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Interpretational Limitations of Global and Local Indices in the Measurement of Residential Isolation

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**Abstract**

The P^* index has been commonly referred to as the “isolation” index in segregation studies because it isolates (more generally, separates) the distributional pattern of a particular group from other mutually exclusive groups. Since the P^* index has been conceived to possess useful mathematical properties for capturing the exposure dimension of residential segregation, its spatial versions have been developed by different researchers. However, these isolation indices may be susceptible to differences in population size and their upper-bound has been known to vary across mutually exclusive groups. To shed light on such interpretational limitations, which have not been clearly demonstrated in the literature, population estimates by race and ethnicity in the State of California at three time periods were assessed in this study. Whether aspatial or spatial in nature, both global and local isolation indices showed that racial and ethnic majority groups were more isolated (or, more generally, “segregated”) than their minority counterparts. For comparative and trend analyses, therefore, further considerations are needed to address the interpretational limitations of aspatial and spatial isolation indices by maintaining the essential meaning of isolation in segregation studies (i.e., the extent of group members’ exposure to the same group).

Keywords

Exposure dimension; Residential segregation; Population size; Upper-bound; Aspatial indices; Spatial indices

1. Introduction

Residential segregation has been a topic of interest to social scientists in the United States (US) and other developed countries (Lloyd et al., 2014; Musterd, 2020; Schwanen & van Kempen, 2019; Skifter Andersen, 2019). While various segregation indices have been developed by different researchers (Yao et al., 2019), the P^* index, which was initially developed by Shevky and Williams (1949), modified by Bell (1954), and popularized by Lieberson (1981), has been widely regarded as the only index capable of capturing the exposure dimension of residential segregation (Brown & Chung, 2006; Johnston et al., 2007; Massey & Denton, 1988; Massey et al., 1996; Reardon & O'Sullivan, 2004). By and large, the P^* index has been referred to as the “isolation” index in segregation studies because it isolates (more generally, separates) the distributional pattern of a particular group from other mutually exclusive groups.

Using census tracts as the basic unit of calculation in a given study area of the US (e.g., demarcated by a city boundary, a county boundary, two or more contiguous county boundaries, or a state boundary), the degree of residential isolation by a particular group has been quantified as

$$P^* = \sum_{i=1}^n \left[\frac{g_i}{G} \times \frac{g_i}{t_i} \right] \quad (\text{Equation 1})$$

where g_i and t_i refer to the population count of a particular group and a total population (i.e., all mutually exclusive groups) in census tract i ($i = 1, 2, 3, \dots, n$), respectively, G refers to the overall population count of a particular group in an entire study area (i.e., $G = \sum_{i=1}^n g_i$), and $\sum_{i=1}^n []$ refers to the aggregation of n number of values into a single value. Since the P^* index is a global index that summarizes the degree of residential isolation by a particular group within a study area, its local index (denoted here as P_i^*) can be formulated as

$$P_i^* = \frac{g_i}{G} \times \frac{g_i}{t_i} \quad (\text{Equation 2})$$

where the notations are the same as Equation 1. By removing the aggregation process of $\sum_{i=1}^n []$, therefore, the P_i^* index quantifies the degree of residential isolation by a particular group across census tracts in a study area.

As a technical note on the structural components of Equations 1 and 2, the term “ g_i/G ” corresponds to the relative frequency of a particular group across census tracts within a study area and the term “ g_i/t_i ” corresponds to the proportion of a particular group across census tracts in a study area. By multiplying these two components, the P^* index summarizes the extent of group members’ exposure to (or potential contact with) the same group within a study area, whereas the P_i^* index quantifies the extent of group members’ exposure to (or potential contact with) the same group for each census tracts in a study area. With a possibility of their minimum value being zero (0) and their maximum value being one (1), values derived from these indices are anchored at the theoretical range between zero and one (0-1), regardless of the numbers of mutually exclusive groups and census tracts under study. While the P^* index summarizes the overall pattern of residential isolation and the P_i^* index describes how each census tract contributes to that overall pattern, both indices capture the exposure dimension of residential segregation: the higher the derived value, the greater the exposure, and the lower the derived value, the lesser the exposure.

While the P^* index (and thus the P_i^* index) has been conceived to possess useful mathematical properties by Morrill (1991) and Reardon and O’Sullivan (2004), the effectiveness of segregation indices lies not only in its mathematical properties, but also in its ability to be sensitive to the spatial arrangement of population distributions (Wong, 2016). Otherwise, segregation indices would obscure the essence of geography (Tobler, 1999): “the phenomenon external to an area of interest affects what goes on in the inside” (p. 87). In other words, the P^* index and the P_i^* index are aspatial (not “non-spatial”) in nature that overlook the importance of spatial relationships between census tracts. From a conceptual and methodological perspective, all aspatial segregation indices assume that people’s exposure to (or potential contact with) their neighbors take place only within the confined boundary of each census tract. With reference to a scoping review of activity space research (Perchoux et al., 2013), however, such an assumption would be inappropriate because physical spaces where people engage in daily activities typically extend beyond their census tract of residence into one or more adjacent census tracts (Basta et al., 2010; Jones & Pebley, 2014; Zenk et al., 2011). Particularly for people living near or at the edge of a census tract, they tend to cross a

street or a road into adjacent census tracts for household-, recreational-, social-, and travel-related activities (collectively, routine activities) on a daily basis.

To address the aspatial nature of the P^* index and the P_i^* index, Oka and Wong (2019) formulated their spatial version, which they referred to as the SI index and the SI_i index, respectively, based on the concept of composite population count developed by Wong (1998) (see Wong (2002, 2008) for a family of spatial segregation indices formulated using this concept). In brief, Wong (1998) developed the c_{ij} function to remove census tract boundaries as the absolute barriers for activity spaces (or routine activities). Building upon the basic concepts of modeling spatial autocorrelation (Anselin, 1995; Getis & Ord, 1992), the c_{ij} function is a spatial binary matrix where $c_{ij} = 1$ indicates census tract i and j are adjacent to one another (i.e., share a common boundary), which corresponds to the first-order adjacency of census tracts, and $c_{ij} = 0$ otherwise. Unlike common spatial weight matrices used in spatial autocorrelation studies, however, i can be equal to j and thus $c_{ii} = 1$ (i.e., c_{ii} is a reference unit).

Based on the c_{ij} function, for example, the composite population count of a particular group and a total population (i.e., all mutually exclusive groups) in census tract i (cg_i and ct_i , respectively) is calculated as

$$cg_i = \sum_j c_{ij} g_j \quad (\text{Equation 3})$$

$$ct_i = \sum_j c_{ij} t_j \quad (\text{Equation 4})$$

where g_j and t_j refer to the population count of a particular group and a total population in census tract j (with respect to a square matrix of i rows and j columns), respectively. In other words, the composite population count of a particular group in census tract i (cg_i) refers to the population count of a particular group in census tract i plus the population count of a particular group in one or more adjacent census tracts j . By the same token, the composite population count of a total population in census tract i (ct_i) refers to the population count of a total population in census tract i plus the population count of a total population in one or more adjacent census tract j . Closely reflecting the extent of activity spaces (or routine activities) demonstrated in different geographic areas of the US (Basta et al., 2010; Jones & Pebley, 2014; Zenk et al., 2011), therefore, the c_{ij} function provides a more realistic portrayal of people's daily experiences in their neighborhood of residence for the measurement of residential segregation.

Similar to how Wong (2002, 2008) spatialized traditionally aspatial segregation indices for capturing the evenness dimension of residential segregation, Oka and Wong (2019) formulated the SI index and the SI_i index as

$$SI = \sum_{i=1}^n \left[\frac{cg_i}{G} \times \frac{cg_i}{ct_i} \right] \quad (\text{Equation 5})$$

$$SI_i = \frac{cg_i}{G} \times \frac{cg_i}{ct_i} \quad (\text{Equation 6})$$

where the notations are the same as those in Equations 1-4. Therefore, whether aspatial or spatial, a set of isolation indices comprises two components attributed to the same group: the relative frequency of a particular group across census tracts within a study area and the proportion of that group across census tracts in a study area. Equally importantly, the SI index summarizes the extent of group members' exposure to (or potential contact with) the same group within a study area, whereas the SI_i index quantifies the extent of group members' exposure to (or potential contact with) the same group for each census tracts in a study area.

By maintaining the same mathematical property of the P^* index and the P_i^* index described above, the SI index and the SI_i index hold the possibility of their minimum value being zero (0). However, the maximum value of the SI index can be greater than one (1), whereas the maximum value of the SI_i index remains anchored at the theoretical value of one (1). While the SI index summarizes the overall pattern of residential isolation and the SI_i index describes how each census tract contributes to that overall pattern, both indices capture the exposure dimension of residential segregation: the higher the derived value, the greater the exposure, and the lower the derived value, the lesser the exposure.

From a measurement perspective, the term “ g_i/G ” in Equations 1 and 2 or the term “ cg_i/G ” in Equations 5 and 6 is of particular importance because the population size of census tracts typically ranges between 1,200 and 8,000 people (with an optimum size of 4,000 people) (United States Census Bureau, 2026f) but ranges much greater in reality (Oka, 2023). For example, the proportion of a particular group in one census tract (e.g., $1,500 / 3,000 = 0.50$) and in another census tract (e.g., $2,500 / 5,000 = 0.50$) may be the same. However, the degree of that group’s exposure to (or potential contact with) the same group in the former census tract (e.g., $0.50 \times [1,500 / 1,000,000] = 0.00075$) and in the latter census tract (e.g., $0.50 \times [2,500 / 1,000,000] = 0.00125$) can be quite different from each other (e.g., a 0.60- or 1.67-fold difference). Since census tracts are not uniform in size or shape (United States Census Bureau, 2026f), the relative frequency of a particular group within a study area adjusts for the compositional differences of census tracts (Oka, 2023).

Despite the usefulness of these isolation indices, values derived from the P^* index and the SI index as well as those derived from the P_i^* index and the SI_i index are not directly comparable in magnitude because aspatial and spatial indices (global and local indices alike) are not on the same scale. More concerning, the population size of two or more mutually exclusive groups would differ from one another and thus the degree of residential isolation by such groups of different sizes would not be comparable to each other. In order to better understand the severity of such analytical implications in the measurement of residential isolation, the purpose of this study was to assess how aspatial and spatial indices would be affected by population size. To this end, the State of California was used as the study area and population estimates by race and ethnicity were considered at three time periods. For analytical clarity, a sequence of non-graphical and graphical techniques was used to compare global and local indices and to understand whether a temporal change in the racial and ethnic makeup of California would also affect the measurement of residential isolation by race and ethnicity. While aspatial and spatial indices were considered in this study, the performance of global and local indices was assessed for each index to understand their susceptibility to population size (i.e., comparing values derived from the same index, not comparing values derived from aspatial and spatial indices).

2. Methods

2.1 Study Area

The State of California is located on the west coast of the US and is bordered by the Pacific Ocean in the west, the State of Oregon in the north, the State of Nevada and Arizona in the east, and the United Mexican States in the south. Encompassing a land area of approximately 403,553 km² (United States Census Bureau, 2026b), California has been the most populous state (United States Census Bureau, 2026c) and the second most racially and ethnically diverse state (trailing behind the State of Hawaii) during the past two decades (United States Census Bureau, 2021b).

2.2 Population Estimates

Census-tract-level population estimates by race and ethnicity for 2000, 2010, and 2020 were obtained from the US Census Bureau's website (United States Census Bureau, 2026c). Following the guidelines provided by the US Office of Management and Budget, racial and ethnic categories included in the census questionnaire reflect a social construct of race and ethnicity and do not reflect any anthropological, biological, or genetic aspect of respondents (United States Census Bureau, 2026d, 2026e). By separating the concepts of race from that of ethnicity, eight self-identified categories in the census questionnaire were treated as eight mutually exclusive groups: non-Hispanic White, non-Hispanic Black, Hispanic or Latino, Asian, American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, Some Other Race, and Two or More Races.

To provide a grasp on the difference in population size among racial and ethnic groups, their overall population count and their overall percentage at three time periods are shown in Table 1. Since census tracts have been updated every ten years to reflect the population change of local areas (e.g., a census tract may be split into two to account for population growth or census tracts may be merged into one to compensate for population decline), the number of census tracts was 7,036 in 2000, 8,004 in 2010, and 9,081 in 2020. Note that census tracts with no population were excluded in this study.

2.3 Computing Composite Population Counts

For implementing the c_{ij} function (Wong, 1998) in the SI index and the SI_i index (Oka & Wong, 2019) (Equations 5 and 6, respectively), the 2000, 2010, and 2020 cartographic boundary shapefiles of census tracts were obtained from the US Census Bureau's website (2026a). To improve the spatial configuration of these three cartographic boundary shapefiles, which include or extend into rivers, streams, lakes and ponds, such bodies of water were removed from the original shapefiles using the Erase tool in ArcGIS Pro (ESRI Inc., Redlands, CA, USA). The shapefile of bodies of water was obtained from the Data & Maps Collection for ArcGIS on DVD and all shapefiles were projected using the NAD 1983, State Plane Coordinate System during these processes. By removing bodies of water, therefore, three modified cartographic boundary shapefiles provide a more realistic depiction of the spatial relationship between census tracts.

When computing composite population counts in Equations 5 and 6, the boundary value problem (Griffith, 1983), often referred to as the border or edge effect in geospatial analysis, has been known to arise from an inadequate specification of spatial relationships between census tracts. In the context of this study, this problem would under-estimate the composite population count of racial and ethnic groups as well as their total population in census tracts along the border or edge of California. For handling such a computational bias, Oka and Wong (2019) recommended including census tracts surrounding a study area and using them to create a buffer zone to prevent the misspecification of spatial relationships between census tracts along the border or edge of a study area. This simple, yet effective way of handling the boundary value problem (Griffith & Amrhein, 1983) is justifiable because the c_{ij} function (Wong, 1998) corresponds to the first-order adjacency of census tracts. Following Oka and Wong's (2019) recommendation, therefore, census tracts along the border or edge of Arizona, Nevada, and Oregon that share a common boundary with census tracts in California (after removing bodies of water from the shapefiles as described above) were included for the computation of composite population counts. After computing all necessary composite

population counts, only census tracts within the State of California (i.e., omitting those in the buffer zone) were considered for the SI index and the SI_i index.

2.4 Data Analysis

In conjunction with algebraic and matrix operations, a combination of functions in the `spdep` package (Bivand, 2023) of R (R Foundation for Statistical Computing, Vienna, Austria) was used for implementing the c_{ij} function (Wong, 1998) into the modified 2000, 2010, and 2020 cartographic boundary shapefiles (after removing bodies of water) for computing the composite population count of racial and ethnic groups as well as their total population. Otherwise, basic algebraic operations were used for the calculation of residential isolation by race and ethnicity based on the P^* index and the SI index (Equations 1 and 5, respectively) or the P_i^* index and the SI_i index (Equations 2 and 6, respectively). For comparing aspatial and spatial global indices at three time periods, aspatial and spatial measures of state-level residential isolation by race and ethnicity are shown in Table 2. To provide a grasp on the difference between aspatial and spatial local indices at three time periods, descriptive statistics of aspatial and spatial measures of census-tract-level residential isolation by race and ethnicity are shown in Tables 3-5 and their relationship with Pearson's correlation coefficient (r) are shown in Figures 1-3. While manual adjustments were applied to improve readability, a combination of basic commands and functions in R was used for creating these tables and figures.

As an interpretation note, values derived from the P^* index, the P_i^* index, and the SI_i index are bounded between zero and one (0-1). However, values derived from the SI index can be greater than one, depending on the distributional pattern of mutually exclusive groups under study. Equally importantly, because aspatial and spatial indices are not on the same scale, values derived from the SI index and the SI_i index are not directly comparable in magnitude to those derived from the P^* index and the P_i^* index, respectively. Therefore, any comparison between the degree of residential isolation by race and ethnicity in Tables 2-5 and Figures 1-3 must be based on the same index.

3. Results

Table 1 shows the steady population growth in California during the first two decades of the twenty-first century. Its total population increased from about 33.9 million in 2000 to about 36.4 million in 2010 and then to about 39.3 million in 2020. As noted above, the number of census tracts increased from 7,036 in 2000 to 8,004 in 2010 and then to 9,081 in 2020 in relation to the steady population growth in California.

Table 1. Description of racial and ethnic groups in the State of California at three time periods

	2000	2010	2020
Overall Population Count			
Total Population	33,871,648	36,637,290	39,346,023
Non-Hispanic White	15,771,163	15,107,042	14,365,145
Non-Hispanic Black	2,147,885	2,163,955	2,142,371
Hispanic or Latino	10,969,132	13,456,157	15,380,929
Asian	3,642,542	4,683,828	5,743,983
American Indian or Alaska Native	181,167	153,430	131,724
Native Hawaiian or Other Pacific Islander	103,712	131,505	135,524

	2000	2010	2020
Some Other Race	68,040	109,184	124,148
Two or More Races	988,007	832,189	1,322,199
Overall Percentage			
Total Population	100.00	100.00	100.00
Non-Hispanic White	46.56	41.23	36.51
Non-Hispanic Black	6.34	5.91	5.44
Hispanic or Latino	32.38	36.73	39.09
Asian	10.75	12.78	14.60
American Indian or Alaska Native	0.53	0.42	0.33
Native Hawaiian or Other Pacific Islander	0.31	0.36	0.34
Some Other Race	0.20	0.30	0.32
Two or More Races	2.92	2.27	3.36

Despite the overall population increase of about 5.5 million in California, the overall population count of non-Hispanic White residents decreased from about 15.8 million in 2000 to about 15.1 million in 2010 and then to about 14.4 million in 2020 and the overall population count of non-Hispanic Black residents remained fairly the same: about 2.1 million in 2000, about 2.2 million in 2010, and about 2.1 million in 2020. On the other hand, the overall population count of Hispanic or Latino residents increased from about 11.0 million in 2000 to about 13.5 million in 2010 and then to about 15.4 million in 2020 and the overall population count of Asian residents increased from about 3.6 million in 2000 to about 4.7 million in 2010 and then to about 5.7 million in 2020. In addition to these four major racial and ethnic groups, the overall population count of American Indian or Alaska Native residents decreased slightly from about 181 thousand in 2000 to about 153 thousand in 2010 and then to 132 thousand in 2020 and the overall population count of Native Hawaiian or Other Pacific Islander residents increased slightly from about 104 thousand in 2000 to about 132 thousand in 2010 and then to about 136 thousand in 2020. With regard to the remaining two groups, the overall population count of residents who identified themselves as “some other race” increased from about 68 thousand in 2000 to about 109 thousand in 2010 and then to about 124 thousand in 2020, whereas those who identified themselves as “two or more races” decreased from about 988 thousand in 2000 to about 832 thousand in 2010, but increased to about 1.3 million in 2020.

With a temporal change in the overall population count of each racial and ethnic group, non-Hispanic White residents were the largest racial or ethnic group in 2000 and 2010 (representing 46.56 percent and 41.23 percent of the total population, respectively) but became the second largest racial or ethnic group in 2020 (representing 36.51 percent of the total population). In contrast, Hispanic or Latino residents were the second largest racial or ethnic group in 2000 and 2010 (representing 32.38 percent and 36.73 percent of the total population, respectively) but became the largest racial or ethnic group in 2020 (representing 39.09 percent of the total population). However, Asian residents were the third largest racial or ethnic group in 2000, 2010, and 2020 (representing 10.75 percent, 12.78 percent, and 14.60 percent of the total population, respectively) and non-Hispanic Black residents were the fourth largest racial or ethnic group in 2000, 2010, and 2020 (representing 6.34 percent, 5.91 percent, and 5.44 percent of the total population, respectively). Otherwise, American Indian or Alaska Native residents and Native Hawaiian or Other Pacific Islander residents

represented less than one percent of the total population between 2000 and 2020. While the overall population count of residents who identified themselves as “some other race” and “two or more races” increased, they represented less than one percent and about three percent of the total population between 2000 and 2020, respectively.

Mostly reflecting the increasing or decreasing trend of each racial and ethnic group in Table 1, Table 2 shows that the degree of residential isolation by race and ethnicity based on the P^* index increased or decreased between 2000 and 2020. In relation to the decreasing overall population count of non-Hispanic White residents (Table 1), state-level non-Hispanic White isolation decreased from 0.63205 in 2000 to 0.58629 in 2010 and then to 0.53501 in 2020. While the overall population count of non-Hispanic Black residents increased slightly in 2010 (Table 1), state-level non-Hispanic Black isolation decreased from 0.25051 in 2000 to 0.21481 in 2010 and then to 0.17842 in 2020. Corresponding to the increasing overall population count of Hispanic or Latino residents and Asian residents (Table 1), state-level Hispanic or Latino isolation increased from 0.52805 in 2000 to 0.55611 in 2010 and then to 0.56898 in 2020 and state-level Asian isolation increased from 0.26508 in 2000 to 0.30203 in 2010 and then to 0.33087 in 2020. Contrary to the decreasing overall population count of American Indian or Alaska Native residents (Table 1), state-level American Indian or Alaska Native isolation increased from 0.03416 in 2000 to 0.04205 in 2010 and then to 0.05099 in 2020. For Native Hawaiian or Other Pacific Islander residents, its overall population count increased between 2000 and 2020, but state-level Native Hawaiian or Other Pacific Islander isolation increased from 0.01928 in 2000 to 0.03536 in 2010 and decreased slightly to 0.03356 in 2020. Otherwise, mirroring the increasing overall population count of residents who identified themselves as “some other race” and the decreasing and increasing number of residents who identified themselves as “two or more races” between 2000 and 2020, state-level Some Other Race isolation increased from 0.00755 in 2000 to 0.01912 in 2010 and then to 0.02764 in 2020 and state-level Two or More Races isolation decreased from 0.04040 in 2000 to 0.03871 in 2010 and increased to 0.05771 in 2020.

