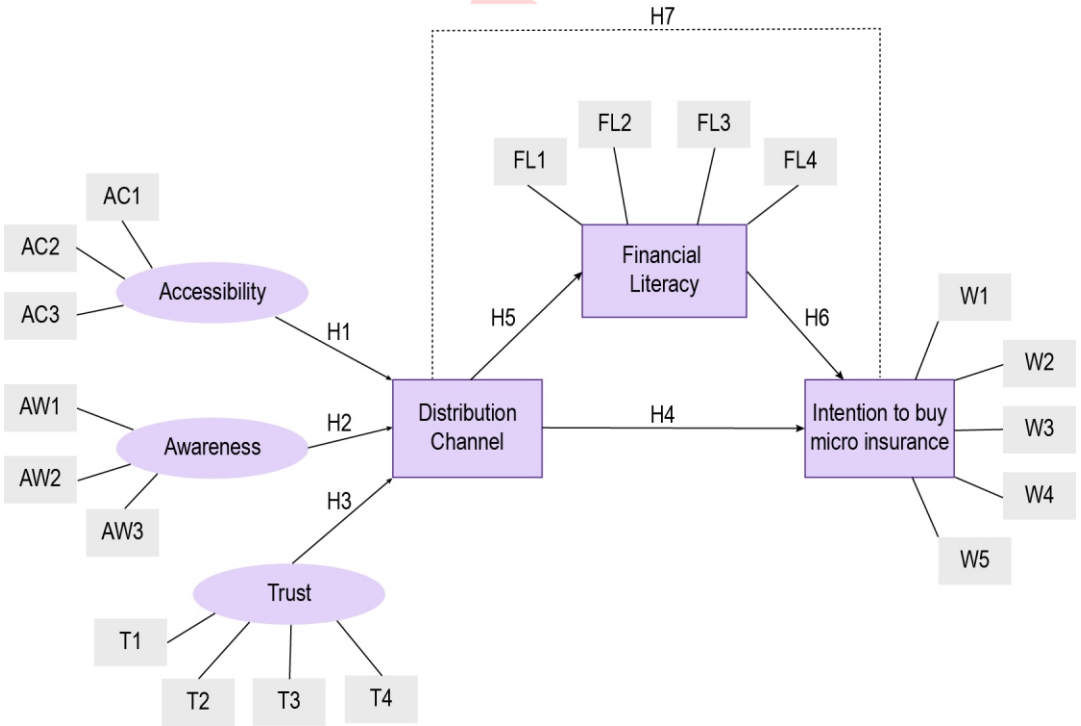

Fig. 1: Conceptual model.

(CSC), for microinsurance penetration. For this purpose, primary data were collected by conducting a survey of the respondents. The secondary data were used through a literature review. Data were collected to examine the role of distribution channels in enabling the penetration of microinsurance and to explore the trust factor, awareness level, and perception of respondents.

Data Collection: Field visits, survey through questionnaire, user group interviews, and discussions were used to gather primary data. Participants were given a structured questionnaire. Strongly Agree to Strongly Disagree was the range of the 5-point Likert scale. There were fifty questions on the survey. The responses were collected from the respondents from low-income group having income of less than Rs. One lakh from four sample districts. Secondary data was collected from government websites and a number of academic journals.

Sampling: Before a larger-scale study was carried out, this pilot study aimed to evaluate the viability of research design, test data gathering tools, and improve procedures. To gather the data, stratified random sampling was employed. The rationale behind using stratified random sampling was that it considers district-wise (strata) population based on characteristics such as age, gender, income, or other relevant variables. Since this study considers the samples based on Human Development Index (HDI) category and demographics, it ensures that each subgroup is represented in the sample, leading to more robust and generalizable findings. According to the Economic Survey of Maharashtra 22–23, the districts in Maharashtra are classified as Low, Medium, High, and Very High based on the Human Development Index (HDI). HDI includes having a good standard of living, being informed, and a long and healthy life. In order to choose the districts for sampling, HDI criterion was used. To increase the representation of the sample, one district was selected from each HDI category to reduce repetition of similar patterns of data. Table 1 shows the sample districts selected for the study based on different criteria following Julious (2005) and Hertzog (2008), a minimum of 12–30 participants per category is considered sufficient for pilot testing. The current study sampled 117 participants, *i.e.,* approximately 29 participants per district (Table 1).