When using the SI index, Table 2 shows that temporal changes in the degree of residential isolation by race and ethnicity followed the same trend as those based on the P^* index: state-level non-Hispanic White isolation decreased from 4.35332 in 2000 to 4.02614 in 2010 and then to 3.65598 in 2020; state-level non-Hispanic Black isolation decreased from 1.53903 in 2000 to 1.27920 in 2010 and then to 1.04948 in 2020; state-level Hispanic or Latino isolation increased from 3.47015 in 2000 to 3.72062 in 2010 and then to 3.86566 in 2020; state-level Asian isolation increased from 1.71123 in 2000 to 1.97128 in 2010 and then to 2.19868 in 2020; state-level American Indian or Alaska Native isolation increased from 0.09657 in 2000 to 0.10648 in 2010 and then to 0.11912 in 2020; state-level Native Hawaiian or Other Pacific Islander isolation increased from 0.06243 in 2000 to 0.08622 in 2010 and decreased to 0.08444 in 2020; state-level Some Other Race isolation increased from 0.02128 in 2000 to 0.04594 in 2010 and then to 0.05320 in 2020; and state-level Two or More Races isolation decreased from 0.25718 in 2000 to 0.21235 in 2010 and increased to 0.31353 in 2020.

Table 2. Aspatial and spatial measures of state-level residential isolation by race and ethnicity in the State of California at three time periods

	2000	2010	2020
P^*			
Non-Hispanic White	0.63205	0.58629	0.53501
Non-Hispanic Black	0.25051	0.21481	0.17842
Hispanic or Latino	0.52805	0.55611	0.56898

	2000	2010	2020
Asian	0.26508	0.30203	0.33087
American Indian or Alaska Native	0.03416	0.04205	0.05099
Native Hawaiian or Other Pacific Islander	0.01928	0.03536	0.03356
Some Other Race	0.00755	0.01912	0.02764
Two or More Races	0.04040	0.03871	0.05771
<i>SI</i>			
Non-Hispanic White	4.35332	4.02614	3.65598
Non-Hispanic Black	1.53903	1.27920	1.04948
Hispanic or Latino	3.47015	3.72062	3.86566
Asian	1.71123	1.97128	2.19868
American Indian or Alaska Native	0.09657	0.10648	0.11912
Native Hawaiian or Other Pacific Islander	0.06243	0.08622	0.08444
Some Other Race	0.02128	0.04594	0.05320
Two or More Races	0.25718	0.21235	0.31353

Note: P^* and SI refer to aspatial and spatial global isolation indices shown in Equation 1 and 5, respectively. Also, values derived from the P^* index and the SI index are not directly comparable in magnitude because aspatial and spatial indices are not on the same scale.

While the P^* index and the SI index yielded the same trend of state-level residential isolation by race and ethnicity in Table 2, both global indices yielded greater degrees of state-level residential isolation for larger racial and ethnic groups or, conversely, lesser degrees of state-level residential isolation for smaller racial and ethnic groups. In simplest terms, for instance, the degree of non-Hispanic White isolation was highest in 2000 and 2010, but the degree of Hispanic or Latino isolation was highest in 2020, whereas the degree of Some Other Race isolation was consistently lowest between 2000 and 2020. Despite the difference in scale, therefore, both global indices suggest that racial and ethnic majority groups were more isolated (or, more generally, “segregated”) than their minority counterparts in the State of California at three different time periods.

With regard to the P_i^* index and the SI_i index, Tables 3-5 show that both local indices also suggest racial and ethnic majority groups to be more isolated (or, more generally, “segregated”) than their minority counterparts in the State of California at three different time periods. These are indicated by wider ranges of their frequency distributions. However, the maximum values of census-tract-level non-Hispanic White isolation were consistently lower than those of census-tract-level non-Hispanic Black isolation, Hispanic or Latino isolation, and Asian isolation. In addition, the maximum values of census-tract-level American Indian or Alaska Native isolation were consistently highest or second highest in spite of its skewed frequency distribution. Therefore, comparing census-tract-level residential isolation by race and ethnicity in Tables 3-5 are not as straightforward as comparing state-level residential isolation by race and ethnicity in Table 2.

Table 3. Five-number summary and mean of aspatial and spatial measures of census-tract-level residential isolation by race and ethnicity in the State of California based on the 2000 data

	Minimum	First Quartile	Median	Mean	Third Quartile	Maximum
P_i^*						
Non-Hispanic White	0.0000000	0.0000145	0.0000668	0.0000898	0.0001412	0.0007430
Non-Hispanic Black	0.0000000	0.0000001	0.0000012	0.0000356	0.0000080	0.0024453
Hispanic or Latino	0.0000000	0.0000039	0.0000191	0.0000751	0.0000945	0.0011682
Asian	0.0000000	0.0000006	0.0000041	0.0000377	0.0000217	0.0014375
AIAN	0.0000000	0.0000000	0.0000002	0.0000049	0.0000012	0.0095558
NHOPI	0.0000000	0.0000000	0.0000000	0.0000027	0.0000004	0.0008322
Some Other Race	0.0000000	0.0000000	0.0000000	0.0000011	0.0000005	0.0001369
Two or More Races	0.0000000	0.0000010	0.0000032	0.0000057	0.0000074	0.0001495
SI_i						
Non-Hispanic White	0.0000000	0.0001477	0.0005035	0.0006187	0.0009527	0.0037227
Non-Hispanic Black	0.0000000	0.0000025	0.0000135	0.0002187	0.0000787	0.0127880
Hispanic or Latino	0.0000002	0.0000465	0.0001882	0.0004932	0.0006463	0.0057026
Asian	0.0000000	0.0000081	0.0000404	0.0002432	0.0001990	0.0055062
AIAN	0.0000000	0.0000009	0.0000027	0.0000137	0.0000072	0.0073736
NHOPI	0.0000000	0.0000002	0.0000010	0.0000089	0.0000041	0.0013921
Some Other Race	0.0000000	0.0000004	0.0000015	0.0000030	0.0000040	0.0000570
Two or More Races	0.0000000	0.0000138	0.0000278	0.0000366	0.0000472	0.0006088

Note: P_i^* and SI_i refer to aspatial and spatial local isolation indices shown in Equation 2 and 6, respectively. Also, values derived from the P_i^* index and the SI_i index are not directly comparable in magnitude because aspatial and spatial indices are not on the same scale. Abbreviations: AIAN = American Indian or Alaska Native; NHOPI = Native Hawaiian or Other Pacific Islander.

Table 4. Five-number summary of aspatial and spatial measures of census-tract-level residential isolation by race and ethnicity in the State of California based on the 2010 data

	Minimum	First Quartile	Median	Mean	Third Quartile	Maximum
P_i^*						
Non-Hispanic White	0.0000000	0.0000088	0.0000493	0.0000732	0.0001172	0.0008534
Non-Hispanic Black	0.0000000	0.0000001	0.0000011	0.0000268	0.0000093	0.0019754
Hispanic or Latino	0.0000000	0.0000051	0.0000257	0.0000695	0.0000990	0.0008396
Asian	0.0000000	0.0000006	0.0000048	0.0000377	0.0000236	0.0011339
AIAN	0.0000000	0.0000000	0.0000000	0.0000053	0.0000006	0.0093743
NHOPI	0.0000000	0.0000000	0.0000000	0.0000044	0.0000001	0.0011544
Some Other Race	0.0000000	0.0000000	0.0000000	0.0000024	0.0000004	0.0008004
Two or More Races	0.0000000	0.0000003	0.0000018	0.0000048	0.0000058	0.0001663
SI_i						
Non-Hispanic White	0.0000000	0.0000911	0.0003750	0.0005030	0.0007910	0.0038344
Non-Hispanic Black	0.0000000	0.0000028	0.0000138	0.0001598	0.0000711	0.0115570
Hispanic or Latino	0.0000003	0.0000579	0.0002230	0.0004648	0.0006643	0.0045410
Asian	0.0000000	0.0000100	0.0000464	0.0002463	0.0001970	0.0066796

	Minimum	First Quartile	Median	Mean	Third Quartile	Maximum
AIAN	0.0000000	0.0000002	0.0000013	0.0000133	0.0000052	0.0079467
NHOPI	0.0000000	0.0000000	0.0000006	0.0000108	0.0000043	0.0015951
Some Other Race	0.0000000	0.0000002	0.0000015	0.0000057	0.0000051	0.0008675
Two or More Races	0.0000000	0.0000070	0.0000183	0.0000265	0.0000375	0.0002336

Note: P_i^* and SI_i refer to aspatial and spatial local isolation indices shown in Equation 2 and 6, respectively. Also, values derived from the P_i^* index and the SI_i index are not directly comparable in magnitude because aspatial and spatial indices are not on the same scale. Abbreviations: AIAN = American Indian or Alaska Native; NHOPI = Native Hawaiian or Other Pacific Islander.

Table 5. Five-number summary of aspatial and spatial measures of census-tract-level residential isolation by race and ethnicity in the State of California based on the 2020 data

	Minimum	First Quartile	Median	Mean	Third Quartile	Maximum
P_i^*						
Non-Hispanic White	0.0000000	0.0000064	0.0000365	0.0000589	0.0000936	0.0008515
Non-Hispanic Black	0.0000000	0.0000001	0.0000011	0.0000196	0.0000085	0.0019044
Hispanic or Latino	0.0000000	0.0000058	0.0000257	0.0000627	0.0000944	0.0005614
Asian	0.0000000	0.0000005	0.0000047	0.0000364	0.0000256	0.0013041
AIAN	0.0000000	0.0000000	0.0000000	0.0000056	0.0000003	0.0128657
NHOPI	0.0000000	0.0000000	0.0000000	0.0000037	0.0000001	0.0011242
Some Other Race	0.0000000	0.0000000	0.0000000	0.0000030	0.0000003	0.0011404
Two or More Races	0.0000000	0.0000004	0.0000023	0.0000064	0.0000074	0.0003904
SI_i						
Non-Hispanic White	0.0000000	0.0000679	0.0002776	0.0004026	0.0006315	0.0033001
Non-Hispanic Black	0.0000000	0.0000031	0.0000140	0.0001156	0.0000638	0.0081798
Hispanic or Latino	0.0000000	0.0000592	0.0002200	0.0004257	0.0006342	0.0038173
Asian	0.0000000	0.0000079	0.0000451	0.0002421	0.0001911	0.0062799
AIAN	0.0000000	0.0000001	0.0000009	0.0000131	0.0000037	0.0106785
NHOPI	0.0000000	0.0000000	0.0000005	0.0000093	0.0000039	0.0012233
Some Other Race	0.0000000	0.0000002	0.0000012	0.0000059	0.0000045	0.0007803
Two or More Races	0.0000000	0.0000088	0.0000241	0.0000345	0.0000489	0.0003131

Note: P_i^* and SI_i refer to aspatial and spatial local isolation indices shown in Equation 2 and 6, respectively. Also, values derived from the P_i^* index and the SI_i index are not directly comparable in magnitude because aspatial and spatial indices are not on the same scale. Abbreviations: AIAN = American Indian or Alaska Native; NHOPI = Native Hawaiian or Other Pacific Islander.

When visualizing the relationships between local indices, Figures 1-3 show that the P_i^* index and the SI_i index captured similar distributional patterns of census-tract-level non-Hispanic White isolation (Figures 1a, 2a, and 3a), census-tract-level non-Hispanic Black isolation (Figures 1b, 2b, and 3b), census-tract-level Hispanic or Latino isolation (Figures 1c, 2c, and 3c), and census-tract-level Asian isolation (Figures 1d, 2d, and 3d) as indicated by strong positive correlations with some degree of dispersion. However, the P_i^* index and the SI_i index captured slightly different distributional patterns of census-tract-level American Indian or Alaska Native isolation (Figures 1e, 2e, and 3e), census-tract-level Native Hawaiian or Other Pacific Islander isolation (Figures 1f, 2f, and 3f), census-tract-level Some Other Race isolation (Figures 1g, 2g, and 3g), and census-tract-level Two or More Races isolation

(Figures 1h, 2h, and 3h) as indicated by weak or modest positive correlations with noticeably high dispersion. Note that Pearson's correlation coefficients in Figures 1e, 2e, and 3e were affected by the presence of an outlier but removing this outlier yielded a very similar relationship as Figures 1f, 2f, and 3f at each respective time period (data not shown). Compared to the P_i^* index, therefore, the SI_i index (or, more specifically, the c_{ij} function) was more sensitive to the spatial arrangement of racial and ethnic minority groups than their majority counterparts.

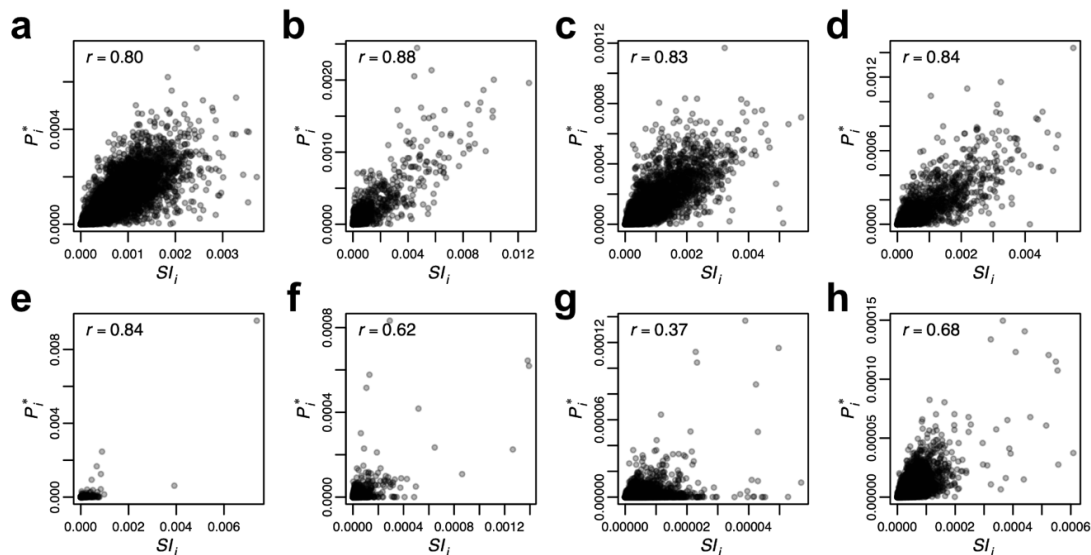


Figure 1. Relationship between aspatial and spatial measures of census-tract-level residential isolation by race and ethnicity in the State of California based on the 2000 data. (a) Non-Hispanic White; (b) Non-Hispanic Black; (c) Hispanic or Latino; (d) Asian; (e) American Indian or Alaska Native; (f) Native Hawaiian or Other Pacific Islander; (g) Some Other Race; and (h) Two or More Races. In these scatterplots, P_i^* and SI_i refer to aspatial and spatial local isolation indices shown in Equation 2 and 6, respectively.

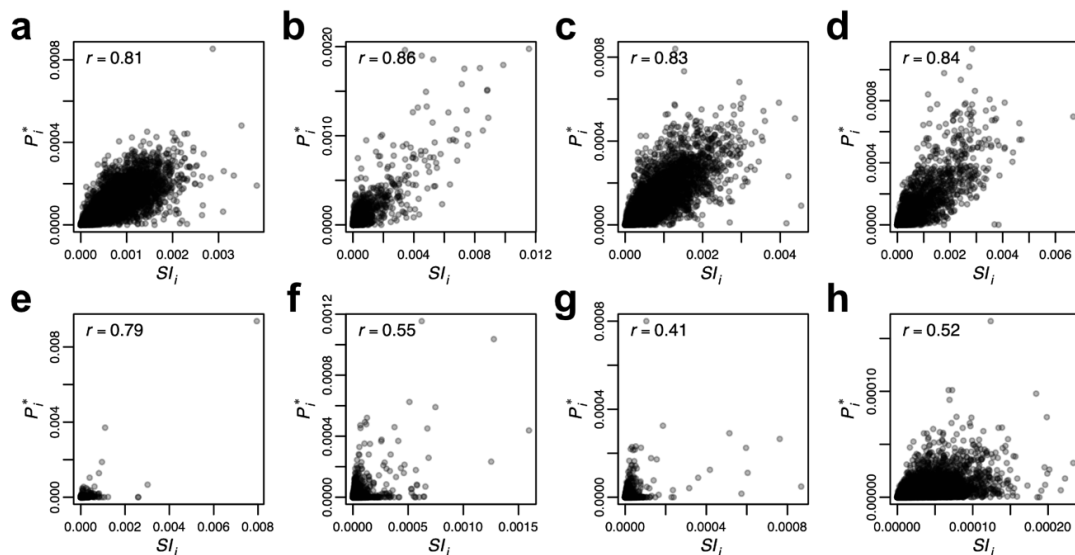


Figure 2. Relationship between aspatial and spatial measures of census-tract-level residential isolation by race and ethnicity in the State of California based on the 2010 data. (a) Non-Hispanic White; (b) Non-Hispanic Black; (c) Hispanic or Latino; (d) Asian; (e) American Indian or Alaska Native; (f) Native Hawaiian or Other Pacific Islander; (g) Some Other Race; and (h) Two or More Races. In these scatterplots, P_i^* and SI_i refer to aspatial and spatial local isolation indices shown in Equation 2 and 6, respectively.

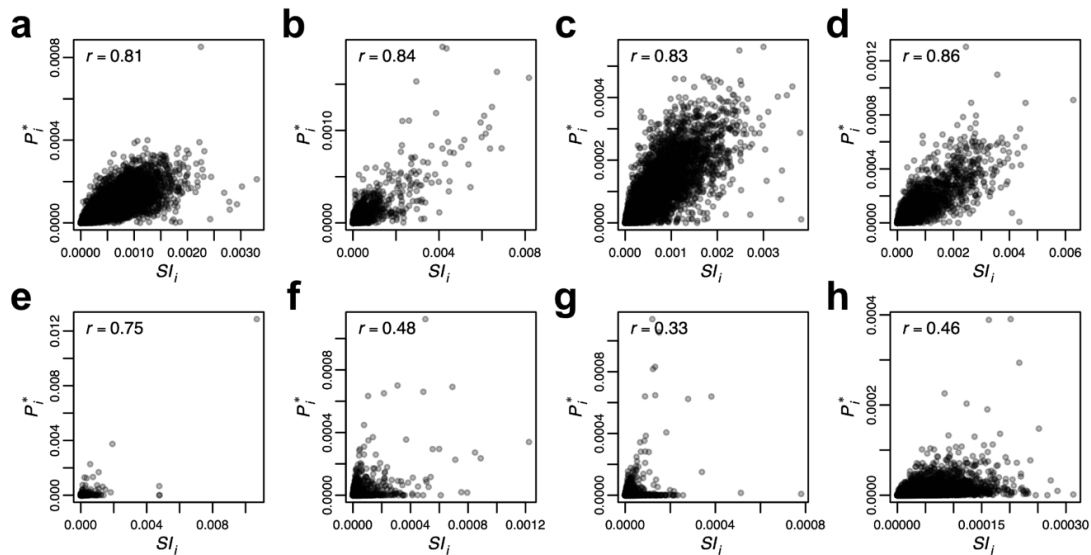


Figure 3. Relationship between aspatial and spatial measures of census-tract-level residential isolation by race and ethnicity in the State of California based on the 2020 data. (a) Non-Hispanic White; (b) Non-Hispanic Black; (c) Hispanic or Latino; (d) Asian; (e) American Indian or Alaska Native; (f) Native Hawaiian or Other Pacific Islander; (g) Some Other Race; and (h) Two or More Races. In these scatterplots, P_i^* and SI_i refer to aspatial and spatial local isolation indices shown in Equation 2 and 6, respectively.

4. Discussion

The results of state-level residential isolation by race and ethnicity in Table 2 suggest that racial and ethnic majority groups were more isolated (or, more generally, “segregated”) than their minority counterparts in the State of California at three different time periods. However, these results assert the opposite intensities and trends of residential segregation by race and ethnicity (or contradict with the conventional wisdom of residential segregation). Particularly in the US, racial and ethnic minority groups have been known to be more isolated (or, more generally, “segregated”) than their majority counterparts due to a consequence of benign market forces (e.g., incomes, preferences, and job locations) and illegal discriminatory forces (e.g., restrictive covenants by state-regulated agencies and discriminatory acts by realtors and financial institutions) (Clark, 1988; Galster, 1988; Rothstein, 2017). Since segregation indices have been known to be susceptible to differences in population size (Krupka, 2007), which may be heightened or lessened by the size of human settlements, the P^* index and the SI index would be subject to the same source of measurement bias.

As shown in Equations 1 and 5, the P^* index and the SI index summarize the product of relative frequency and proportion across census tracts. Whether aspatial or spatial in nature, both global indices would be susceptible to differences in population size because a majority group or majority groups would inevitably “fill up” more census tracts than their minority counterparts. In the simplest of terms, for instance, census tracts are designed to contain an optimum size of 4,000 people (United States Census Bureau, 2026f) and thus quite a large number of census tracts would be necessary for containing 15.0 million people than 13.3 million people (i.e., the three-time-period average of non-Hispanic White and Hispanic or Latino populations in Table 1, respectively) and for containing 4.7 million people than 2.2 million people (i.e., the three-time-period average of Asian and non-Hispanic Black populations in Table 1, respectively). Even between 155,440 and 123,580 people (i.e., the three-time-period average of American Indian or Alaska Native and Native Hawaiian or Other Pacific Islander populations in Table 1, respectively), a difference of few census tracts would lead to a greater or lesser degree of state-level residential isolation between the two groups.

Given the natural tendency of larger overall population counts to occupy more census tracts, therefore, the degree of residential isolation by race and ethnicity based on the P^* index and the SI index would be greater for racial and ethnic majority groups than their minority counterparts.

To handle the difference in population size among racial and ethnic groups (or, more generally, two or more mutually exclusive groups), a family of P^* -type indices (James, 1986; Lieberman & Carter, 1982) has been proposed during the 1970s and 1980s to take into account for the space- and time-varying nature of compositional effects in its measurement. However, these P^* -type indices are not only aspatial in nature but were formulated for capturing the interaction aspect of exposure (not the isolation aspect of exposure). Using the basic formulae provided on US Census Bureau's website (United States Census Bureau, 2021a), which summarized the review article of Massey and Denton (1988), for example, the isolation of a majority group (${}_xP_x^*$) and a minority group (${}_yP_y^*$) as well as the interaction between majority and minority groups (${}_xP_y^*$) and between minority and majority groups (${}_yP_x^*$) are defined as

$${}_xP_x^* = \sum_{i=1}^n \left[\frac{x_i}{X} \times \frac{x_i}{t_i} \right] \quad (\text{Equation 7})$$

$${}_yP_y^* = \sum_{i=1}^n \left[\frac{y_i}{Y} \times \frac{y_i}{t_i} \right] \quad (\text{Equation 8})$$

$${}_xP_y^* = \sum_{i=1}^n \left[\frac{x_i}{X} \times \frac{y_i}{t_i} \right] \quad (\text{Equation 9})$$

$${}_yP_x^* = \sum_{i=1}^n \left[\frac{y_i}{Y} \times \frac{x_i}{t_i} \right] \quad (\text{Equation 10})$$

where x_i and y_i refer to the population count of majority group and minority group in census tract i ($i = 1, 2, 3, \dots, n$), respectively, X and Y refers to the overall population count of majority group and minority group in an entire study area (i.e., $X = \sum_{i=1}^n x_i$ and $Y = \sum_{i=1}^n y_i$), respectively, and the other notations are the same as those in Equation 1.

By definition, Equations 7 and 8 are same as Equation 1 and thus both ${}_xP_x^*$ and ${}_yP_y^*$ comprise two components attributed to the same group: the relative frequency of a majority group within a study area and the proportion of that group across census tracts in a study area (Equation 7); and the relative frequency of a minority group within a study area and the proportion of that group across census tracts in a study area (Equation 8). With regard to Equations 9 and 10, however, both ${}_xP_y^*$ and ${}_yP_x^*$ comprise two components attributed to different groups: the relative frequency of a majority group within a study area and the proportion of a minority group across census tracts in a study area (Equation 9); and the relative frequency of a minority group within a study area and the proportion of a majority group across census tracts in a study area (Equation 10). Instead of these formulae, a more appropriate way of quantifying the degree of interaction between majority and minority groups would be to formulate as ${}_xP_x^* \times {}_yP_y^* (\neq {}_xP_y^*)$ and between minority and majority groups would be to formulate as ${}_yP_y^* \times {}_xP_x^* (\neq {}_yP_x^*)$. Because of such inappropriate specifications in existing interaction indices (global and local indices alike), different modification approaches considered in the past (James, 1986; Lieberman & Carter, 1982) would not be applicable for addressing the susceptibility of the P^* index and the SI index to population size.

Even among different modification approaches considered in recent years (Alonso-Villar & del Río, 2010; del Río & Alonso-Villar, 2022; Mora & Ruiz-Castillo, 2011), these so-called generalized or standardized (or normalized) segregation indices have been formulated for capturing the evenness dimension of residential segregation. While such modified versions of

dissimilarity indices and of diversity indices may provide insights into modifying the P^* index and the SI index, generalized or standardized (or normalized) segregation indices (Alonso-Villar & del Río, 2010; del Río & Alonso-Villar, 2022; Mora & Ruiz-Castillo, 2011) assume that their maximum value is definable. As shown in Tables 3-5, however, the minimum value of the P_i^* index and the SI_i index sits at zero (0.0000000), which indicates the absence of each respective racial and ethnic group, but the maximum value of these local indices tends to vary by the population size of two or more mutually exclusive groups. For example, two census tracts of equal size may be exclusively occupied by majority and minority groups (i.e., the proportion of majority and minority groups in two census tracts is 1.00), but the degree of census-tract-level residential isolation in two census tracts would differ from each other (e.g., $1.00 \times [4,000 / 4,000,000] = 0.001$ and $1.00 \times [4,000 / 1,000,000] = 0.004$) depending on the overall population count of each group (i.e., the term “ G ” in Equations 2 and 6). Because of such indefinable maximum values of the P_i^* index and the SI_i index, different modification approaches considered in recent years (Alonso-Villar & del Río, 2010; del Río & Alonso-Villar, 2022; Mora & Ruiz-Castillo, 2011) would not be applicable for addressing the susceptibility of the P^* index and the SI index to population size.

While global and local indices have been developed and used in segregation studies for different purposes, the interpretability of segregation indices matters for gaining a grasp on what is being measured. As pointed above, the P^* index and the SI index as well as the P_i^* index and the SI_i index possess useful mathematical properties and thus provide a clear understanding on the intrinsic meaning of their formula. From a measurement perspective, however, the usefulness of segregation indices also rests on its ability to provide a meaningful comparison of its derived values not only within a given geographic area at a certain time period, but also across different geographic areas and over different time periods (Johnston et al., 2014). Therefore, further considerations are needed to address the interpretational limitations of local indices by maintaining the essential meaning of isolation in segregation studies (i.e., the extent of group members’ exposure to the same group). With reference to the basic ideas of different modification approaches considered by different researchers (Alonso-Villar & del Río, 2010; del Río & Alonso-Villar, 2022; James, 1986; Lieberson & Carter, 1982; Mora & Ruiz-Castillo, 2011), for example, adding a term “ $\times 1/G$ ” to take into account for differences in the overall population count of a particular group of interest and/or adding a term “ $\times 1/n$ ” to take into account for differences in the number of census tracts may be useful for the P^* index and the SI index, but adding either one or both terms would obscure the interpretation of values derived from the P_i^* index and the SI_i index. For this reason, exploring effective ways of addressing the susceptibility of the P_i^* index and the SI_i index to population size and the context-specific nature of their upper-bound may hold the key for a better understanding of residential isolation across space and over time.

As a supplementary note, Reardon and O’Sullivan (2004) and Feitosa et al. (2007) also developed a spatial version of the P^* index and the P_i^* index using a spatial density function (denoted here as sd_{ij}) and a spatial kernel function (denoted here as sk_{ij}), respectively. Unlike the c_{ij} function (Wong, 1998) incorporated into the SI index and the SI_i index by Oka and Wong (2019), the sd_{ij} function and the sk_{ij} function obtain information on the spatial relationship between census tracts based on a spatial distance between centroids (i.e., geometric centers) by which the population counts closer to a reference census tract are weighted more and those farther away are weighted less. From a conceptual and methodological perspective, spatial indices developed by Reardon and O’Sullivan (2004) and Feitosa et al. (2007) have been considered to more closely reflect the very essence of geography (Tobler, 1970): “everything is related to everything else, but near things are more

related than distant things” (p. 236). However, their indices also inherent the same interpretational limitations discussed above. Therefore, further considerations may focus on modifying spatial indices developed by Reardon and O'Sullivan (2004) and Feitosa et al. (2007), instead of the SI index and the SI_i index developed by Oka and Wong (2019).

As with all segregation indices, the results of this study (Tables 1-5 and Figures 1-3) would be affected by the survey design and methodology implemented by the US Census Bureau and changes in statistical quality standards over time (United States Census Bureau, 2023, 2024, 2025) and would be subject to the modifiable areal unit problem (MAUP) (Openshaw, 1984; Wong, 2004, 2009). To ensure the quality of population estimates, the US Census Bureau handles different types of sampling bias (e.g., selection bias, self-selection bias, non-response bias, and coverage bias) by incorporating sampling weights. While sampling weights have been known to improve the efficacy of survey data (Haziza & Beaumont, 2017; Pfeffermann, 1993; Solon et al., 2015), they do not eliminate sampling bias associated with census-tract-level population estimates by race and ethnicity used in this study. Even if the data had been collected from complete surveys (though unrealistic), census tract and state boundaries used in this study are demarcated artificially onto a geographic space and thus their spatial size, shape, and orientation are modifiable in nature. Coined by geographers during the 1970s, the MAUP has been known to arise when different ways of drawing a boundary yield different patterns in the data (i.e., the zone effect of the MAUP) and manifest itself through different ways of aggregating the same data (i.e., the scale effect of the MAUP). Because no solution has been found to enhance the quality of population estimates nor to address the MAUP, a curtain of uncertainty casts over the values derived from aspatial and spatial indices used in this study.

5. Conclusion

The P^* index (Bell, 1954; Lieberman, 1981; Shevky & Williams, 1949) has been widely regarded as the only index capable of capturing the exposure dimension of residential segregation (Brown & Chung, 2006; Johnston et al., 2007; Massey & Denton, 1988; Massey et al., 1996; Reardon & O'Sullivan, 2004). It has been commonly referred to as the “isolation” index in segregation studies because it isolates (more generally, separates) the distributional pattern of a particular group from other mutually exclusive groups. Since the P^* index (and thus the P_i^* index) has been conceived to possess useful mathematical properties (Morrill, 1991; Reardon & O'Sullivan, 2004), Oka and Wong (2019) developed its spatial version by incorporating the c_{ij} function (Wong, 1998) to more realistically portrayal people's daily experiences in their neighborhood of residence for the measurement of residential isolation. Whether aspatial or spatial in nature, local indices have been shown to take into account for the difference in population size across census tracts (Oka, 2023), which typically ranges between 1,200 and 8,000 people (United States Census Bureau, 2026f) but ranges much greater in reality (Oka, 2023). Therefore, the P^* index and the SI index would be useful for understanding the distributional pattern of residential isolation by a particular group within a given study area, whereas the P_i^* index and the SI_i index would be useful for understanding the distributional pattern of residential isolation by a particular group across census tracts in a given study area.

Despite the usefulness of these isolation indices, Table 2 shows that the P^* index and the SI index yielded greater degrees of state-level residential isolation for racial and ethnic majority groups than their minority counterparts. From an interpretational perspective, these in turn imply that racial and ethnic majority groups were more isolated (or, more generally,

“segregated”) than their minority counterparts. By comparing with the overall population count of racial and ethnic groups at three time periods in Table 1, however, both global indices appear to be susceptible to differences in population size. Regardless of the difficulty of comparisons, Table 3-5 collectively show that the P_i^* index and the SI_i index also yielded greater degrees of census-tract-level residential isolation for racial and ethnic majority groups than their minority counterparts (see also the x- and y-axes in Figures 1-3). In addition to such interpretational limitations, the context-specific nature of upper-bound on these global and local indices also undermine a straightforward understanding on the intensities and trends of residential isolation by race and ethnicity. For these reasons, both global and local indices in their current form hinder a meaningful comparison of its derived values not only within a given geographic area at a certain time period, but also across different geographic areas and over different time periods.

While different modification approaches have been considered for formulating so-called generalized or standardized (or normalized) segregation indices (Alonso-Villar & del Río, 2010; del Río & Alonso-Villar, 2022; James, 1986; Lieberman & Carter, 1982; Mora & Ruiz-Castillo, 2011), such techniques would not be applicable for addressing the interpretational limitations of the P^* index and the SI index as well as the P_i^* index and the SI_i index because most, if not all, of them would obscure the intrinsic meaning of their formula and their derived values. In other words, an inappropriate or ineffective modification to isolation indices would obscure a meaningful understanding of what is being measured. This is of particular importance because isolation has been conceived as a multi-contextual and multi-faceted phenomenon in stratified societies (Oka & Wong, 2019). Therefore, further considerations are needed to address the interpretational limitations of global and local indices by maintaining the essential meaning of isolation in segregation studies (i.e., the extent of group members’ exposure to the same group). Since the P^* index and the P_i^* index have been used in organizational settings (e.g., schools and workplaces) (Reardon, 2017), exploring effective ways of improving the interpretability of isolation indices may provide an avenue for gaining a better grasp on the patterns, trends, and consequences of organizational isolation and residential isolation across space and over time.

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Conflicts of Interest

The author(s) declare no conflicts of interest regarding the publication of this paper.

Ethics Statement

Not applicable.

Data Availability

The datasets analyzed in this study are publicly available from the United States Census Bureau at <https://www.census.gov/data.html>.

References

- Alonso-Villar, O., & del Río, C. (2010). Local versus overall segregation measures. *Mathematical Social Sciences*, 60(1), 30–38. <https://doi.org/10.1016/j.mathsocsci.2010.03.002>
- Anselin, L. (1995). Local indicators of spatial association–LISA. *Geographical Analysis*, 27(2), 93–115. <https://doi.org/10.1111/j.1538-4632.1995.tb00338.x>
- Basta, L. A., Richmond, T. S., & Wiebe, D. J. (2010). Neighborhoods, daily activities, and measuring health risks experienced in urban environments. *Social Science & Medicine*, 71(11), 1943–1950. <https://doi.org/10.1016/j.socscimed.2010.09.008>
- Bell, W. (1954). A probability model for the measurement of ecological segregation. *Social Forces*, 32(4), 357–364. <https://doi.org/10.2307/2574118>
- Bivand, R. S. (2023). *spdep: Spatial dependence: Weighting schemes, statistics* (Version 1.2-8) [Computer software].
- Brown, L. A., & Chung, S.-Y. (2006). Spatial segregation, segregation indices and the geographical perspective. *Population, Space and Place*, 12(2), 125–143. <https://doi.org/10.1002/psp.403>
- Clark, W. A. V. (1988). Understanding residential segregation in American cities: Interpreting the evidence: A reply to Galster. *Population Research and Policy Review*, 7(2), 113–121. <https://doi.org/10.1007/BF00125463>
- del Río, C., & Alonso-Villar, O. (2022). On measuring segregation in a multigroup context: Standardized versus unstandardized indices. *Social Indicators Research*, 163(2), 633–659. <https://doi.org/10.1007/s11205-022-02911-y>
- Feitosa, F. F., Câmara, G., Monteiro, A. M. V., Koschitzki, T., & Silva, M. P. S. (2007). Global and local spatial indices of urban segregation. *International Journal of Geographical Information Science*, 21(3), 299–323. <https://doi.org/10.1080/13658810600911903>
- Galster, G. (1988). Residential segregation in American cities: A contrary review. *Population Research and Policy Review*, 7(2), 93–112. <https://doi.org/10.1007/BF00125462>
- Getis, A., & Ord, J. K. (1992). The analysis of spatial association by use of distance statistics. *Geographical Analysis*, 24(3), 189–206. <https://doi.org/10.1111/j.1538-4632.1992.tb00261.x>
- Griffith, D. A. (1983). The boundary value problem in spatial statistical analysis. *Journal of Regional Science*, 23(3), 377–387. <https://doi.org/10.1111/j.1467-9787.1983.tb00996.x>
- Griffith, D. A., & Amrhein, C. G. (1983). An evaluation of correction techniques for boundary effects in spatial statistical analysis: Traditional methods. *Geographical Analysis*, 15(4), 352–360.
- Haziza, D., & Beaumont, J.-F. (2017). Construction of weights in surveys: A review. *Statistical Science*, 32(2), 206–226. <https://doi.org/10.1214/16-STS608>
- James, F. J. (1986). A new generalized “exposure-based” segregation index: Demonstration in Denver and Houston. *Sociological Methods & Research*, 14(3), 301–316. <https://doi.org/10.1177/0049124186014003005>
- Johnston, R., Poulsen, M., & Forrest, J. (2007). Ethnic and racial segregation in U.S. metropolitan areas, 1980–2000: The dimensions of segregation revisited. *Urban Affairs Review*, 42(4), 479–504. <https://doi.org/10.1177/1078087406292701>
- Johnston, R., Poulsen, M., & Forrest, J. (2014). Two: Segregation matters, measurement matters. In C. D. Lloyd, I. G. Shuttleworth, & D. W. S. Wong (Eds.), *Social-spatial segregation: Concepts processes and outcomes* (pp. 13–44). The Policy Press. <https://doi.org/10.1332/policypress/9781447301356.003.0002>
- Jones, M., & Pebley, A. R. (2014). Redefining neighborhoods using common destinations: Social characteristics of activity spaces and home census tracts compared. *Demography*, 51(3), 727–752. <https://doi.org/10.1007/s13524-014-0283-z>
- Krupka, D. J. (2007). Are big cities more segregated? Neighbourhood scale and the measurement of segregation. *Urban Studies*, 44(1), 187–197. <https://doi.org/10.1080/00420980601023828>
- Lieberson, S. (1981). An asymmetrical approach to segregation. In C. Peach, V. Robinson, & S. Smith (Eds.), *Ethnic segregation in cities* (pp. 61–82). Croom-Helm.
- Lieberson, S., & Carter, D. K. (1982). Temporal changes and urban differences in residential segregation: A reconsideration. *American Journal of Sociology*, 88(2), 296–310. <https://doi.org/10.1086/227672>
- Lloyd, C. D., Shuttleworth, I. G., & Wong, D. W. S. (2014). *Social-spatial segregation: Concepts, processes and outcomes*. Policy Press. <https://doi.org/10.51952/9781447301363>
- Massey, D. S., & Denton, N. A. (1988). The dimensions of residential segregation. *Social Forces*, 67(2), 281–315. <https://doi.org/10.2307/2579183>

- Massey, D. S., White, M. J., & Phua, V.-C. (1996). The dimensions of segregation revisited. *Sociological Methods & Research*, 25(2), 172–206. <https://doi.org/10.1177/0049124196025002002>
- Mora, R., & Ruiz-Castillo, J. (2011). Entropy-based segregation indices. *Sociological Methodology*, 41(1), 159–194. <https://doi.org/10.1111/j.1467-9531.2011.01237.x>
- Morrill, R. L. (1991). On the measure of geographic segregation. *Geography Research Forum*, 11, 25–36.
- Musterd, S. (2020). *Handbook of urban segregation*. Edward Elgar Publishing. <https://doi.org/10.4337/9781788115605>
- Oka, M. (2023). Neighborhood-level residential isolation and neighborhood composition: Similar but different. *Journal of Urban Health*, 100(5), 987–1006. <https://doi.org/10.1007/s11524-023-00750-x>
- Oka, M., & Wong, D. W. S. (2019). Segregation: A multi-contextual and multi-faceted phenomenon in stratified societies. In T. Schwanen & van R. Kempen (Eds.), *Handbook of urban geography* (pp. 255–280). Edward Elgar Publishing. <https://doi.org/10.4337/9781785364600.00028>
- Openshaw, S. (1984). *The modifiable areal unit problem* (Vol. 38). Geo Books.
- Perchoux, C., Chaix, B., Cummins, S., & Kestens, Y. (2013). Conceptualization and measurement of environmental exposure in epidemiology: Accounting for activity space related to daily mobility. *Health & Place*, 21, 86–93. <https://doi.org/10.1016/j.healthplace.2013.01.005>
- Pfeffermann, D. (1993). The role of sampling weights when modeling survey data. *International Statistical Review / Revue Internationale de Statistique*, 61(2), 317–337. <https://doi.org/10.2307/1403631>
- Reardon, S. F. (2017). A conceptual framework for measuring segregation and its association with population outcomes. In J. M. Oakes & J. S. Kaufman (Eds.), *Methods in social epidemiology* (2nd ed., pp. 132–157). Jossey-Bass.
- Reardon, S. F., & O'Sullivan, D. (2004). Measures of spatial segregation. *Sociological Methodology*, 34(1), 121–162. <https://doi.org/10.1111/j.0081-1750.2004.00150.x>
- Rothstein, R. (2017). *The color of law—A forgotten history of how our government segregated America*. Liverlight Publishing Corporation.
- Schwanen, T., & van Kempen, R. (2019). *Handbook of urban geography*. Edward Elgar Publishing. <https://doi.org/10.4337/9781785364600>
- Shevky, E., & Williams, M. (1949). *The social areas of Los Angeles: Analysis and typology*. University of California Press.
- Skifter Andersen, H. (2019). *Ethnic spatial segregation in European cities*. Routledge. <https://doi.org/10.4324/9780429280573>
- Solon, G., Haider, S. J., & Wooldridge, J. M. (2015). What are we weighting for? *The Journal of Human Resources*, 50(2), 301–316. <https://doi.org/10.3368/jhr.50.2.301>
- Tobler, W. R. (1970). A computer movie simulating urban growth in the Detroit region. *Economic Geography*, 46(S), 234–240. <https://doi.org/10.2307/143141>
- Tobler, W. R. (1999). Linear pycnophylactic reallocation comment on a paper by D. Martin. *International Journal of Geographical Information Science*, 13(1), 85–90. <https://doi.org/10.1080/136588199241472>
- United States Census Bureau. (2021a). *Housing patterns: Appendix B: Measures of residential segregation*. <https://www.census.gov/topics/housing/housing-patterns/guidance/appendix-b.html>
- United States Census Bureau. (2021b). *Racial and ethnic diversity in the United States: 2010 census and 2020 census*. <https://www.census.gov/library/visualizations/interactive/racial-and-ethnic-diversity-in-the-united-states-2010-and-2020-census.html>
- United States Census Bureau. (2023). *Statistical quality standards*. <https://www.census.gov/about/policies/quality/standards.html>
- United States Census Bureau. (2024). *Content changes*. <https://www.census.gov/programs-surveys/acs/methodology/content-test.html>
- United States Census Bureau. (2025). *Research & methodology*. <https://www.census.gov/programs-surveys/acs/methodology.html>
- United States Census Bureau. (2026a). *TIGER/Line® shapefiles*. <https://www.census.gov/cgi-bin/geo/shapefiles/index.php>
- United States Census Bureau. (2026b). *California - Census Bureau profile*. <https://data.census.gov/profile/California?g=040XX00US06>
- United States Census Bureau. (2026c). *Explore census data*. <https://data.census.gov>
- United States Census Bureau. (2026d). *About the Hispanic population and its origin*. <https://www.census.gov/topics/population/hispanic-origin/about.html>