Testing: Statistical analysis was used to test the research model that is being developed. The suggested model was tested using structural equation modelling (SEM) with Smart PLS4 software. SEM is an appropriatete chnique for an exploratory study with statistical model. It measures causal relationships using statistical data and qualitative causal assumptions. Smart PLS is a powerful structural equation modelling software used in research for performing multivariate analysis. The two models that make up the SEM are a measurement model that assessed the validity and reliability of the constructs and a structural model that illustrates the relationships between constructs. To address potential common method bias, both procedural and statistical remedies were employed. Procedurally, anonymity and confidentiality were used. Statistically, multicollinearity was tested for all the factors.

Results and Discussion

This section demonstrates the results of the structural model analysis carried out using Smart PLS 4 software, and subsequently discusses the results obtained. The results cover a systematic evaluation of respondent demographics, multicollinearity tests, assessment of the structural and measurement model, as well as tests of mediation and overall model fit. Table 2 provides the demographic characteristics of the respondents, giving an idea about the population sample on which the empirical analysis was conducted (Table 2). Before proceeding with the test of hypothesized relationships, multicollinearity among the independent constructs was checked, as higher correlations among independent variables impact estimates in a Structural Model. The Variance Inflation Factor and Tolerance can be used on Structural Equation Modelling for multicollinearity analysis. According to Hair *et al.* (2019), multicollinearity can be represented as a condition wherein VIF surpasses 5 and Tolerance < 0.10. As presented in Table 3, the VIF of all variables was less than 5, whereas Tolerance > 0.10, thus establishing that no multicollinearity exists, and hence the data set of the CSC distribution channel was appropriate for further analysis (Table 3). The first-order measurement model was then tested for its fitness and on the basis of this, connections between the observed variables and their corresponding constructs were determined (Hair *et al.,* 2019).

Table 4 below shows the results of the first-order measurement model. The reliability of constructs was tested with Cronbach's alpha (CA) and Composite reliability (CR), and a reliability of 0.70 and above was acceptable (Hair *et al.,* 2019). The construct reliability was established since all of the latent variables' Cronbach's alpha and CR values were higher than 0.70. Along with reliability, validity was checked for the constructs. The extent to which one measure of the same construct positively correlates with another is known as convergent validity (Panse *et*

Table 1: Sample Districts

Criteria	Pune	Sambhajinagar	Amaravati	Nandurbar
HDI	Very High	High	Medium	Low
*Population ('000)	9,429	3,701	2,888	1,648
*Literacy (%)	86.2	79.0	87.4	64.4

(Sources: * Economic Survey of Maharashtra (2022-23)

Table 2: Demographic Analysis

Categories	Demographic Variables	Frequency (N)	Percent (%)
Gender	Male	66	56.4
	Female	51	43.6
Age	18-29	29	24.8
	30-39	34	29.1
	40-49	27	23.1
	50-59	22	18.8
	60 and above	5	4.2
Education	Less than primary	20	17.1
	Less than matriculate	29	24.8
	Matriculate	16	13.7
	12th pass	25	21.4
	Graduate/Postgraduate	27	23.0
Income	0 to 24000	10	8.5
	25000 to 49000	30	25.6
	50000 to 74000	13	11.1
	75000 to 100000	37	31.6
	Above 100000	27	23.2
District	Pune	23	19.7
	Aurangabad	34	29.1
	Amaravati	29	24.8
	Nandurbar	31	26.5

Table 3: Multicollinearity

Variable	VIF
AW1	4.341
AW2	2.176
AW3	3.253
AC1	1.320
Ac2	2.254
AC3	1.966
T1	3.642
T2	4.489
T3	2.423
T4	3.053
FL1	2.265
FL2	2.524
FL3	4.071
FL4	3.742
W1	2.037
W2	1.755
W3	1.942
W4	2.188
W5	1.817

al., 2019). The results for the convergent validity were obtained using the factor loadings (FL) values and Average Variance Extracted (AVE). Hair *et al.* (2019) suggested that the factor loadings and AVE values must exceed 0.50 for a confirmatory validity. The data shows that the values satisfied the requirements because the indicators well loaded on the respective constructs, with the AVE values exceeded the recommended value. The results show that the constructs accounted for more than 50 percent variation in the observed variables (Table 4). Once the convergent validity was confirmed, the Fornell–Larcker criterion was used to test for discriminant validity. Discriminant validity helps in understanding that every latent variable is different from that of the other variables. Fornell Larcker (1981) suggested that latent variables' square root of AVE should be higher than the correlation coefficients among the variables to ensure discriminant validity. The results of the study as given in Table 5 state that all the values of the square root of AVE were higher (as shown in bold) than the inter-variable correlations and thus, the discriminant validity was also confirmed for CSC channel (Table 5).