- United States Census Bureau. (2026e). *About the topic of race*.
<https://www.census.gov/topics/population/race/about.html>
- United States Census Bureau. (2026f). *Glossary*. <https://www.census.gov/programs-surveys/geography/about/glossary.html>
- Wong, D. W. S. (1998). Measuring multiethnic spatial segregation. *Urban Geography*, 19(1), 77–87.
<https://doi.org/10.2747/0272-3638.19.1.77>
- Wong, D. W. S. (2002). Modeling local segregation: A spatial interaction approach. *Geographical & Environmental Modelling*, 6(1), 81–97. <https://doi.org/10.1080/13615930220127305>
- Wong, D. W. S. (2004). The modifiable areal unit problem (MAUP). In D. G. Janelle, B. Warf, & K. Hansen (Eds.), *WorldMinds: Geographical perspectives on 100 problems: Commemorating the 100th anniversary of the Association of American Geographers 1904–2004* (pp. 571–575). Springer. https://doi.org/10.1007/978-1-4020-2352-1_93
- Wong, D. W. S. (2008). A local multi-dimensional approach to evaluate changes in segregation. *Urban Geography*, 29(5), 455–472. <https://doi.org/10.2747/0272-3638.29.5.455>
- Wong, D. W. S. (2009). Modifiable areal unit problem. In R. Kitchin & N. Thrift (Eds.), *International encyclopedia of human geography* (1st ed., pp. 169–174). Elsevier Science. <https://doi.org/10.1016/B978-008044910-4.00475-2>
- Wong, D. W. S. (2016). From aspatial to spatial, from global to local and individual: Are we on the right track to spatialize segregation measures? In F. M. Howell, J. R. Porter, & S. A. Matthews (Eds.), *Recapturing space: New middle-range theory in spatial demography* (pp. 77–98). Springer International Publishing.
https://doi.org/10.1007/978-3-319-22810-5_5
- Yao, J., Wong, D. W. S., Bailey, N., & Minton, J. (2019). Spatial segregation measures: A methodological review. *Tijdschrift Voor Economische en Sociale Geografie*, 110(3), 235–250.
<https://doi.org/10.1111/tesg.12305>
- Zenk, S. N., Schulz, A. J., Matthews, S. A., Odoms-Young, A., Wilbur, J., Wegrzyn, L., Gibbs, K., Braunschweig, C., & Stokes, C. (2011). Activity space environment and dietary and physical activity behaviors: A pilot study. *Health & Place*, 17(5), 1150–1161.
<https://doi.org/10.1016/j.healthplace.2011.05.001>



Research on Career Planning of Hotel Management Students under the Background of Cultural-Tourism Integration — A Case Study of Lijiang

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Abstract

With the continuous advancement of Lijiang's initiative to build a world-famous cultural tourism city, the cultural and tourism industry has become a pillar of the local economy. Accommodation formats including hotels, homestays and hillside hotels are thriving. While the industry's demand for hotel management professionals keeps expanding, it is confronted with practical dilemmas such as talent outflow, students' insufficient professional identity and diversified job competition. Based on official statistical data of Lijiang's cultural-tourism industry and the status quo of talent training for hotel management majors in local universities, this paper analyzes the employment market demand of Lijiang's hotel industry and the employment advantages of hotel management majors. It sorts out practical problems existing in students' career planning and puts forward optimization countermeasures from the perspectives of students' self-improvement, local career path selection and collaborative education among universities, enterprises and the government. This paper provides references for hotel-management majors in Lijiang to formulate career plans and realize high-quality employment.

Keywords

Hotel management; Career planning; Cultural-tourism integration; Lijiang; Homestay talents

1. Introduction

Relying on the World Cultural Heritage — the Old Town of Lijiang, the cultural-tourism industry serves as the core pillar of Lijiang's economy. According to publicly available official statistics, Lijiang received 80.64 million tourists and achieved a total tourism revenue of 138.523 billion yuan in 2024 (Yunnan Provincial Department of Transport, 2025). The tertiary industry accounted for 54.2% of the city's GDP. The cultural-tourism industry directly drove 200,000 jobs and indirectly boosted 400,000 jobs (Xinhua, 2025). The region is home to international brand hotels, star-rated hotels, hillside hotels and characteristic residential inns, forming diverse and abundant accommodation formats.

The Hotel Management major of Lijiang Culture and Tourism College is a national first-class undergraduate major construction point (Lijiang Culture and Tourism College, n.d.). It adopts the "3+0.5+0.5" talent training model and has established school-enterprise cooperation with leading local cultural-tourism enterprises such as InterContinental Lijiang Ancient Town

Resort. Every year, it supplies a large number of hotel-management graduates to local industries. Nevertheless, many students are confused about career choices: whether to work in high-end chain hotels or engage in emerging posts such as homestay housekeeper and hillside hotel operation. Faced with the obvious peak and off-peak seasons of the tourism industry and the heavy workload of entry-level positions, they hesitate over whether to stay and develop in Lijiang. Many students blindly adopt generic templates for career planning without considering the characteristics of Lijiang's local industry, which leads to vague career goals, frequent job-hopping and a high industry turnover rate.

Career planning is critical for hotel management graduates. Scientific career planning helps students identify their own strengths and weaknesses, match with job requirements of the industry and realize personal value (Lu & Adler, 2009). Combined with Lijiang's official industry data, this paper studies the dilemmas and solutions of career planning for hotel management students targeting local hotels and new homestay formats.

2. Research Background and Research Foundation

2.1 Development Overview of Lijiang's Hotel and Cultural-Tourism Industry

Lijiang's accommodation industry has formed a coordinated development pattern of high-end resort hotels, star-rated hotels, hillside hotels and boutique homestays. There are 5,399 standardized homestays and inns (Yunnan Provincial Department of Justice, 2026), directly creating more than 17,000 jobs, and the total number of cultural-tourism practitioners in the city exceeds 300,000. The industry is faced with a structural talent contradiction: there is a huge shortage of front-line service staff in peak tourist seasons, while the supply of ordinary service personnel is sufficient. Compound talents proficient in homestay management and operation, resort hotel middle-level administration, and digital cultural-tourism operation are in acute shortage.

To make up for the shortage of cultural-tourism talents, Lijiang Municipal Government launched the Lijiang Talent Support Program, setting up special policies for cultural-tourism talents. One-time subsidies up to 100,000 yuan are offered for high-end homestay management talents, and the construction of the professional evaluation system for homestay housekeepers is promoted (Organization Department of the CPC Lijiang Municipal Committee, 2024), which fully reflects the urgent demand of the local industry for high-quality hotel management talents. Meanwhile, the industry also has prominent inherent drawbacks. Lijiang is characterized by striking seasonal differences in tourism. Some homestays are trapped in homogeneous competition. The workload of entry-level positions fluctuates greatly with seasons, and the overall staff turnover rate remains high, placing high psychological demands on practitioners.

2.2 Domestic and Foreign Research Status

Research on hospitality careers has examined students' expectations and perceptions of industry employment (Goh & Lee, 2018; Richardson, 2010). Studies in China also connect career barriers and professional identity with students' career intentions (Liu et al., 2023; Lu & Adler, 2009). Internship research emphasizes programme quality, language and communication skills, and internship satisfaction as influences on career preparation and intentions (Chen et al., 2023; Collins & Pearlman, 2023; Zikrah et al., 2025). Entrepreneurship offers another relevant career direction for hospitality and tourism students (Boz, 2026). At the industry level, working conditions and seasonal employee leadership remain relevant to workforce retention (Aktürk & Yeşiltaş, 2024; Baum, 2015).

Local accounts of Lijiang's tourism development emphasize accommodation upgrading and homestay governance (Lijiang Municipal Ethnic and Religious Affairs Bureau, 2025). Few studies specifically focus on the career planning of hotel-management students from local universities. Most researches fail to incorporate emerging local formats such as homestay housekeeper and hillside hotel operation into the career planning framework, which constitutes the research entry point of this paper.

2.3 Research Purpose and Significance

Theoretically, this paper enriches the research on career planning of hotel management students in tourist cities under cultural-tourism integration, and incorporates Lijiang's local emerging formats into the analytical system of career planning. Practically, it helps local hotel management students objectively understand the current situation of Lijiang's hotel and homestay industry and identify their career orientation. In addition, it provides practical references for universities' career guidance, cultural-tourism enterprises' recruitment and government's cultivation of cultural-tourism talents.

2.4 Research Ideas

This paper firstly sorts out publicly available official data of Lijiang's cultural-tourism accommodation industry and summarizes the characteristics of industry talent demand. Secondly, it analyzes the employment advantages of hotel management students in Lijiang. Thirdly, it explores various practical problems existing in students' career planning practice. Finally, feasible countermeasures and suggestions are put forward from four dimensions: students, universities, enterprises and the government.

3. Analysis of Employment Demand of Hotel Industry in Lijiang

3.1 Overall Talent Demand Characteristics of Lijiang's Accommodation Industry

Lijiang's accommodation industry is a typical labor-intensive industry. Its positions can be categorized into traditional hotel positions and emerging local-format positions. Traditional positions include front desk, housekeeping, catering, human resources and marketing. Local emerging positions mainly refer to homestay housekeeper, homestay operation, experience planning for hillside hotels, cultural-tourism new media operation and brand management of inns. National occupational standards provide a basis for identifying the skills required of homestay housekeepers (Ministry of Human Resources and Social Security & Ministry of Culture and Tourism, 2024).

Affected by tourism seasonality, the shortage of front-line positions surges in peak seasons. However, what the industry lacks in the long run is not basic service staff, but compound talents who are familiar with local Naxi culture, equipped with professional hotel management capabilities and master new media operation and customer maintenance skills. Lijiang Human Resources and Social Security Bureau holds special job fairs for cultural-tourism talents every year. Many enterprises indicate that graduates with a systematic professional training background are more favored.

There are obvious hierarchies in job entry thresholds. Basic positions such as room cleaners and entry-level front desk staff have low access thresholds. By contrast, positions such as homestay principal, hotel department manager and hillside-hotel project manager impose strict requirements on professional knowledge, practical experience, cultural understanding and comprehensive management capabilities, which are not low-threshold jobs.

3.2 Employment Motivation and Job Demands of Hotel Management Students

The career demands of hotel management students in local universities in Lijiang can be roughly divided into three categories. The first group chooses to stay in Lijiang, aiming for international brand hotels or boutique homestays, attracted by the local living environment and opportunities in the cultural-tourism industry. The second group goes to chain hotel groups in Kunming, Sanya, Shanghai and other cities for career development. The third group takes cross-industry jobs, shifting to cultural-tourism planning, new media, administration and other positions.

Students generally face career-selection contradictions. While optimistic about the development prospect of Lijiang's cultural-tourism industry, they worry about the heavy workload at entry-level positions and income volatility caused by tourism seasons. Besides, they suffer from social stereotypes against the service industry. Many students have a vague understanding of emerging positions such as homestay housekeepers, unclear promotion paths and lack complete and clear career plans.

4. Employment Advantages of Hotel Management Students in Lijiang

4.1 Systematic Professional Knowledge Reserve

Taking the Hotel Management major of Lijiang Culture and Tourism College as an example, students systematically study courses including Introduction to Hotel Management, Hotel Service Etiquette, Hotel English, Housekeeping Management, Catering Operation and Digital Hotel Operation. They are familiar with the standardized operation process of hotels. Compared with non-professional job seekers, hotel management students can quickly adapt to the standardized management system of hotels and get familiar with front desk, catering and housekeeping work, possessing a theoretical foundation for promotion to management positions.

4.2 Practical Resource Advantages in Local Cultural-Tourism Scenarios

Local universities have built training bases with many high-end hotels and boutique homestays in Lijiang. Students can participate in internships in local enterprises during their school years, get familiar with the operation mode of resort hotels and homestays, and understand how Naxi ethnic culture is integrated into accommodation products. Compared with graduates seeking jobs from other regions, students from local colleges are familiar with the local environment and better adapt to resort accommodation positions in Lijiang, which serves as an important competitive advantage.

4.3 Comprehensive Competencies Adaptable to the Development of Homestays and Boutique Hotels

Boutique homestays and resort hotels in Lijiang provide more than basic reception services. They require practitioners to organize intangible cultural heritage experience activities, plan tourist activities and receive foreign visitors. Hotel management students receive systematic etiquette training. Some have artistic talents and strong communication and coordination skills. They are competent in homestay housekeeper reception, customer maintenance and activity planning, forming differentiated advantages in the competition of the local boutique accommodation industry.

5. Existing Problems in Career Planning of Hotel Management Students in Lijiang

5.1 Prominent Competitive Pressure from Cross-major Job Seekers

Lijiang's hotel and homestay industry is inclusive with diverse sources of job applicants. Hotel management students face competition not only from peers of the same major, but also from graduates of other majors.

First, fine-arts majors. Many fine-arts students possess strengths in photography and literary creation and have advantages in homestay activity planning and travel-photography supporting positions. Nevertheless, hotel management students master standardized operation and hotel oral English, making them more competitive in international resort hotels and standardized management positions.

Second, foreign language majors. Foreign language students have outstanding language competence and an edge in receiving inbound tourists, yet they lack practical training in hotel operation and are unfamiliar with the logic of homestay operation, so they are less competitive for comprehensive management positions than hotel management students. In addition, a large number of graduates majoring in tourism management, journalism and communication flood into new media positions of homestays, further intensifying job competition.

5.2 Insufficient Professional Identity towards Local Hotel and Homestay Industry

Social stereotypes still exist against the accommodation service industry. Some students simply equate homestay housekeepers with room cleaners. Some yearn for Lijiang's cultural-tourism industry but resist training at entry-level positions, and develop an unrealistic expectation: they aim for high-level positions yet are unwilling to take entry-level training posts. They frequently change jobs during internships and employment with low professional loyalty. Although Lijiang has carried out the professional evaluation system for homestay housekeepers, many students on campus know little about it and fail to incorporate emerging local positions into their own career planning.

5.3 Misunderstanding of "Low Threshold" Industry and Misaligned Perception of Job Hierarchies

Misled by public opinions, many students hold the one-sided belief that the hotel and homestay industry requires no professional capabilities. In fact, recruitment standards for back-office functional positions and management positions in Lijiang's international resort hotels and boutique homestays are rigorous, requiring professional background, practical experience, as well as knowledge of ethnic culture and new media skills. Students tend to confuse the recruitment criteria of entry-level positions and management positions. They either underestimate the required abilities or despise front-line experience, leading to a distorted judgment of job hierarchies.

5.4 Cognitive Bias on Work Intensity and Salary Structure of the Industry

Lijiang's accommodation industry has striking seasonal differences. Overtime work and heavy workload are common in peak seasons. Many students only notice the basic base salary of entry-level positions during school, without understanding the real local salary structure: most enterprises provide free accommodation and meals to reduce living costs. High-end hotels and boutique homestays offer performance bonuses and peak-season subsidies, and

excellent homestay housekeepers can also obtain performance rewards from customer maintenance. Due to insufficient understanding of working hours and salary during college, students suffer a great psychological gap after employment and choose to resign directly, interrupting their career development.

5.5 Conflicts between Traditional Career Concepts and the Particularity of Cultural-Tourism Industry

Traditional social perceptions treat civil-service and public-institution positions as stable and decent careers, while hotel and homestay jobs are viewed as unstable. The objectively high turnover rate of Lijiang's homestay industry further deepens the concerns of students and their parents. Many parents prefer their children to obtain public-sector jobs and do not support them to engage in hotel or homestay related work, bringing external pressure on students' career choices.

5.6 Lack of Local Emerging Formats in Career Planning

Most of the current career planning teaching in universities revolves around traditional star hotel positions, rarely introducing local characteristic positions such as homestay housekeeper, hillside hotel operation and cultural-tourism new media operation. Students lack information about these emerging local positions, and their career planning is limited to traditional positions like front desk manager and catering manager, failing to fully grasp the development opportunities of local industries.

6. Countermeasures to Improve Career Planning of Hotel Management Students

6.1 At Student Level

6.1.1 Improve comprehensive capabilities in an all-round way

First, foster healthy professional psychology. View Lijiang's hotel and homestay industry objectively, rationally treat training at entry-level positions, and accept the fluctuating work rhythm brought by the peak and off-peak seasons of tourism. Take the initiative to relieve emotions when encountering setbacks at work, abandon the misconception that the "service industry is inferior" and build a positive professional mentality.

Second, polish professional image and comprehensive literacy. Pay attention to a decent professional image and master business service etiquette proficiently (Kaufman & Ricci, 2014). Combined with the needs of Lijiang's industry, take the initiative to learn Naxi ethnic culture and reception foreign languages to adapt to reception work in resort hotels and homestays.

Third, consolidate professional foundation and expand cross-disciplinary skills. Master the core courses of hotel management, take the initiative to learn short-video editing and community operation, keep track of industry policies released by Lijiang Bureau of Culture and Tourism, and get familiar with the development trend of the hillside hotel and homestay industry.

Fourth, establish correct values for career selection. Break the inherent stereotype that only public-sector jobs are good jobs, face up to the social value of the cultural-tourism service industry, and treat emerging occupations such as homestay housekeepers and resort hotel management rationally.

6.1.2 Conduct scientific career planning based on Lijiang local market

Firstly, objectively evaluate personal strengths and weaknesses. Recognize personal advantages and drawbacks, and select suitable positions according to willingness to adapt to the seasonal work rhythm. Those good at cultural planning can target homestay housekeeper and hillside hotel experience planning positions; students with outstanding foreign language competence can aim at foreign-related positions in international brand resort hotels.

Secondly, match job directions according to personality. Outgoing students with good communication skills are suitable for front desk, homestay housekeeper and sales positions; careful and introverted students fit housekeeping management, human resources and back-office operation positions. Do not confine yourself to traditional hotel positions, and actively take local emerging formats as alternative career options.

Thirdly, expand diverse career paths based on interests. Hotel management students do not have to stick to traditional hotel positions. They can try paths such as homestay principal, cultural-tourism activity planning and homestay new media operation in combination with personal interests, making full use of cultural-tourism resources in Lijiang.

Lastly, establish a long-term development perspective. Management positions in hotels and homestays all require front-line entry-level accumulation. Students should adopt a long-term vision and understand that front-line training is a phased process. After accumulating practical experience, cultural understanding and operational capabilities, they can be promoted to supervisor or homestay principal. Take the initiative to learn local policies such as the Lijiang Talent Support Program and the professional evaluation system for homestay housekeepers to plan long-term career paths.

6.2 At University Level: Optimize Vocational Education and Employment Guidance by Connecting with Lijiang Industries

First, update the teaching content of career planning and add teaching modules of local emerging formats including homestay housekeeper and hillside hotel operation. Invite practitioners from local hotels and homestays to enter classrooms to introduce the real job content, salary level and promotion channels of local positions.

Second, deepen industry-education integration and school-enterprise cooperation with high-end hotels and homestay clusters in Lijiang. Encourage students to choose high-quality homestays for internships instead of only large chain hotels. Rely on cultural-tourism talent job fairs, build communication channels between enterprises and students and push local employment information.

Third, carry out targeted employment psychological counseling. Launch special counseling for problems such as the weak professional identity of students and conflicts of family career concepts to ease career anxiety.