In operationalizing the latent Suitable Distribution Channel as a second-order construct, a two-stage disjoint approach was adopted as suggested by Sarstedt *et al.* (2019). The construct has been conceptualized as an abstract higher-order variable made up of three first-order dimensions: Accessibility, Awareness, and Trust. Since the Suitable Distribution Channel could not be directly measured by the observed indicators, it was modelled as a second-order construct in the structural equation model. The resultant structural framework is depicted in Fig. 2. After confirming the reliability and validity of the measurement model, the structural model was assessed to validate the research hypotheses (Hair *et al.,* 2019). The Smart PLS 4 software was employed to determine the path coefficients, and the hypotheses were tested using a bootstrap method with 5,000 sub-samples. The results of the structural model analysis are shown in Table 6. The significance of the relationships of the variables was evaluated. Since the p-values were less than 0.05, the relationships were statistically significant, thus validating all six hypotheses. Hence, it indicates that

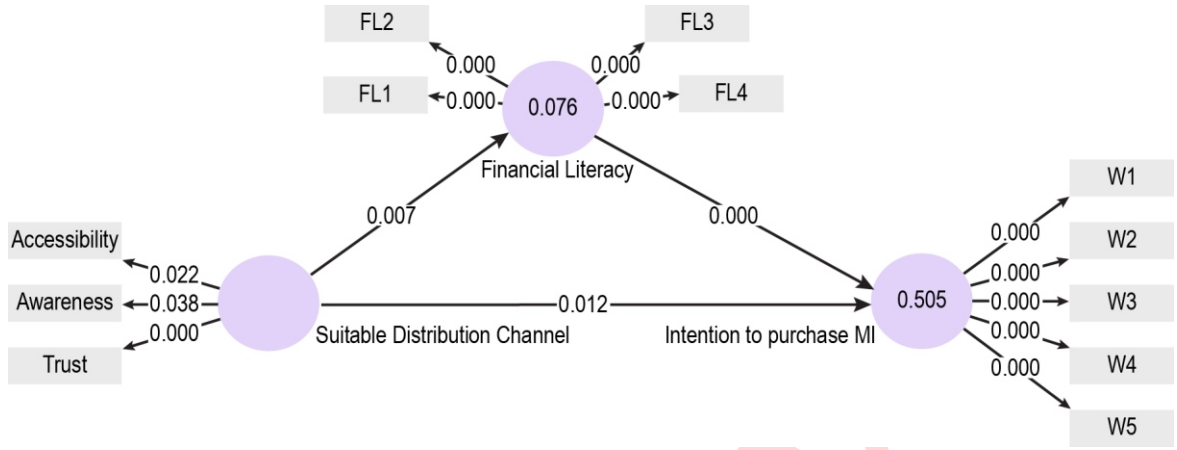

Fig. 2: Structural Equation Model (SEM)

Table 4: Construct Reliability and Validity

Latent Variables	Items	FL	CA	CR	AVE
Accessibility	Ac1	0.551	0.763	0.846	0.658
	Ac2	0.886			
	Ac3	0.941			
Awareness	Aw1	0.957	0.890	0.932	0.820
	Aw2	0.865			
	Aw3	0.892			
Trust	T1	0.895	0.917	0.941	0.799
	T2	0.933			
	T3	0.836			
	T4	0.909			
Financial Literacy	FL1	0.808	0.874	0.914	0.727
	FL2	0.842			
	FL3	0.890			
	FL4	0.868			
Intention to purchase MI	W1	0.766	0.844	0.889	0.616
	W2	0.767			
	W3	0.790			
	W4	0.818			
	W5	0.780			

accessibility, awareness, and trust contribute to suitability of distribution channel, which in turn impacts purchase intention. And as a mediator, financial literacy impacts consumers' intention to buy microinsurance.

The mediating variable, Financial Literacy, was then tested further to clarify the extent to which it affects the relationship between Distribution Channel and the Intention to Purchase Microinsurance. The results show that the mediation effect was statistically significant, since t-value was greater than the cut-off value of 1.96 and the p-value was less than 0.05. The beta value was positive indicating that mediator mediates the relationship between the independent and dependent variable in the same direction. The outcomes of the analysis show that Financial Literacy acts as a significant mediator between Distribution Channel and the Intention to Purchase Microinsurance at p value lower than 0.05, and the direct relationship between Distribution Channel and the Intention to Purchase Microinsurance remained significant. This shows that a partial mediation exists and thus, support the hypothesis that an effective distribution channel has a direct and an indicative influence on the purchase intention that is strengthened by a higher level of financial literacy (Table 7).

Following the assessment of the structural model, the model evaluation indices were also confirmed. The Coefficient of

Table 5: Discriminant Validity

Latent variables	Accessibility	Awareness	Financial Literacy	Intention to purchase MI	Trust
Accessibility	0.811				
Awareness	-0.191	0.905			
Financial Literacy	0.158	0.239	0.852		
Intention to purchase MI	0.265	0.192	0.679	0.785	
Trust	0.312	0.139	0.123	0.276	0.894

Table 6: Structural model analysis results

Hypotheses	Direct Paths	Beta	T statistics	P values	Results
H1	Accessibility-> Suitable Distribution Channel	0.611	2.299	0.022	Supported
H2	Awareness -> Suitable Distribution Channel	0.494	2.073	0.038	Supported
H3	Trust -> Suitable Distribution Channel	0.771	3.532	0.000	Supported
H4	Suitable Distribution Channel -> Intention to Purchase Microinsurance	0.220	2.523	0.012	Supported
H5	Suitable Distribution Channel -> Financial Literacy	0.276	2.689	0.007	Supported
H6	Financial Literacy -> Intention to Buy Microinsurance	0.618	11.653	0.000	Supported

Table 7: Mediating/Indirect effects

Hypothesis	Paths	Beta	T statistics	P values	Results
H7	Suitable Distribution Channel -> Financial Literacy -> Intention to Buy MI	0.171	2.692	0.007	Significant

Table 8: Structural Model Assessment (R^2 and Q^2 Values)

Channel	Endogenous Construct	R^2	Q^2 Predict	Interpretation
Common Service Centre (CSC)	Intention to purchase Microinsurance	0.505	0.094	Moderate Explanatory power and Predictive relevance

Endogenous construct: The dependent variable in the structural model; R^2: Coefficient of determination indicating the proportion of variance in the endogenous construct; Q^2 Predict: Stone Geisser's Q^2 value assesses the predictive relevance of the model. The value greater than 0 suggests predictive relevance

Determination (R^2) was employed to analyze the explanatory role of the model. Coefficient of Determination (R^2) is a measurement of the proportion of variance in the dependent construct that can be explained by the predictor construct. R^2 values of 0.25, 0.50, and 0.75 are considered as weak, moderate, and substantial. The R^2 value in Table 8 implies that the Distribution Channel, CSC, has moderate effect on Intention to purchase Microinsurance (Table 8). The Stone–Geisser Q^2 statistic was used to evaluate the predictive relevance of the model. Predictive Relevance displays the model's power for prediction. For a given endogenous construct, Q^2 values greater than 0.00 suggest that the prediction accuracy of the path model is appropriate for that construct (Hair *et al.,* 2019). Therefore, Table 8 illustrates that all the endogenous constructs used in this model had predictive relevance towards intention to purchase microinsurance. Lastly, the fitness of the model was assessed using the Standardized Root Mean Square Residual. A SRMR value less than 0.09 is an indicator of an adequate model fitness, according to Byrne (2013). The SRMR value obtained, which 0.069 for the CSC model, confirmed the adequate fitness of the structural model (Kang and Ahn, 2021).

In conclusion, the empirical findings validate the proposed conceptual model, the relationships among the constructs studied, and the hypotheses proposed by the study were all statistically valid (Marincioni *et al*., 2013). Based on these findings the authors suggest subsequent policy recommendations which can provide a safety net for marginalized section of the society against environmental risks.

Policy recommendations: The study results indicate that inclusion of microinsurance among low-income groups is greatly impacted by suitable distribution channel. Nonetheless, the distribution of microinsurance can be made more sustainable and successful over the long run by incorporating climate adaptation techniques. The following policy recommendations should be considered: Climate-related risks, including floods, droughts, and

extreme heatwaves should be specifically covered by insurance plans to guarantee that disadvantaged groups get timely financial assistance. Microinsurance can be made more widely available while lessening its environmental impact by switching from paper-based to mobile and blockchain-based insurance arrangements.

Public-private partnerships should be promoted by policy in order to incorporate microinsurance into climate adaptation initiatives. For environmentally friendly insurance products, government might offer tax breaks or subsidies. In order to encourage the adoption of sustainable microinsurance, financial literacy initiatives should also inform people about the connection between financial security and climate change. Sustainable microinsurance distribution channels must integrate climate resilience strategies to ensure financial security for vulnerable communities. Government-backed initiatives, insurance provider collaborations, and financial literacy programs should focus on enhancing environmental risk awareness alongside adopting insurance policy. Strengthening microinsurance accessibility through climate-conscious policies will contribute to long-term sustainability and economic stability for low-income populations. Future studies should examine the function of technology-driven green microinsurance models, how they affect the mitigation of climate risk, and how well they work to lessen the economic vulnerability.

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