6.3 At Enterprise and Government Level: Improve the Cultivation and Guarantee Mechanism of Cultural-Tourism Talents

For enterprises: local hotel and homestay enterprises shall improve internal talent training systems, build clear promotion channels from entry-level to management positions, optimize salary subsidies for peak and off-peak seasons, improve staff accommodation and meal benefits, and strengthen the promotion of positions such as homestay housekeepers to help graduates clarify career growth paths.

For the government: implement the Lijiang Talent Support Program and the professional evaluation system for homestay housekeepers, and carry out policy publicity on talent subsidies and professional evaluation for college students. Organize special training for cultural-tourism talents, promote the joint training of local hotel management talents by universities, industry associations and enterprises, reduce talent outflow and attract more graduates to engage in the cultural-tourism industry in Lijiang.

7. Conclusion

Against the backdrop of Lijiang building a world-famous cultural tourism city, the booming hotel, homestay and hillside hotel industries bring abundant employment opportunities as well as many practical challenges for hotel management students. Hotel management students possess advantages such as systematic professional knowledge and local practical training resources, yet they have shortcomings in cross-major competition, recognition of professional identity, understanding of emerging formats, and prediction of salary and working hours. Their career planning tends to be divorced from the reality of Lijiang's local industries.

Effective career planning requires multi-party collaborative efforts. Students should improve themselves comprehensively in psychological literacy, professional skills and values, base themselves on Lijiang's local industries and incorporate emerging formats such as homestay housekeeper and hillside hotel operation into career options. Universities shall optimize teaching content and deepen local industry-education integration. Enterprises shall improve internal promotion and welfare guarantees. The government shall implement cultural-tourism talent policies and perfect talent evaluation and incentive mechanisms. Joint efforts of all parties help hotel management students in Lijiang identify their career orientation, fulfill personal career aspirations, and deliver high-quality professionals for the high-quality development of Lijiang's cultural-tourism industry.

This study has limitations. As a single-city case study, its findings may not be fully generalizable to other tourist destinations with different industrial structures. Moreover, the analysis relies primarily on official statistics and secondary sources rather than a large-scale first-hand survey, so the sample basis for the observed student perceptions remains limited. Future research could employ questionnaire surveys and in-depth interviews with a larger sample to strengthen the empirical evidence.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

Ethics Statement

Not applicable.

Data Availability

The data supporting this study are available from the corresponding author upon reasonable request.

References

- Aktürk, C., & Yeşiltaş, M. (2024). Seasonal employee leadership and turnover intention in the hospitality and tourism industry: Serial mediation model workplace ostracism and work alienation. *Canadian Journal of Administrative Sciences*, 41(1), 77–93. <https://doi.org/10.1002/cjas.1728>
- Baum, T. (2015). Human resources in tourism: Still waiting for change? – A 2015 reprise. *Tourism Management*, 50, 204–212. <https://doi.org/10.1016/j.tourman.2015.02.001>
- Boz, N. (2026). Entrepreneurial intentions, career expectations, and life satisfaction of hospitality and tourism students. *Current Issues in Tourism*, 29(15), 3141–3159. <https://doi.org/10.1080/13683500.2025.2475086>
- Chen, T.-L., Goodman, D., Morrison, A., & Wang, M.-J. (2023). International internships, language competency, and employability: Perceptions of and gaps between students and industry stakeholders. *Advances in Hospitality and Tourism Research*, 11(3), 371–391. <https://doi.org/10.30519/ahtr.1133594>
- Collins, M. D., & Pearlman, D. M. (2023). Quality internships in the hospitality industry: A way to help address the labor shortage. *Journal of Human Resources in Hospitality & Tourism*, 22(4), 562–585. <https://doi.org/10.1080/15332845.2023.2207990>
- Goh, E., & Lee, C. (2018). A workforce to be reckoned with: The emerging pivotal Generation Z hospitality workforce. *International Journal of Hospitality Management*, 73, 20–28. <https://doi.org/10.1016/j.ijhm.2018.01.016>
- Kaufman, T. J., & Ricci, P. (2014). Creation of a professionalism scale for hospitality students: An exploratory study. *SAGE Open*, 4(4), 1–6. <https://doi.org/10.1177/2158244014559016>
- Lijiang Culture and Tourism College. (n.d.). *School profile*. <https://ltc.cau.edu.cn/module/download/downfile.jsp?classid=0&filename=f743c6e636794e01ae413e9386409cc2.pdf>
- Lijiang Municipal Ethnic and Religious Affairs Bureau. (2025, December 10). *Lijiang promotes the transition of the homestay industry from standardization to quality upgrading*. Yunnan Provincial Ethnic and Religious Affairs Commission. https://mzzj.yn.gov.cn/html/2025/difangdongtai_1210/4061813.html
- Liu, F., Zhang, F., Wu, N., & James, N. K. (2023). Career barriers of hospitality and tourism management students and the impacts on their career intention. *Economic Research-Ekonomska Istraživanja*, 36(2), Article 2129410. <https://doi.org/10.1080/1331677X.2022.2129410>
- Lu, T., & Adler, H. (2009). Career goals and expectations of hospitality and tourism students in China. *Journal of Teaching in Travel & Tourism*, 9(1–2), 63–80. <https://doi.org/10.1080/15313220903041972>
- Ministry of Human Resources and Social Security & Ministry of Culture and Tourism. (2024). *National occupational standard for homestay housekeepers (2024 edition)*. https://www.mohrss.gov.cn/xxgk2020/fdzdgknr/rcrs_4225/jnrc/202402/W020240227600084512277.pdf
- Organization Department of the CPC Lijiang Municipal Committee. (2024, July 9). *Party building leads the development of tourism homestays in Lijiang and turns beautiful scenery into a beautiful economy*. People.cn. <https://dangjian.people.com.cn/n1/2024/0709/c458448-40274344.html>
- Richardson, S. (2010). Generation Y's perceptions and attitudes towards a career in tourism and hospitality. *Journal of Human Resources in Hospitality & Tourism*, 9(2), 179–199. <https://doi.org/10.1080/15332840903383855>
- Xinhua. (2025, December 17). *Lijiang's cultural-tourism industry has continued to expand during the 14th Five-Year Plan period*. <https://www.yn.xinhuanet.com/20251217/5a4a68e3d8954d2ba869b6cc317ef956/c.html>
- Yunnan Provincial Department of Justice. (2026). *Lijiang writes a new chapter in grassroots governance through rule of law and public service*. https://sft.yn.gov.cn/yfzs/pages_5_9420.aspx
- Yunnan Provincial Department of Transport. (2025, December 1). *Lijiang Highway Bureau achieves four consecutive improvements in road quality to support high-quality local economic development*. https://jtyst.yn.gov.cn/html/2025/xingyexinwen_1201/3135748.html
- Zikrah, D., Ilham, Hasnel, H., & Ferdian, F. (2025). From intern to industry professional: How work experience and satisfaction influence career intentions in the hotel sector. *Journal of Business on Hospitality and Tourism*, 11(1), 20–33. <https://doi.org/10.22334/jbhost.v11i1.455>



Human Rights of Women Domestic Workers in Dhaka City: Gender, Informality, and Urban Inequality

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Abstract

Women domestic workers in Dhaka occupy a highly vulnerable position at the intersection of gendered labor relations, employment informality, and urban inequality. This study examines the current level of human-rights vulnerability among women domestic workers and assesses whether gender inequality, informality and urban inequality are associated with the severity of rights violations. The study uses a quantitative cross-sectional design and distinguishes the analytic unit from supplementary stakeholder respondents. The dataset contains 100 respondents: 80 domestic workers and 20 key informants. The main inferential analysis is restricted to the 80 domestic workers because the research question concerns their lived working conditions. Five-item indices are constructed for gender inequality, informality, urban inequality, and human-rights outcomes. Stata 17 is used for descriptive statistics, reliability screening, Spearman correlations, multicollinearity diagnostics, ordinary least-squares regression with heteroskedasticity-robust standard errors. Among domestic workers, the mean human-rights outcome score is 4.55 on a five-point scale, indicating a high level of reported rights vulnerability. In the controlled robust model, gender inequality is positively associated with the outcome ($b = 0.462, p < .001$), urban inequality is also positively associated ($b = 0.424, p = .002$), while informality is not statistically significant ($b = 0.031, p = .609$). The model explains 65.6% of the variance. These results suggest that gendered disadvantage and urban inequality are particularly important correlates of rights vulnerability, while the independent contribution of informality is less clear after controls are introduced.

Keywords

Dhaka; Gender inequality; Human rights vulnerability; Informality; Labor rights; Urban inequality; Women domestic workers

1. Introduction

Dhaka is the main economic centre of Bangladesh and attracts a large number of rural migrants who seek employment and better livelihood opportunities (Sifullah et al., 2023). However, women have relatively low participation in formal employment and approximately 96.6% of female employment remains informal (Jahan, 2024). Therefore, domestic work has become an important source of employment for poor and migrant women, particularly in low-income urban communities. Bangladesh has an estimated 2 million domestic workers, although other

estimates suggest that the actual number may be considerably higher because of underreporting (Ashraf et al., 2019). Women constitute approximately 80–97% of domestic workers in the country (Rahman, 2023).

Despite their important contribution to urban households, women domestic workers in Dhaka generally experience low wages, long working hours, weak legal protection and limited social security. Approximately 88% of domestic workers have no written employment contract, while 62% work more than 50 hours per week. Their average monthly income is approximately BDT 5,000, and about 80% earn less than BDT 8,000 (WIEGO Policy Brief No 19, 2020). This income is substantially below the estimated urban living wage of BDT 25,497 in 2023 (Khan, 2024). Migration is also an important feature of domestic work in Dhaka. About 86% of domestic workers come from outside Dhaka, while only 9% are long-term city residents (WIEGO Policy Brief No 19, 2020). Furthermore, approximately 78% of domestic workers have reportedly experienced physical or psychological abuse (BSS News, 2025).

The legal and institutional protection of domestic workers also remains limited. Bangladesh introduced the Domestic Workers Protection and Welfare Policy in 2015. However, domestic workers remain outside the main protection framework of the Bangladesh Labour Law (2006), and the policy lacks strong enforcement mechanisms (WIEGO Policy Brief No 19, 2020). Bangladesh has constitutional guarantees of equality and has ratified the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) and the Convention on the Rights of the Child. Nevertheless, domestic workers continue to experience limited practical protection. Bangladesh has also not ratified ILO Convention 189 on domestic workers (ILO, 2011). Child domestic workers remain another concern because domestic work is not adequately addressed within existing child labour protections (Ashraf et al., 2019; Hoque, 2024).

These conditions are closely associated with gender inequality, labour informality, and urban poverty. Domestic work is socially constructed as women's work, which contributes to its low economic and social recognition (Rahman, 2023). Previous studies have also identified discrimination, limited awareness of rights, harassment, and insecure employment among women working in the informal sector (Mahmood & Rezina, 2016; Sifullah et al., 2023). The vulnerability of domestic workers became particularly visible during the COVID-19 pandemic. Approximately 95% of domestic workers lost their jobs during the COVID-19 lockdown (Shining a Light on the Rights of Domestic Workers in Bangladesh, 2022).

The situation indicates a broader human-rights problem among women domestic workers in Dhaka. They generally work with limited contractual protection, low income, long working hours, weak social security, and limited access to justice (BSS News, 2025; WIEGO Policy Brief No 19, 2020). Their exclusion from the Bangladesh Labour Law (2006) further limits their access to legally enforceable employment rights (Bangladesh Labor Law, 2006). Although the Domestic Workers Protection and Welfare Policy 2015 provides guidance on wages, working hours, and welfare, its implementation remains weak (Jahan, 2024). Therefore, the formal existence of policies does not necessarily ensure effective protection for women domestic workers.

Previous studies have examined informal employment, domestic workers' working conditions, gender discrimination, child domestic work, and legal protection. For example, Ashraf et al. (2019) examined issues related to domestic work and child domestic workers (Ashraf et al., 2019). Mahmood and Rezina (2016) examined gender discrimination and women's experiences in informal employment (Mahmood & Rezina, 2016). Seery (2020) discussed issues related to domestic workers and their rights (Seery, 2020), while Shameem et al. (2024) examined legal

and human-rights concerns affecting domestic workers (Shameem et al., 2024). However, these studies have generally addressed different dimensions of the problem separately. Consequently, there is limited quantitative evidence on how gender inequality, labour informality, and urban inequality jointly relate to the human-rights conditions of women domestic workers in Dhaka.

This study addresses this gap by examining the relationship between gender inequality, employment informality, urban inequality, and human-rights vulnerability among women domestic workers in Dhaka City. The study specifically aims to assess the current level of human-rights vulnerability and to estimate the association of gender inequality, employment informality and urban inequality with such vulnerability. The study therefore has four objectives:

1. To assess the current level of human-rights vulnerability among women domestic workers in Dhaka City.
2. To estimate the association between gender inequality and human-rights vulnerability among women domestic workers.
3. To estimate the association between employment informality and human-rights vulnerability among women domestic workers.
4. To estimate the association between urban inequality and human-rights vulnerability among women domestic workers.

Based on these objectives, the study addresses the following research questions:

1. What is the current level of human-rights vulnerability among women domestic workers in Dhaka City?
2. To what extent is gender inequality associated with human-rights vulnerability among women domestic workers?
3. To what extent is employment informality associated with human-rights vulnerability among women domestic workers?
4. To what extent is urban inequality associated with human-rights vulnerability among women domestic workers?

2. Theoretical Framework

This study is grounded in the integration of Human Rights Theory, Gender Inequality Theory, and Urban Informality Perspective. Human Rights Theory explains that all individuals are entitled to basic rights such as dignity, fair wages, and safe working conditions (ILO, 2011). However, in informal employment settings, these rights are often not protected due to weak legal enforcement. Gender Inequality Theory explains that women face structural discrimination in labor markets due to patriarchal norms and social roles (Misra & Kumar, 2026). Urban Informality Perspective explains that informal workers in cities experience exclusion from legal, economic, and social protection systems (Banks et al., 2020). In Dhaka, this is intensified by migration and urban poverty.

Based on the objectives, the following diagram is presenting the conceptual framework of the study.

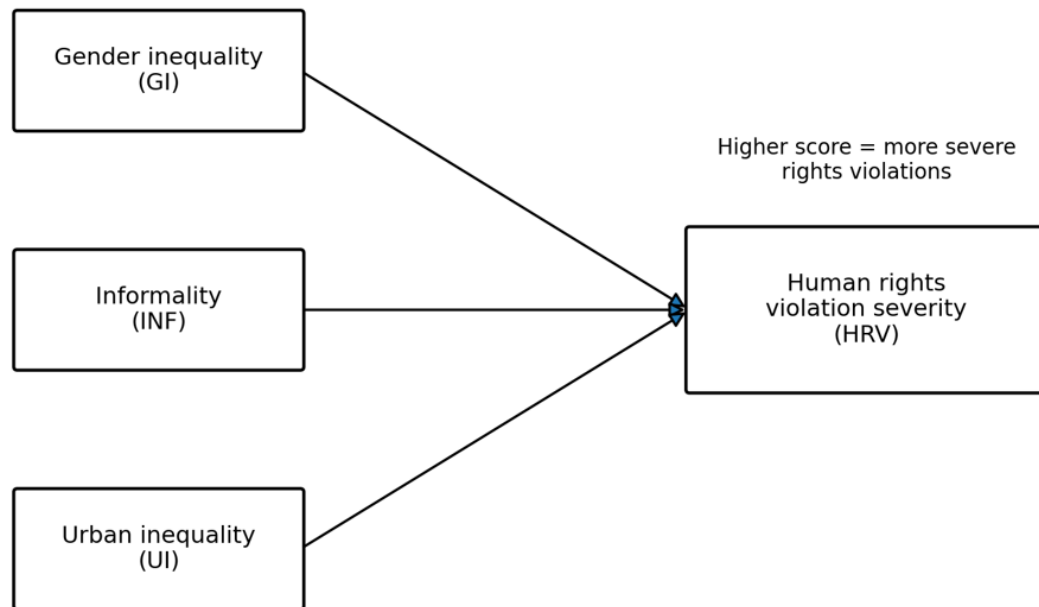


Figure 1. Conceptual framework

According to the conceptual framework, the structured hypotheses are as follows:

H1: Higher gender inequality is positively associated with greater human-rights violation severity among women domestic workers.

H2: Greater employment informality is positively associated with greater human-rights violation severity among women domestic workers.

H3: Greater urban inequality is positively associated with greater human-rights violation severity among women domestic workers.

3. Methods

3.1 Research Design and Unit of Analysis

This study used a quantitative, cross-sectional research design. The study included 100 respondents, comprising 80 women domestic workers and 20 key informants from NGOs and labour rights organizations. The unit of analysis was the individual woman domestic worker. Therefore, the main regression analysis was based on the 80 domestic workers, while the 20 key informants were treated as supplementary respondents.

The 80 domestic workers were aged 15-48 years, with a mean age of 28.89 years ($SD = 7.99$). The full sample of 100 respondents ranged in age from 15 to 50 years, with a mean age of 31.83 years. As some participants were below 18 years of age, appropriate consent and assent procedures were followed. Relevant safeguards for minor participants were also applied in accordance with the applicable ethical requirements.

3.2 Sampling and Recruitment

Data were collected through Google Forms and face-to-face interviews in Dhaka. A purposive sampling approach was used to recruit both domestic workers and key informants. Women domestic workers were recruited based on their experience of domestic work and their residence or employment in the study area. Key informants were recruited from NGOs and labour rights

organizations based on their professional or field experience related to labour rights, women's rights, or domestic work.

The inclusion and exclusion criteria used for participant selection are presented in Tables 1 and 2.

Table 1. Inclusion criteria

Participant group	Inclusion criteria
Women domestic workers	Female domestic workers aged 15 years or above
	Currently working or recently worked as a domestic worker in Dhaka
	Had direct experience of domestic work and related employment conditions
	Willing to participate in the study
Key informants	NGO workers or labour rights activists working on labour, women's rights, or domestic workers' issues
	Had relevant professional or field experience
	Willing to participate in the study

Table 2. Exclusion criteria

Participant group	Exclusion criteria
Women domestic workers	Persons who did not perform domestic work
	Persons outside the study area
	Persons unwilling to provide informed consent or assent
Key informants	Persons without relevant professional or field experience
	Persons unwilling to participate

Questionnaire and Measurement: Data were collected using a structured questionnaire containing five-point Likert-scale items. Four composite indices were developed, with five items used to measure each construct: gender inequality (GI1-GI5), informality (INF1-INF5), urban inequality (UI1-UI5), and human-rights violations (HRV1-HRV5). Each composite index was calculated as the arithmetic mean of its five items, as confirmed by the Stata syntax.

The HRV index measured the severity of human-rights violations experienced by the respondents. The direction of all items was checked against the original questionnaire. Positively worded items were reverse-coded when necessary, so that higher scores consistently represented greater severity of human-rights violations.

Data Quality and Statistical Analysis: The data were analyzed using Stata 17. The dataset contained complete responses for all 20 Likert-scale items. All responses were within the intended 1-5 range, and no duplicate respondent identifiers were identified.

The analysis was conducted in four stages. First, descriptive statistics were used to assess the human-rights conditions of domestic workers. Second, Spearman's correlation analysis was used to examine the bivariate relationships among the study variables. Third, variance inflation factors (VIFs) were calculated to assess multicollinearity among the independent variables. Fourth, ordinary least squares (OLS) regression was used to estimate the associations between gender inequality, informality, urban inequality, age, and the severity of human-rights violations.

The Breusch-Pagan test was statistically significant ($\chi^2 = 6.36$, $p = .0117$), indicating the presence of heteroskedasticity. Therefore, heteroskedasticity-robust standard errors were used

in the final regression model. In addition, a 1,000-replication bootstrap analysis was conducted as a robustness check.

The regression model was specified as:

$$HRV_i = \beta_0 + \beta_1 GI_i + \beta_2 INF_i + \beta_3 UI_i + \beta_4 Age_i + \varepsilon_i \quad (1)$$

where HRV represents the severity of human-rights violations, GI represents gender inequality, INF represents informality, UI represents urban inequality, Age represents respondent age, and ε represents the error term. Model 1 excludes age, whereas Model 2 includes age as a control variable. The final regression model reports heteroskedasticity-robust standard errors.

4. Results

Table 3. Respondent structure and analytic sample

Respondent group	<i>N</i>	%	Role in analysis
Women domestic workers	80	80.0	Primary unit of analysis; main regression sample
Key informants	20	20.0	Supplementary stakeholder respondents; excluded from main regression
Total	100	100.0	Full field dataset

Table 4. Descriptive statistics of the study variables

Variable	<i>N</i>	Mean	<i>SD</i>	Min	Max
Human-rights violation severity (HRV)	80	4.550	0.195	4.20	5.00
Gender inequality (GI)	80	4.538	0.264	4.00	5.00
Informality (INF)	80	4.538	0.184	4.20	4.80
Urban inequality (UI)	80	4.538	0.117	4.40	4.80
Age	80	28.888	7.986	15	48

The descriptive results provide an initial answer to the first research question concerning the level of human-rights violation severity among the sampled domestic workers. The mean HRV score was 4.55 on a five-point scale, with a standard deviation of 0.195 and a range from 4.20 to 5.00. Based on the coding scheme, the result indicates a high level of reported human-rights violation severity among the sampled domestic workers. The three explanatory indices also had high mean scores. The mean scores for GI, INF, and UI were approximately 4.54.

4.1 Internal Consistency

Table 5. Internal consistency of the study indices

Index	Items	Cronbach's α	Interpretation
Gender inequality	GI1–GI5	0.922	High internal consistency
Informality	INF1–INF5	0.886	High internal consistency
Urban inequality	UI1–UI5	0.881	High internal consistency
Human-rights violation severity	HRV1–HRV5	0.895	High internal consistency

Table 5 presents the internal consistency results for the four five-item indices. Cronbach's alpha values were 0.922 for gender inequality, 0.886 for informality, 0.881 for urban inequality, and 0.895 for human-rights violation severity. These values indicate high internal consistency across all four indices.

4.2 Correlation and Multicollinearity

Table 6. Spearman correlations among study variables

Variable	HRV	GI	INF	UI	Age
HRV	1.000	0.714	0.351	0.517	0.078
GI	0.714	1.000	0.384	0.433	0.127
INF	0.351	0.384	1.000	0.239	0.263
UI	0.517	0.433	0.239	1.000	-0.134
Age	0.078	0.127	0.263	-0.134	1.000

Spearman correlation analysis showed positive associations between HRV and GI ($\rho = .714$), INF ($\rho = .351$), and UI ($\rho = .517$). The association between age and HRV was weak ($\rho = .078$). The VIF diagnostics indicated no serious multicollinearity among the predictors. The VIF values were 1.53 for GI, 1.39 for UI, 1.32 for INF, and 1.20 for age, with a mean VIF of 1.36.

4.3 Multivariate Regression Analysis

Table 7. OLS regression results for human-rights violation severity

Predictor	Model 1: <i>b</i>	Model 2: <i>b</i>	Final robust model: <i>b</i>	Robust <i>SE</i>	<i>p</i>
Gender inequality (GI)	0.4842	0.4620	0.4620	0.0650	<.001
Informality (INF)	0.0580	0.0314	0.0314	0.0611	.609
Urban inequality (UI)	0.3634	0.4238	0.4238	0.1342	.002
Age	—	0.0027	0.0027	0.0019	.169
Constant	0.4411	0.3106	0.3106	0.4445	.487

Model 1 included gender inequality, informality, and urban inequality. The model explained 64.6% of the variance in HRV, with an adjusted R^2 of .632. Model 2 added age as a control variable. The inclusion of age increased the R^2 to .656 and the adjusted R^2 to .638. The overall Model 2 was statistically significant, $F(4, 75) = 86.93, p < .001$.

Gender inequality was positively associated with human-rights violation severity in the final robust model ($b = 0.462, SE = 0.065, t = 7.11, p < .001$). Therefore, the result supports H1. Urban inequality was also positively associated with HRV ($b = 0.424, SE = 0.134, t = 3.16, p = .002$), which supports H3. In contrast, informality was not statistically significant after controlling for the other predictors and age ($b = 0.031, SE = 0.061, t = 0.51, p = .609$). Therefore, H2 was not supported. Age was also not statistically significant ($b = 0.0027, p = .169$).

4.4 Robustness Checks

A 1,000-replication bootstrap analysis was conducted as a robustness check. The bootstrap coefficient for GI was 0.462, with a bias-corrected confidence interval of approximately [0.328, 0.581]. The corresponding interval for UI was approximately [0.126, 0.671]. The confidence interval for INF included zero and was approximately [-0.101, 0.153]. These results indicate that GI and UI remained positively associated with HRV in the bootstrap analysis, whereas the association between INF and HRV was not statistically distinguishable from zero.

The model without age produced a similar pattern. GI remained statistically significant ($b = 0.484, p < .001$), and UI remained statistically significant ($b = 0.363, p = .010$). INF remained statistically non-significant ($b = 0.058, p = .316$). This stability suggests that the main regression findings were similar with and without age as a control variable.

5. Discussion

The first finding concerns the high reported level of human-rights violation severity among the sampled domestic workers. The mean HRV score of 4.55 on a five-point scale indicates a high level of reported rights-related violations under the revised coding direction. This finding directly addresses Objective 1 and shows that human-rights concerns remain substantial among the domestic workers included in the study.

The second finding concerns the strong positive association between gender inequality and human-rights violation severity. Gender inequality had the largest coefficient among the substantive predictors in the final regression model. The association was also statistically significant and remained stable in the robustness analysis. This finding supports the theoretical argument that domestic work is influenced by gendered social expectations and unequal bargaining relationships. Therefore, legal and labour protections may not be sufficient on their own when social norms and unequal power relations continue to undervalue women's domestic work.

The third finding concerns urban inequality. The positive coefficient for UI indicates that greater spatial and service-related disadvantage is associated with higher human-rights violation severity after controlling for gender inequality, informality, and age. This finding suggests that the urban environment and unequal access to services may contribute to the vulnerability experienced by domestic workers. Therefore, policies addressing domestic workers' rights should also consider their living conditions, access to urban services, and broader forms of social and spatial inequality.

6. Policy and Practical Implications

First, labor protection should focus on enforceable rights rather than policy recognition alone. The original literature review identifies a gap between formal policy and practical enforcement, particularly regarding contracts, wages, working hours, social protection, and grievance mechanisms.

Second, gender-responsive interventions should address both economic and social dimensions of vulnerability. Because gender inequality is the strongest predictor in the final model, interventions could prioritize legal awareness, access to complaint mechanisms, protection from discriminatory treatment, and recognition of domestic work as productive labor.

Third, urban policy should be connected with labor policy. The significant UI coefficient suggests that affordable housing, safe mobility, access to basic services, and social protection in low-income urban areas may form part of a broader rights-protection strategy. This is especially relevant for migrant workers who experience multiple forms of urban disadvantage.

Fourth, social-protection measures should be designed for workers whose employment relationships are informal or difficult to monitor. However, because informality is not independently significant in the final regression, policy claims should not imply that informality alone explains the observed outcome. The evidence instead supports an integrated approach in which gender and urban inequality are given particular attention.

7. Conclusion

This study provides a clear quantitative assessment of human-rights vulnerability among women domestic workers in Dhaka. The descriptive analysis shows a high level of reported

human-rights vulnerability, thereby answering the first objective directly. The multivariate results indicate that gender inequality and urban inequality are significant positive correlates of rights vulnerability, whereas informality does not retain an independent statistically significant association after controls are included. These findings support an integrated policy response centered on enforceable labor protection, gender-responsive rights interventions, social protection, and urban inclusion.

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Conflicts of Interest

The author(s) declare no conflicts of interest regarding the publication of this paper.

Ethics Statement

The study was conducted in accordance with appropriate ethical standards. Participation was voluntary, and informed consent was obtained from all participants. Participant anonymity and confidentiality were maintained throughout the study.

Data Availability

The data supporting this study are available from the corresponding author upon reasonable request.

References

- Ashraf, A. A., Azad, S., Moninoor Roshid, M., & Yasmin, F. (2019). *A study on decent work deficits in domestic work in Bangladesh*. International Labour Organization. <https://doi.org/10.13140/RG.2.2.32105.31849>
- Bangladesh Labor Law. (2006). https://mccibd.org/wp-content/uploads/2021/09/Bangladesh-Labour-Act-2006_English-Upto-2018.pdf
- Banks, N., Lombard, M., & Mitlin, D. (2020). Urban informality as a site of critical analysis. *The Journal of Development Studies*, 56(2), 223–238. <https://doi.org/10.1080/00220388.2019.1577384>
- BSS News. (2025, September 8). *Children in domestic work: Rights, principles and realities*. BSS. <https://www.bssnews.net/others/309628>
- Hoque, M. M. (2024). A critical review of Bangladesh's child labor regulations and policies. *World Development Sustainability*, 5, 100177. <https://doi.org/10.1016/j.wds.2024.100177>
- ILO. (2011, June 16). *Convention no. 189: Decent work for domestic workers*. <https://www.ilo.org/media/34541/download>
- Jahan, N. (2024, September 10). *Boosting women's labour force participation: Opportunities and challenges in Bangladesh*. VoxDev. <https://voxdev.org/topic/labour-markets/boosting-womens-labour-force-participation-opportunities-and-challenges>
- Khan, J. J. (2024, January 16). *Understanding the dynamics of the care economy in Bangladesh*. FairWork. <https://fair.work/en/fw/blog/understanding-the-dynamics-of-the-care-economy-in-bangladesh/>
- Mahmood, F., & Rezina, S. (2016). Gender disparity in Bangladesh and its impact on women in workplaces. *Scholar Journal of Business and Social Science*, 2(2), 27–34. https://www.researchgate.net/publication/310022634_Gender_Disparity_in_Bangladesh_and_its_impact_on_women_in_workplaces

- Misra, R., & Kumar, V. (2026). South Asia's gender divide: Structural and social barriers. *Millennial Asia*. Advance online publication. <https://doi.org/10.1177/09763996261421657>
- Rahman, M. M. (2023). বাংলাদেশের নারী গৃহকর্মীদের কর্মপরিস্থিতি ও অধিকার: ইসলামী দিক-নির্দেশনা [Working conditions and rights of women domestic workers in Bangladesh: Islamic perspective]. *ইসলামী আইন ও বিচার [Islami Ain O Bichar]*, 19(73), 9–30. <https://doi.org/10.58666/iab.v19i73.240>
- Seery, E. (2020). *Securing protection for domestic workers in Bangladesh*. <https://doi.org/10.21201/2020.5860>
- Shameem, N., Khan, A., & Khan, N. (2024). *Servitude and separateness in the time of pandemic: Female domestic workers in urban households in Bangladesh* (SSRN Scholarly Paper No. 5229822). Social Science Research Network. <https://papers.ssrn.com/abstract=5229822>
- Shining a light on the rights of domestic workers in Bangladesh*. (2022, March 29). <https://www.international.gc.ca/world-monde/stories-histoires/2022/domestic-rights-droits-domestique.aspx?lang=eng>
- Sifullah, Md. K., Sohel, Md. S., Hossain Sarker, Md. F., Islam, M., Ahmad, M., & Rahman, M. M. (2023). Mapping out the vulnerabilities of migrant women in the informal sector: A qualitative investigation in Dhaka city. *Heliyon*, 9(10), e20950. <https://doi.org/10.1016/j.heliyon.2023.e20950>
- WIEGO Policy Brief No 19. (2020, October). *The costs of insecurity: Domestic workers' access to social protection and services in Dhaka, Bangladesh*. WIEGO. https://www.wiego.org/wp-content/uploads/2020/11/WIEGO_PolicyBrief_N19_Bangladesh%20for%20Web.pdf



Mechanism Development for the Digital Living Transmission of Embroidery Intangible Cultural Heritage: A Case Study of Rizhao Embroidery

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Abstract

Digital technologies have opened up new pathways for the living transmission of intangible cultural heritage (ICH). However, digitalization practices for local traditional crafts generally place greater emphasis on storage and preservation than on transmission and inheritance, and sustainable operational mechanisms have yet to be established. To address the developmental challenges of digital transmission in traditional crafts, this study takes Rizhao embroidery as a case study and employs a case study approach to examine the structural constraints on its digital living transmission from three dimensions: knowledge, participation, and value, drawing on multiple sources of data. The findings reveal a closed-loop constraint in the digital transmission of Rizhao embroidery, characterized by discontinuities in knowledge transformation, the absence of sustained learning mechanisms, and insufficient value feedback and circulation. These three constraints are interrelated and mutually reinforce one another, thereby limiting the long-term transmission of ICH. Building on the essential principles of living ICH transmission, this study develops a three-dimensional operational mechanism and a five-stage transmission model comprising “recording, dissemination, learning, co-creation, and feedback,” thereby clarifying the systemic operational logic of digital living transmission. By moving beyond the conventional perspective of technology-enabled transmission, this study contributes to the theoretical framework for the digital transmission of local traditional crafts and provides a feasible reference model for the digital, living, and sustained transmission of local ICH.

Keywords

Intangible cultural heritage; Digital living transmission; Traditional crafts; Mechanism development

1. Introduction

In recent years, the rapid development of digital technologies has continuously transformed both the concepts and practices of cultural heritage preservation. From digital collection and digital presentation to digital dissemination, the digitalization of intangible cultural heritage (ICH) has continued to deepen. New technologies, including digital platforms, virtual

exhibitions, artificial intelligence, and immersive experiences, have gradually become important supports for ICH preservation. Against this background, how digital technologies can enhance the effectiveness of ICH dissemination, expand channels for public participation, and strengthen cultural influence has become an important issue of common concern to both academic researchers and practitioners. However, existing digitalization practices have focused predominantly on resource preservation, outcome presentation, and cultural dissemination, while the potential of digital technologies to promote skill transmission, knowledge continuity, and community participation has not yet been fully realized. Whether digitalization has genuinely promoted the living transmission of ICH, rather than merely expanded its reach of dissemination, has therefore become an important question that current research on ICH digitalization needs to address.

Unlike tangible cultural heritage, the core value of ICH does not lie in static preservation, but in its continuous practice and recreation by communities, groups, and bearers, through which its cultural vitality is maintained across generations (Huang et al., 2026). The Convention for the Safeguarding of the Intangible Cultural Heritage explicitly recognizes ICH as cultural traditions that are continuously practiced and recreated by relevant communities, groups, and individuals. Its vitality derives from continuous transmission rather than preservation alone. Accordingly, digital preservation cannot automatically be transformed into living transmission. If digital initiatives remain limited to the accumulation of images, videos, or database resources, without corresponding mechanisms for learning, participation, and value feedback, digital resources may fail to enter actual transmission practices. They may even produce a structural contradiction in which “digital preservation continues to expand while actual transmission continues to weaken.” The key to digital living transmission, therefore, lies not in increasing the quantity of digital resources, but in whether digital technologies can be embedded throughout the processes of knowledge transfer, stakeholder participation, and value creation, thereby establishing a sustainable transmission mechanism.

Traditional embroidery crafts particularly exemplify this tension. Embroidery techniques involve not only patterns, colors, and finished forms, but also extensive tacit knowledge concerning stitch techniques, material selection, craft experience, and aesthetic judgment. Such knowledge is highly dependent on embodied practice and master-apprentice interaction and is difficult to fully articulate through written descriptions or static images. In recent years, short-video platforms and social media have significantly increased public attention to traditional embroidery. However, platform-based traffic-oriented logics tend to favor visually striking content, which can easily reduce complex craft practices to fragmented and entertainment-oriented material, while process-based knowledge capable of supporting sustained learning and skill transmission remains relatively limited (Chen & Zhang, 2026). As a result, a clear disconnection has emerged between the popularity of dissemination and the depth of transmission. At the same time, although young people frequently use digital media, their participation often remains limited to browsing, liking, and short-term experiences. Relatively few users progress to sustained learning and co-creation, and a stable connection between digital dissemination and intergenerational transmission has yet to be established.

As a local craft within the Lu embroidery tradition, Rizhao embroidery has been shaped by multiple cultural influences, including coastal agrarian culture and the folk traditions of Jiaodong and Yimeng. It possesses distinctive technical characteristics, pattern narratives, and memories of family and folk customs that distinguish it from other embroidery traditions. In the context of local initiatives such as the “Shandong Handicrafts” program, the development of ICH workshops, and the integration of culture and tourism, Rizhao has already

accumulated a certain practical foundation for the preservation of embroidery. Nevertheless, Rizhao embroidery continues to face practical challenges, including fragmented documentation of techniques, discontinuous learning pathways, unstable youth participation, considerable operational pressure on workshops, and the absence of clear rules for digital innovation. These problems are not isolated from one another. Rather, they collectively indicate that effective connections have yet to be established among digital resource development, knowledge transmission, stakeholder participation, and industrial development, and that digitalization has not yet been effectively transformed into the capacity for living transmission.

Existing research has generated substantial findings concerning ICH digital preservation, digital resource development, productive preservation, youth participation, and the integration of culture and tourism, providing an important theoretical foundation and practical experience for the application of digital technologies to ICH preservation. Nevertheless, three issues warrant further investigation. First, existing studies have focused primarily on individual aspects such as digital resource development, digital presentation, and digital dissemination, while providing insufficient systematic explanations of how digital resources can subsequently be transformed into learning behaviors, social participation, and sustained transmission. Second, a considerable body of research has concentrated on the development of digital platforms, digital museums, and digital archives, while paying insufficient attention to the digital representation of tacit knowledge and its transformation into learnable knowledge in traditional craft-based ICH. Third, research on digital living transmission has largely focused on technological applications and practical approaches, while lacking an integrative analytical framework capable of explaining how knowledge flows, stakeholder participation, and value feedback can form a sustained cycle.

Based on these observations, this study argues that digital living transmission is not a natural extension of digital preservation, but rather a dynamic operational process involving knowledge production, stakeholder participation, and value circulation. Digital technologies can genuinely promote the living transmission of ICH only when they simultaneously facilitate the continuous accumulation of craft knowledge, sustained participation by diverse social actors, and the continuous circulation of cultural value back into the transmission system. Therefore, an approach focused solely on digital resource development or dissemination outcomes cannot adequately explain why digital practices can continue to function effectively, nor can it fully address the practical difficulties faced by local ICH in the process of digital transformation.

Accordingly, this study takes Rizhao embroidery as a case study and focuses on the development of a mechanism for digital living transmission. It addresses three interrelated research questions. First, what are the key structural constraints confronting the digital living transmission of Rizhao embroidery? Second, what are the internal relationships and operational logic among these constraints? Third, how can digital technologies establish a sustainable mechanism for living transmission through knowledge transfer, stakeholder participation, and value feedback? Following a problem-oriented approach combining data analysis and mechanism development, this study reviews relevant theories and previous research and draws on policy documents, publicly available local cases, and preliminary exploratory pre-interview materials to establish an analytical framework. It then proposes a mechanism model for digital living transmission, with the aim of enriching the theoretical interpretation of local ICH digitalization and providing an analytical framework that can inform the digital living transmission of traditional craft-based ICH.

2. Literature Review and Theoretical Foundations

2.1 Evolution of Research on the Living Transmission of ICH

The concept of ICH preservation has gradually evolved from “rescue-oriented preservation” toward “living transmission.” In contrast to tangible cultural heritage, which emphasizes physical preservation and the maintenance of authenticity, ICH places greater emphasis on the continuity of cultural practices. Its value derives from the continuous practice, recreation, and intergenerational transmission undertaken by communities, groups, and bearers in everyday life. The Convention for the Safeguarding of the Intangible Cultural Heritage explicitly recognizes ICH as cultural traditions formed and sustained through the continuous practice and recreation of relevant communities, groups, and individuals, with its vitality deriving from ongoing transmission rather than static preservation. As Tan and Li (2024) point out, this concept establishes an important characteristic distinguishing ICH preservation from the preservation of cultural resources in general. The object of preservation encompasses not only skills, knowledge, and forms of cultural expression, but also the social relationships, cultural spaces, and operational practices that sustain their development.

From the perspective of contemporary ICH preservation practices, Huang et al. (2026) emphasize that living transmission should remain people-centered and should establish a multi-actor network involving workshops, communities, and educational institutions to facilitate effective intergenerational continuity of traditional skills. With the gradual advancement of productive preservation, community participation, and the integration of culture and tourism, research on living transmission has increasingly shifted from the interpretation of macro-level concepts toward the examination of its internal operational mechanisms. On the one hand, scholars generally agree that ICH can achieve long-term continuity only when it is deeply embedded in contemporary production and everyday life and becomes part of stable social practices and cultural identities. On the other hand, it has increasingly been recognized that living transmission cannot rely solely on individual bearers, but also requires a collaborative network involving educational institutions, social organizations, market actors, and public cultural agencies. Consequently, living transmission has moved beyond the conventional understanding of one-to-one master-apprentice transmission and has come to be regarded as a social process involving continuous interaction and joint participation among multiple actors.

Overall, existing research has completed a theoretical shift from viewing ICH primarily as a “preservation object” to understanding it as a “preservation concept” centered on cultural vitality and social practice. However, existing studies have largely addressed why living transmission is necessary, while providing insufficient systematic explanations of the operational mechanisms on which living transmission depends, how different actors can establish sustained collaboration, and how digital technologies can be embedded within this dynamic process.

2.2 Development of Research on the Digital Preservation of ICH

The development of digital technologies has provided new technological pathways for ICH preservation and has made digital preservation an important area of ICH research in recent years. Early digitalization initiatives focused primarily on digital collection, digital archives, database development, and digital presentation, using technologies such as images, audio and video, and three-dimensional modeling to facilitate the long-term preservation and shared use of cultural resources. With the development of digital humanities, artificial intelligence, virtual reality, and related technologies, the application of digital technologies has gradually

expanded from resource preservation to digital presentation, digital dissemination, digital education, and digital cultural and creative development.

Addressing the existing shortcomings in the digitalization of traditional craft-based ICH, Zhai (2026) argues that digitalization should not simply remain at the level of archiving images of finished products, but should undertake process-oriented knowledge encoding of tacit craft knowledge, thereby shifting the focus from “preserving outcomes” to “preserving knowledge.” Industry standards issued by the Ministry of Culture and Tourism further clarify that the digitalization of traditional craft-based ICH should preserve not only visible outcomes but also complete information concerning the craft process. As generative artificial intelligence becomes increasingly involved in the ICH sector, Zhao et al. (2026) note that although digital creativity, cultural and creative product development, and open sharing of resources represent important directions for development, attention must also be paid to practical risks associated with AI, including cultural misinterpretation, symbolic appropriation, and potential harm to the rights and interests of ICH bearers.

From the perspective of Manovich's (2001) analysis of digital media and cultural archives, digital resources have long moved beyond their role as simple tools for static storage and have become important media interfaces through which the public can engage in cultural practices. Drawing on Jenkins's (2006) theory of convergence culture, ICH digitalization should not rely entirely on one-way institutional content delivery; participatory production by ordinary users also deserves attention, as digital media have created new pathways for the public to access and reinterpret local traditional cultures. Castells's (2010) research on network society further demonstrates that network environments can reduce spatial barriers to knowledge dissemination. The transmission of craft skills is no longer confined to face-to-face offline master-apprentice settings, as online spaces can also provide environments for knowledge interaction. However, from the perspective of Bandura's (1977) social learning theory, skill acquisition depends on observation, imitation, repeated practice, and feedback. Simply browsing digital media content cannot be directly transformed into actual mastery of skills.

Overall, research on digital preservation has gradually moved beyond an exclusive emphasis on digital storage toward a new stage characterized by digital utilization and digital enablement. Nevertheless, existing research continues to focus primarily on what digital technologies can “do,” while offering insufficient explanations of how digital resources can genuinely enter learning processes, promote social participation, and generate sustained momentum for transmission. In other words, digital preservation research has largely answered the question of “how to preserve,” but has not yet adequately addressed “how to sustain transmission.”

2.3 Further Development of Research on Digital Living Transmission

The integration of digital technologies with the concept of living transmission has made digital living transmission an increasingly important topic in ICH research in recent years. Existing studies generally suggest that digital technologies can not only improve the accessibility of cultural resources but also overcome the temporal and spatial limitations of traditional master-apprentice transmission, thereby creating new possibilities for public participation, educational dissemination, and cultural innovation. Consequently, digital living transmission has gradually expanded from digital resource development to areas such as digital education, digital communities, digital cultural and creative development, and digital governance.

With regard to youth engagement with and participation in ICH, Yang's (2026) study indicates that cultural identity among young people cannot be established simply through passive reception of information; rather, it develops gradually through sustained learning, experiential practice, and co-creation. Superficial browsing of short videos is difficult to translate directly into actual acquisition of craft skills. Initiatives such as incorporating ICH into school education, experiential learning programs, interaction within online communities, and community-based experiences have created diverse pathways for youth participation and have enriched the practical forms of digital living transmission.

However, existing research on digital living transmission still presents three areas requiring further development.

First, existing studies have largely examined individual aspects such as digital resource development, digital platform dissemination, educational practice, or industrial development. There remains a lack of an integrated analytical framework covering the entire process from knowledge recording and social dissemination to sustained learning, co-creation, and value feedback. Consequently, digitalization practices often exhibit the characteristics of “abundant resources but fragmented mechanisms.”

Second, although existing research generally recognizes the value of applying digital technologies, insufficient attention has been paid to the digital representation of tacit knowledge embedded in traditional crafts. Traditional crafts such as embroidery, pottery, and woodworking contain extensive operational knowledge formed through embodied experience and long-term practice. Such knowledge cannot be fully represented through images, videos, or textual descriptions alone, and its mechanisms of knowledge transformation have not yet been sufficiently examined.

Third, although previous studies have addressed youth participation, community collaboration, and industrial development, these elements have often been treated as relatively independent practical approaches. Insufficient attention has been paid to the systematic operational logic through which digital resources promote learning behavior, learning is transformed into co-creation, and co-creation subsequently generates value feedback. Consequently, research on digital living transmission has remained largely at the level of empirical discussions of “digital enablement,” without yet establishing a theoretical framework capable of explaining the sustained operational logic of digital transmission.

2.4 Literature Review and Theoretical Entry Point of This Study

A review of existing research shows that substantial progress has been made in the study of ICH digitalization and living transmission, providing an important theoretical foundation for this study. Nevertheless, whether in research on living transmission or digital preservation, attention has largely been directed toward specific individual aspects, while insufficient attention has been paid to the overall logic of digital living transmission as a continuously operating system. Existing studies have generally demonstrated that digital technologies can facilitate dissemination, improve presentation, and expand participation, but a unified theoretical explanation of how digital resources can continuously be transformed into knowledge accumulation, stakeholder participation, and cultural value circulation remains lacking.

In fact, digital living transmission is not simply an accumulation of digital preservation, digital dissemination, digital education, and other individual components. Rather, it is a dynamic process jointly driven by knowledge production, stakeholder participation, and value

creation. The sustained transmission of traditional craft-based ICH depends not only on the digital documentation of knowledge, but also on the continuous entry of learners and other participants into the transmission system, together with the formation of a sustained cycle through industrial feedback and social recognition. Strengthening any single component cannot substitute for the coordinated operation of the system as a whole.

Based on this understanding, this study proposes to move beyond the technology-centered analytical perspective prevalent in previous research and conceptualize digital living transmission as a dynamic mechanism jointly shaped by knowledge flows, stakeholder participation, and value feedback. Taking Rizhao embroidery as a case study, the study systematically examines the operational logic of digital living transmission.

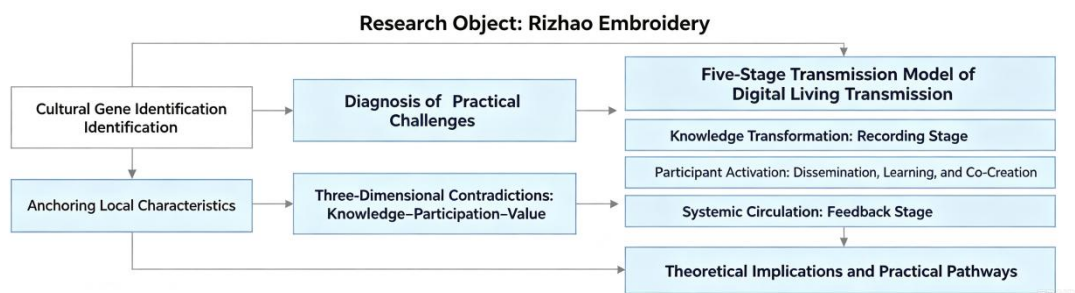


Figure 1. Analytical framework for the digital living transmission of Rizhao embroidery

3. Research Design

3.1 Research Approach

This study takes the digital living transmission of Rizhao embroidery as its research focus and employs a case study approach to examine the digitalization practices of traditional craft-based intangible cultural heritage (ICH) at the local level. Case studies emphasize the examination of complex social phenomena within their specific contexts. Their advantage lies in their ability to explain the interactions and operational logic among different factors through the integrated analysis of multiple sources of data. Digital living transmission involves not only the application of digital technologies, but also multiple dimensions including craft knowledge transfer, stakeholder participation, institutional support, and industrial development. It therefore exhibits clear systemic and contextual characteristics. Compared with large-sample statistical analysis, a case study approach is better suited to revealing the underlying logic through which mechanisms of digital living transmission are formed.

Rizhao embroidery was selected as the case for three main reasons. First, Rizhao embroidery exhibits typical characteristics of traditional craft-based ICH. Its transmission relies heavily on embodied practice, accumulated experience, and master-apprentice interaction, with a substantial proportion of tacit knowledge, making it a representative case for examining the digital living transmission of traditional crafts. Second, in recent years, Rizhao has continuously promoted the development of ICH workshops and the cultivation of the “Shandong Handicrafts” brand, establishing a relatively favorable practical foundation for digital preservation and productive preservation. This provides an appropriate real-world setting in which to examine digital living transmission. Third, compared with traditional embroidery forms such as Suzhou embroidery and Hunan embroidery, which have been more extensively studied, research on Rizhao embroidery remains relatively limited. It can therefore provide a relatively direct reflection of the practical challenges faced by local

traditional crafts in the process of digital transformation and has certain representative value for enriching research on the digital living transmission of local ICH.

In response to the three research questions proposed in the Introduction, this study follows a research approach characterized by “problem orientation, data analysis, and mechanism development.” First, it examines the practical context of digital living transmission and identifies the key factors constraining the digital living transmission of Rizhao embroidery. Second, it analyzes the internal relationships among different problems through cross-validation of multiple sources of data. Finally, based on the research findings, it theoretically synthesizes the operational mechanism of digital living transmission and proposes an analytical framework with potential applicability beyond the specific case.

3.2 Data Sources and Data Collection

To comprehensively examine the current state of digital living transmission of Rizhao embroidery, this study adopts a multi-source approach to data collection and cross-validation. The main sources of data consist of three categories: policy documents, local case materials, and preliminary exploratory interview materials. A standardized interview guide has been developed for this study; large-scale systematic field interviews and questionnaire-based data collection will be conducted in subsequent stages of the research.

First, policy documents. These include national-level policy documents such as the Law of the People's Republic of China on Intangible Cultural Heritage, the 14th Five-Year Plan for the Protection of Intangible Cultural Heritage, the National Cultural Digitalization Strategy, and the China Traditional Craft Revitalization Plan, as well as relevant policy documents issued by Shandong Province and Rizhao concerning ICH preservation, traditional craft revitalization, and the development of public cultural services. Policy documents are primarily used to examine the institutional context of digital living transmission and serve as an important basis for the analysis.

Second, local case materials. These mainly include publicly available reports by media outlets such as Xinhua News Agency and Wenlv China on the development of ICH workshops in Rizhao, practices associated with “Shandong Handicrafts,” and the productive preservation of traditional crafts, as well as local cultural publicity materials and publicly released information on ICH cases in Rizhao. These materials are used primarily to review the current development of digital preservation and living transmission of Rizhao embroidery and to further identify the characteristics of local practices.

Third, semi-structured preliminary exploratory interviews. Exploratory preliminary interviews were conducted around key issues including craft documentation, digital dissemination, learning practices, youth participation, workshop operation, and digital innovation. The interviewees included different types of stakeholders, such as ICH bearers and workshop managers, staff members of cultural and ICH preservation institutions, primary and secondary school and university teachers, young learners, cultural and creative enterprise operators, and community cultural organizers. Their perspectives were collected from multiple dimensions, including craft transmission, public governance, educational practice, market operation, and community participation, providing preliminary clues for identifying the practical difficulties confronting digital living transmission.

To enhance the credibility of the data analysis, this study follows the principle of source triangulation by cross-comparing policy documents, publicly available case materials, and preliminary interview data. When different sources consistently reflect the same issue, that

issue is regarded as having relatively high evidentiary credibility. Where substantial discrepancies exist among different sources, the relevant information is further examined in light of its specific context in order to minimize potential interpretive bias arising from reliance on a single source.

3.3 Data Analysis Method

This study employs Thematic Analysis to systematically organize and analyze the collected data. Thematic Analysis focuses on identifying themes that share common meanings within large bodies of textual data and subsequently examining the logical relationships among different themes. It is particularly suitable for research that seeks to explore the formation of mechanisms and explain complex social phenomena. The analysis proceeded in three stages.

The first stage involved open coding. Policy documents, case materials, and interview transcripts were read line by line to identify keywords and significant events reflecting the characteristics of digital living transmission, thereby generating initial codes. For example, statements such as “stitch techniques are difficult to demonstrate,” “I don’t know how to make the stitches,” and “only the finished product is available, not the process” were grouped under codes related to craft documentation. Statements such as “I came across a video,” “I don’t know where to learn,” and “I can’t find the course” were grouped under codes related to learning pathways. Statements such as “there is no further contact after the activity ends,” “nobody evaluates the work,” and “it is difficult to continue learning” were grouped under codes related to sustained participation.

The second stage involved theme development. On the basis of the initial codes, semantically related codes were clustered and progressively developed into thematic categories that reflected the major characteristics of digital living transmission. Through repeated comparison and refinement, several core themes were ultimately identified, including craft documentation, platform-based dissemination, learning transformation, collaborative participation, industrial feedback, and digital governance. The relationships among these themes were then further examined.

The third stage involved mechanism development. Based on the thematic analysis and relevant theories of digital living transmission, the interactive relationships among the identified themes were systematically synthesized. Particular attention was paid to explaining how digital resources enter learning processes, how learning promotes stakeholder participation, how stakeholder participation contributes to value creation, and how value feedback subsequently supports knowledge accumulation. This process helped reveal the underlying logic through which digital living transmission can operate continuously and provided an analytical foundation for the subsequent development of the transmission mechanism.

3.4 Ensuring Research Credibility

To enhance the credibility of the research findings, this study adopts corresponding measures in three areas: data sources, the analytical process, and validation of findings.

Regarding data sources, the study follows the principle of triangulation by combining policy documents, local case materials, and preliminary interview data. Conclusions are not based on any single source of information, thereby minimizing, to the extent possible, the influence of data bias on the research findings.

Regarding the analytical process, the study follows the principle of constant comparison. Statements concerning the same issue from different interviewees are repeatedly compared, with attention paid both to common perspectives and to representative differences in opinion.

Regarding validation of findings, the study emphasizes the mutual corroboration of theoretical interpretation and empirical evidence. Important judgments generated during the research process are examined through an integrated analysis of policy contexts, case practices, and interview materials, thereby avoiding inferences based solely on individual cases. During the process of mechanism development, particular attention is also paid to the relationships among different factors, ensuring that the findings not only respond to the practical problems of digital living transmission in Rizhao embroidery but also possess a certain degree of theoretical explanatory value and potential for broader application.

4. Research Findings

The integrated analysis of policy documents, case materials, and preliminary exploratory interview data indicates that the various practical problems emerging in the digital living transmission of Rizhao embroidery are not isolated phenomena. Rather, they constitute a set of structural constraints extending across the entire chain from knowledge preservation and stakeholder participation to value realization. To present the underlying structure of these constraints more clearly, this study categorizes and examines them across three analytical dimensions—knowledge, participation, and value, as shown in Table 1.

Table 1. Comparison of the three dimensions, core contradictions, and empirical manifestations of the digital living transmission of Rizhao embroidery

Analytical Dimension	Core Contradiction	Empirical Manifestations
Knowledge Dimension	Disconnection between digital documentation and knowledge transformation	Greater emphasis on displaying finished products than documenting craft processes; difficulty in digitizing tacit stitching techniques and embodied knowledge such as tactile experience; risks of cultural distortion in AI-generated patterns
Participation Dimension	Digital dissemination has not been transformed into a sustained learning mechanism	Young people tend to engage in superficial browsing, while systematic learners remain few; one-time experiential activities are common, but continuous learning pathways are lacking; online dissemination is disconnected from offline workshops and courses
Value Dimension	Value creation does not provide stable support for continued transmission	Unstable workshop income; continuing costs of teaching and digital documentation; unclear licensing and revenue-sharing arrangements; evaluation focused on traffic and sales rather than sustained transmission

The table adopts a three-level structure of “analytical dimension–core contradiction–empirical manifestation.” The analytical dimension provides the perspective from which the problem is examined; the core contradiction refers to the fundamental conflict at each level; and the empirical manifestations refer to the specific observable problems identified in the research materials.

From the perspective of the knowledge dimension, the fundamental problem is not the lack of digital resources such as images and short videos, but rather the fact that existing digitization efforts tend to focus on displaying finished products and have difficulty translating the tacit

knowledge embedded in embroidery techniques into a form that can be documented, transmitted, and learned. This has also generated related problems, such as AI-generated embroidery patterns becoming detached from their local cultural contexts. From the perspective of the participation dimension, the problem is not that the public lacks access to Rizhao embroidery, but that the attention generated by short videos and cultural-tourism experiences has not been supported by institutional pathways that can transform such attention into sustained craft learning. As a result, a disconnect has emerged between online dissemination and offline practice. From the perspective of the value dimension, the problem is likewise not a complete absence of attempts at cultural and creative product development or digital innovation, but the lack of supporting institutional arrangements and value feedback mechanisms. The efforts of workshops and ICH bearers are therefore difficult to translate into reasonable returns, while an evaluation system that places excessive emphasis on traffic and sales data further constrains the motivation for transmission.

The three dimensions do not exist independently; rather, they are interrelated and mutually constitutive. Shortcomings in knowledge documentation directly lead to insufficient learning materials. The absence of sustained participation pathways makes it difficult to expand the community of transmission participants. A limited participant base, in turn, constrains the market foundation for cultural and creative products and educational programs, further weakening value feedback. Insufficient value feedback then restricts investment in craft documentation and course development. This cyclical pattern of constraints also represents a common challenge faced by the digital transformation of local traditional crafts. The following sections examine each of the three dimensions in greater detail based on the research materials.

4.1 Constraints in the Knowledge Dimension

Traditional embroidery is a typical form of experiential knowledge. Its core value lies not only in the finished products themselves, but also in tacit knowledge concerning stitch techniques, material processing, craft procedures, and aesthetic judgment. Compared with explicit knowledge, such knowledge is highly dependent on embodied practice and accumulated experience and is strongly contextual and practice-oriented. It is difficult to represent it comprehensively through written descriptions or displays of finished products alone.

Interview data indicate that several ICH bearers believe that current digital documentation remains largely focused on the presentation of finished works, with insufficient attention to process-based knowledge that directly determines embroidery quality, such as the angle at which the needle is inserted, thread tension, and transitions between stitches. These aspects can often only be mastered through on-site demonstration and repeated practice. Learners also reported that even high-resolution images of finished embroidery available online cannot solve practical problems such as “not knowing how to make the first stitch.”

In addition, two types of bias can easily emerge in digital documentation practices. First, influenced by the traffic-oriented logic of short-video platforms, digital content tends to favor visually spectacular finished products while overlooking the processes of trial, error, and correction involved in skill acquisition. Second, AI-assisted pattern processing has rapidly become more widespread, but AI systems may generate artificial patterns that are detached from local folk-cultural contexts, creating a risk of misinterpreting the cultural characteristics of local embroidery (Chen & Zhang, 2026).

Further analysis reveals that digital resource development focuses more on “preserving outcomes” than on “preserving knowledge.” At present, a large proportion of digital resources exist in the form of images, short videos, or publicity materials, whose primary function is cultural dissemination rather than knowledge-based learning. As a result, although digital resources continue to increase in quantity, the supply of knowledge capable of supporting skill learning and sustained transmission remains insufficient. The disconnect between knowledge preservation and knowledge acquisition means that digital resources have not yet been effectively integrated into the transmission system, and this has become an important constraint on digital living transmission.

4.2 Constraints in the Participation Dimension

Digital platforms have expanded public access to traditional culture and created new spaces for the dissemination of local ICH. However, an expansion in the reach of dissemination does not necessarily lead to the formation of learning behaviors. Preliminary interviews indicate that most young interviewees first encountered Rizhao embroidery through short-video platforms, social media, or cultural and tourism activities, but relatively few subsequently entered a stage of sustained learning.

Many young interviewees noted that although platform content could stimulate their interest, it often lacked accessible pathways for further learning. For example, after watching embroidery videos, they did not know whether local experiential courses were available or whether further learning opportunities existed after an initial experience. Other interviewees observed that many ICH activities currently remain primarily one-off experiential events. After an activity ends, there is often little continued contact or learning feedback, making long-term participation difficult to establish.

Further comparison of different types of interview data suggests that the problem with youth participation is not a lack of interest, but rather the absence of institutional arrangements that can transform interest into learning. Current digital dissemination primarily serves a cultural publicity function, while course systems, workshop-based practice, community activities, and online platforms have yet to establish effective connections. The lack of a continuous participation pathway linking browsing, experiencing, learning, practicing, and co-creating leaves many potential learners at the initial stages of “knowing about ICH” and “experiencing ICH,” making it difficult for them to develop into stable participants or even new bearers.

At the same time, some schools have begun incorporating local ICH into curricula and practical activities. Students who have participated in a series of such courses generally demonstrate stronger cultural identification and a greater willingness to participate continuously. This suggests that young people's capacity for participation is not directly determined by digital dissemination, but gradually develops through sustained learning and repeated practice. Digital platforms can attract participants, but sustained learning mechanisms ultimately determine whether digital living transmission can achieve intergenerational continuity.

4.3 Constraints in the Value Dimension

Digital living transmission requires not only knowledge preservation and stakeholder participation, but also a value cycle capable of supporting long-term development. Field research indicates that Rizhao embroidery has undertaken active explorations in digital innovation, industrial development, and institutional support, but insufficient value feedback remains a significant problem overall.

First, ICH workshops perform multiple functions, including exhibition, teaching, production, and public cultural services, but their sources of stable income remain relatively limited. Some workshop managers reported that daily opening and operation, course organization, venue maintenance, and material procurement all require continuous investment, whereas existing revenues depend mainly on festival-related activities or sales of cultural and creative products, making it difficult to establish stable financial support. Due to considerable operational pressure, some bearers have had to devote more time and energy to commercial activities, leaving relatively limited time for curriculum development and digital resource production.

Second, digital innovation and collaboration still lack clear institutional standards. In recent years, an increasing number of cultural and creative enterprises have sought to apply traditional patterns to product development and digital design. However, participating enterprises commonly reported that there are no unified standards concerning the scope of pattern licensing, the boundaries of adaptation, revenue distribution, and attribution of creative outcomes, thereby increasing the costs of collaboration. At the same time, some ICH bearers are concerned that digital technologies may lead to the excessive commercialization of traditional patterns or even the misuse of their cultural meanings, making them relatively cautious toward digital innovation.

Finally, current evaluation systems for digitalization still rely primarily on indicators such as views, dissemination volume, and the number of activities. An excessive reliance on traffic and sales revenue as evaluation criteria may overlook cultural authenticity and actual transmission outcomes (Yan et al., 2026). The narrow orientation of evaluation encourages digital platforms to prioritize dissemination efficiency while paying comparatively less attention to sustained learning and long-term transmission, making it difficult to establish a virtuous cycle for digital living transmission.

4.4 Interrelationships Among the Constraints

The three dimensions discussed above are not independent problems. Rather, they form an interconnected and mutually reinforcing set of relationships within the process of digital living transmission.

Insufficient documentation of knowledge makes it difficult for digital resources to support sustained learning. The absence of sustained learning mechanisms, in turn, further reduces the possibility of young people entering the transmission system. Insufficient stakeholder participation weakens stable demand for workshop courses, digital resources, and community activities, thereby constraining value-creation capacity. Insufficient value feedback then further affects investment in digital resource updating, curriculum development, and craft documentation, gradually weakening the capacity for knowledge accumulation. This produces a cyclical structural constraint: knowledge is difficult to accumulate effectively, participation is difficult to deepen continuously, and value is difficult to circulate back into the system in a stable manner. These three dimensions interact with one another and collectively constrain the sustained operation of the digital living transmission system of Rizhao embroidery.

It should be noted that these constraints are not unique to Rizhao embroidery. Rather, they reflect problems that are commonly found in the digitalization practices of traditional craft-based ICH in many local contexts. Therefore, addressing the challenges of digital living transmission requires more than proposing solutions to individual problems. It also requires a reexamination of the relationships among knowledge preservation, stakeholder participation,

and value creation from the perspective of the overall operational system, followed by the development of a digital living transmission mechanism capable of sustaining a continuous cycle.

5. Discussion and Mechanism Development

In the digital preservation of local traditional crafts, problems are often attributed to a lack of technological tools. However, the structural contradictions identified in the case of Rizhao embroidery indicate that the core constraint on digital living transmission does not lie in the mere availability or absence of digital resources. Rather, it lies in the failure to establish an organic linkage among digital resources, stakeholder participation, and value circulation. Conventional digital preservation practices have largely focused on the storage and visualization of cultural resources, whereas the inherent requirements of living transmission point toward the continuous circulation of craft knowledge, deep participation by transmission actors, and the iterative generation of cultural value. Digital living transmission should therefore not be understood as the one-way embedding of digital technologies into traditional crafts, but as a dynamic operational process jointly driven by the coordinated interaction of knowledge production, stakeholder participation, and value creation.

To achieve systematic and effective digital documentation, material collection should not begin directly with the acquisition of digital resources. Instead, it is first necessary to identify and systematically organize the cultural genes of local embroidery. The cultural connotations of local embroidery can be conceptualized as four interconnected layers: formal genes, semantic genes, practice genes, and social genes.

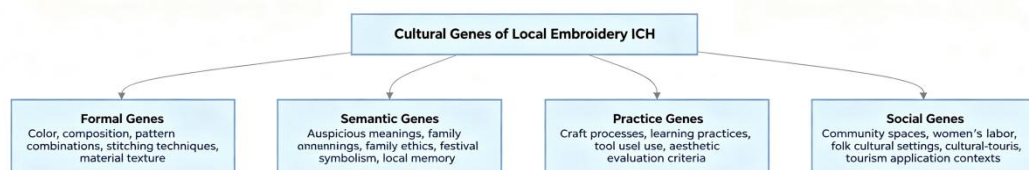


Figure 2. Four-dimensional framework for identifying the cultural genes of local embroidery ICH

This figure divides the cultural genes of local embroidery into four sub-dimensions. Formal genes correspond to the externally visible craft forms embodied in embroidery works; semantic genes convey the folk symbolism and local collective memory underlying the patterns; practice genes focus on experiential knowledge related to skill acquisition, operational procedures, and criteria for evaluating craftsmanship; and social genes reflect the folk contexts and social environments on which embroidery practices depend. The identification of cultural genes constitutes a prerequisite for digital documentation.

Cultural gene identification should be completed before the documentation stage. Its purpose is to anchor the distinctive local characteristics of Rizhao embroidery and mitigate the risks of detaching digital documentation from local cultural contexts and simplifying cultural meanings during the digitization process (Chen & Zhang, 2026). Only by clarifying these multiple layers of cultural meaning can digital documentation avoid becoming merely an archive of images of finished products and instead preserve a complete local cultural foundation for subsequent dissemination, learning, and co-creation. On the basis of this prerequisite of cultural gene identification, this study further develops the five-stage transmission model of “recording, dissemination, learning, co-creation, and feedback.”

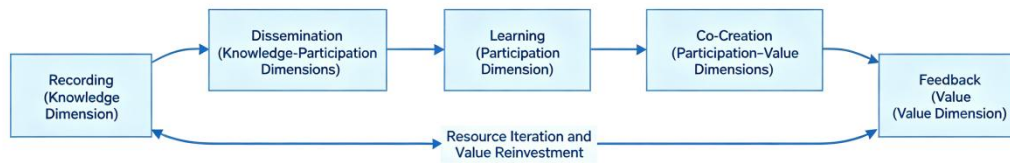


Figure 3. Five-stage transmission model of digital living transmission: “recording, dissemination, learning, co-creation, and feedback”

This model corresponds to the three-dimensional operational mechanism comprising the knowledge, participation, and value dimensions. Solid lines represent the progressive flow from one stage to the next, whereas dashed lines represent the feedback loops through which resources and value circulate back into the system. The recording stage incorporates the outcomes of cultural gene identification; dissemination expands cultural reach; learning then facilitates the development of transmission participants; co-creation enables cultural reproduction and reinterpretation; and feedback ultimately promotes resource iteration and value reinvestment, thereby sustaining the cyclical operation of the entire system.

5.1 The Core Essence of Living Transmission

A relatively common understanding in current ICH digitalization practices is to regard digital technologies primarily as tools for cultural preservation, using images, videos, databases, and other digital means to ensure the long-term retention of cultural resources. However, for traditional craft-based ICH, the completion of digital documentation does not in itself constitute living transmission. This is because the core value of ICH does not reside entirely in its visualized outcomes, but also in the experiential knowledge and cultural meanings continuously generated through craft practices.

Rizhao embroidery provides a clear example. Although an embroidery work can be fully presented through high-resolution images, images cannot adequately explain practical knowledge such as transitions between stitching techniques, control of hand pressure, material selection, and aesthetic judgment. If digitalization remains limited to the presentation of finished works, what is preserved is the outcome of the craft rather than the system of methods that enables the craft to be produced. Therefore, the key to digital living transmission is not simply to increase the quantity of digital resources, but to transform tacit knowledge into a knowledge system that can be learned, disseminated, and recreated.

From this perspective, digital living transmission is essentially a continuous process of knowledge production. Digital technologies are expected not only to perform a preservation function, but also to facilitate the organization, dissemination, and reproduction of knowledge, enabling traditional crafts to continuously generate new cultural meanings within changing social contexts. Digital resources are no longer merely static archives; they become important media connecting ICH bearers, learners, and the wider public. At the same time, it must be emphasized that digital technologies are only supporting means for transmission and cannot replace the actual practices of bearers and communities (Tan & Li, 2024).

Accordingly, the effectiveness of digital living transmission should not be evaluated solely in terms of the quantity of resources or the scale of dissemination. Greater attention should be paid to whether knowledge is understood, whether craft skills are learned, whether participants remain engaged, and whether cultural value is sustained.

5.2 Three-Dimensional Operational Mechanism

The emergence of digital living transmission cannot be achieved through any single type of factor in isolation. Rather, it is a systemic outcome produced through the coupling and coordinated interaction of the knowledge, participation, and value dimensions.

5.2.1 Knowledge transformation mechanism

The knowledge dimension addresses how traditional craft knowledge can be effectively documented, organized, and disseminated. Traditional crafts are characterized by a substantial amount of tacit knowledge. Many key skills depend on the embodied experience and long-term practical accumulation of ICH bearers and are difficult to fully articulate through conventional textual forms. Therefore, digital living transmission must first move beyond the model of “recording works” toward that of “recording knowledge,” with the identification of local cultural genes serving as a prerequisite for documentation.

This transformation means that digital resource development should not focus solely on images of finished products, but should systematically document the production process, material information, operating methods, cultural meanings, and transmission stories behind those products. For example, changes in stitching techniques, thread-color combinations, the origins of patterns, and the environments in which embroidery is produced should all become important components of digital resources. Only by shifting from recording outcomes to recording processes can digital resources genuinely become a knowledge foundation capable of supporting learning and transmission.

The knowledge dimension determines the starting point of digital living transmission. Without effective knowledge transformation, digital platforms can perform only a dissemination function and cannot genuinely enter the process of transmission.

5.2.2 Stakeholder participation mechanism

The participation dimension addresses the questions of who participates in transmission and how sustained participation can be achieved. ICH transmission is not a one-way process of information dissemination, but a process in which participants continuously enter, learn, and practice. Particularly among young people, cultural identification is not established simply through viewing cultural content, but gradually develops through experience, learning, and creation.

The case of Rizhao embroidery indicates that although digital dissemination has expanded public attention, a mechanism for transforming initial interest into sustained learning has yet to be established. Young people need not only cultural content but also clearly defined pathways for participation. For example, they may move from watching short videos to participating in experiential courses, then proceed to systematic learning, and ultimately engage in craft production and cultural dissemination, thereby forming a gradual process of participation.

Digital living transmission should therefore transform members of the public from passive viewers into active participants. Digital platforms should not function merely as display windows, but as interactive spaces connecting ICH bearers, learners, and cultural communities. Only through the establishment of stable participation mechanisms can ICH move beyond dependence on a limited number of individual bearers and achieve broader social continuity.

5.2.3 Value circulation mechanism

The value dimension addresses how digital living transmission can operate over the long term. ICH digitalization requires continuous investment in resource maintenance, curriculum development, platform operation, and talent cultivation. Without a stable value-feedback mechanism, digital resources may fall into a situation in which “construction is completed but maintenance is neglected.”

The value dimension emphasizes that digital living transmission requires not only cultural value, but also a comprehensive cycle involving economic, educational, and social value. In the process of industrial transformation, three types of cultural and creative development should be distinguished—traditional reconstruction, modern reinterpretation, and creative inspiration—while maintaining the boundaries of cultural preservation (Yan et al., 2026). On the one hand, digital resources can support educational programs, cultural and creative product development, cultural exhibitions, and other practical activities, thereby creating new sources of income for transmission actors. On the other hand, the resulting income can be reinvested in craft documentation, talent development, and platform construction, thereby promoting the continuous improvement of the transmission system.

The value dimension therefore does not simply refer to commercial development. Rather, it constitutes a feedback mechanism that supports the sustained operation of cultural transmission. Only when cultural value interacts positively with social and economic value can digital living transmission move beyond short-term project-based operation and achieve long-term development.

5.3 Construction of the Five-Stage Transmission Model

Based on an examination of the operational logic of the knowledge, participation, and value dimensions, this study further develops a five-stage transmission model comprising “recording, dissemination, learning, co-creation, and feedback.” The model is not a linear operational procedure, but a dynamic system formed through the interaction and coupling of the knowledge, participation, and value dimensions. Its stages are interconnected and collectively constitute a complete cycle of digital living transmission.

As the logical starting point of the entire system, the recording stage belongs primarily to the knowledge dimension and must be preceded by the identification of local embroidery cultural genes. By systematically documenting craft procedures, information about finished works, transmission stories, and the cultural contexts in which the craft exists, experiential craft knowledge can be digitally transformed into an organized knowledge base, laying a resource foundation for subsequent dissemination and practical learning.

Once knowledge resources have been systematically accumulated, the process moves into the dissemination stage. This stage serves as a bridge between the knowledge and participation dimensions. Digital media such as short videos, online courses, and virtual exhibitions can overcome geographical barriers and expand the social reach of traditional crafts. However, the primary purpose of dissemination should not be limited to increasing traffic and public attention. Its value lies in directing audiences toward appropriate entry points and creating opportunities for members of the public to become learners.

The transition from information reception to practical internalization is achieved through the learning stage, which is also crucial for translating the participation dimension into practice. Through tiered course design, hands-on experiences, and process-oriented practice and

feedback, ordinary audiences can gradually shift from passive viewers of cultural content to active craft learners, enabling the digital resources accumulated in the earlier stages to enter actual transmission practices.

When learners acquire a certain level of practical experience, they can enter the co-creation stage. This represents a core characteristic distinguishing digital living transmission from conventional preservation models and spans both the participation and value dimensions. Traditional crafts are not fixed collections of symbols; they are continuously evolving cultural practices. Through collaborative interaction among ICH bearers, young people, design practitioners, market actors, and communities, traditional patterns, craft techniques, and local cultural narratives can be connected to new application contexts, thereby enabling the reproduction and contemporary transformation of traditional culture.

The outcomes generated through craft practice and cultural creation ultimately converge in the feedback stage, which embodies the systemic support function of the value dimension. Learning outcomes, revenues generated through cultural and creative industries, and cultural identification at the social level collectively constitute forces that flow back into the system. These resources can support the updating of digital resources, the optimization of curricula, and the cultivation of a new generation of bearers, thereby enabling the entire transmission system to operate as a continuous cycle.

Overall, the model establishes a complete internal operational logic: recording consolidates the knowledge foundation of the system; dissemination expands the social reach of the culture; learning cultivates and develops transmission participants; co-creation enables the reproduction of cultural value; and feedback provides support for the continued operation of the entire system. These five stages are interconnected and collectively constitute a dynamic cycle for the digital living transmission of local traditional crafts.

5.4 Theoretical Significance and Practical Implications

The three-dimensional operational mechanism and five-stage transmission model developed in this study provide a new analytical perspective for understanding the digital living transmission of traditional craft-based ICH at the local level.

From a theoretical perspective, this study moves beyond the one-way logic of “technology enablement” commonly found in previous research on ICH digitalization and examines digital living transmission within an integrated system of knowledge flows, stakeholder participation, and value circulation. Digital technologies themselves are merely tools; their potential for transmission can only be realized when they are deeply embedded in the complete practical chain of ICH transmission, rather than being relied upon in isolation to achieve preservation objectives. At the same time, this study broadens the analytical scope of living transmission. Previous research has often focused primarily on individual ICH bearers, whereas this study argues that the transmission network consists of multiple actors, including ICH bearers, young learners, platform operators, market actors, and communities. This perspective is consistent with the increasing diversification of ICH transmission actors in digital environments. In addition, the proposed analytical framework addresses the relative lack of systematic analytical tools in existing research and provides a reference framework for examining the digital transformation of traditional crafts.

At the practical level, this analytical framework also has potential value for local practice. In the case of Rizhao embroidery, local digitalization should not focus exclusively on dissemination popularity or presentation effects. Instead, a complete transmission system

should be established around knowledge documentation, learning transformation, co-creation, and value feedback. This logic is not limited to Rizhao embroidery. It may also offer a useful reference for other local traditional craft-based ICH projects in China and provide ideas for developing digital living transmission practices in similar contexts.

6. Conclusion

Digital technologies have opened up new possibilities for the preservation and transmission of traditional craft-based intangible cultural heritage at the local level. However, technological digitalization alone cannot automatically resolve the practical challenges confronting ICH transmission. Taking Rizhao embroidery as a case study, this research combines policy documents, publicly available case materials, and preliminary exploratory interview data to examine the practical difficulties emerging during the digital transformation of traditional crafts and to identify the underlying operational mechanisms of digital living transmission.

The findings indicate that the core constraint on the digital living transmission of Rizhao embroidery is not an insufficient supply of digital resources, but the lack of an organic linkage among digital resources, stakeholder participation, and value feedback. From the knowledge dimension, embroidery contains substantial tacit knowledge that cannot be fully conveyed through images of finished products. Current digitalization practices generally emphasize the presentation of outcomes over process-based documentation, while also requiring attention to the risks of distortion of local cultural characteristics associated with traffic-oriented content production and inappropriate uses of AI. From the participation dimension, digital media have increased the social visibility of ICH but lack effective pathways for converting public attention into sustained participation. Young people's interest and attention are difficult to translate into continuous craft learning, and public participation cannot be effectively transformed into a force for transmission. From the value dimension, stable collaborative arrangements among ICH workshops, digital platforms, and market actors remain underdeveloped, while digital innovation has yet to generate effective revenue feedback capable of providing long-term support for the transmission system.

In response to these structural constraints, this study identifies a three-dimensional operational mechanism for digital living transmission and develops a five-stage transmission model comprising “recording, dissemination, learning, co-creation, and feedback.” The model emphasizes that digital living transmission is not equivalent to the simple digital archiving of traditional cultural resources. Rather, it is a dynamic cyclical system that takes the identification of local embroidery cultural genes as its prerequisite, knowledge transformation as its foundation, stakeholder participation as its driving force, and value feedback as its supporting condition. The recording stage transforms experiential craft knowledge into digital knowledge; the dissemination stage expands the social reach of the culture; the learning stage cultivates stable participants in the transmission process; co-creation facilitates the contemporary re-expression of traditional culture; and the feedback stage provides momentum for the continued operation of the entire system. These five stages are interconnected and collectively constitute the underlying logic of digital living transmission for local traditional crafts.

This study also generates several theoretical insights. Moving beyond an analytical perspective centered primarily on technological tools, examining ICH digitalization within an integrated system of knowledge flows, stakeholder participation, and value generation can enrich the theoretical trajectory of ICH digitalization from “resource preservation” toward “knowledge production.” At the same time, the study moves beyond an excessive focus on

individual ICH bearers and reveals a multi-actor collaborative transmission network involving bearers, learners, educational institutions, digital platforms, markets, and communities. By incorporating the identification of local cultural genes into the initial stage of digitalization, the study develops an interpretive framework adapted to local traditional crafts and addresses some of the limitations of single-dimensional analyses.

At the practical level, for Rizhao embroidery and similar local traditional crafts, digitalization should move beyond an exclusive pursuit of presentation popularity and dissemination traffic. Cultural gene identification should be conducted at an early stage, followed by systematic development of a knowledge system that fully documents craft processes and cultural narratives. Digital platforms should strengthen their capacity to convert audiences into learners and establish progressive pathways for practical participation. ICH workshops, educational institutions, and digital platforms should be encouraged to develop collaborative linkages. Authorization arrangements, revenue-feedback mechanisms, and diversified evaluation systems should also be improved so that cultural, educational, and industrial values can be considered together, ensuring that digital innovation serves cultural transmission itself rather than pursuing commercial returns alone.

7. Limitations and Future Research

The deeper integration of digital technologies with ICH transmission remains an important research direction in the revitalization of traditional culture. As emerging technologies such as artificial intelligence, digital twins, and virtual interaction continue to evolve, the digital living transmission of traditional crafts will encounter increasingly diverse practical contexts and research opportunities. Future research may further examine how to balance technological innovation with cultural authenticity. While safeguarding the cultural genes and core meanings of local ICH, researchers can explore appropriate ways for new technologies to participate in the reproduction of traditional culture and promote forms of digital innovation that are better adapted to traditional crafts.

In addition, digital living transmission of ICH is a long-term and dynamic process of social practice. Technological development, market conditions, youth cultural preferences, and local ICH policies are all subject to continuous change. Future studies may therefore conduct longitudinal research to dynamically examine the evolution of digital transmission systems and further refine the theoretical framework and practical approaches for the digital revitalization of traditional crafts.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

Ethics Statement

The study was conducted in accordance with appropriate ethical standards. Participation was voluntary, and informed consent was obtained from all participants. Participant anonymity and confidentiality were maintained throughout the study.

Data Availability

The data supporting this study are available from the corresponding author upon reasonable request.

References

- Bandura, A. (1977). *Social learning theory*. Prentice-Hall.
- Castells, M. (2010). *The rise of the network society*. Wiley-Blackwell.
- Chen, L., & Zhou, S. (2025). Cultural gene digitization and tacit knowledge preservation of traditional craft heritage. *Sustainability*, 17(12), 6890.
- Chen, S. Y., & Zhang, J. (2026). Digital preservation and ecological reconstruction of Han embroidery as intangible cultural heritage empowered by AIGC technology. *Silk*, 63(3), 10–19.
- Feng, Z., & Zhang, L. (2022). Barriers to digital living inheritance of traditional embroidery crafts: A structural dilemma analysis. *Heritage Science*, 14(1), 78.
- General Office of the Central Committee of the Communist Party of China & General Office of the State Council. (2022). *Opinions on promoting the implementation of the National Cultural Digitization Strategy*.
- Huang, S. (2022). Social media participation and systemic inheritance of regional intangible cultural heritage. *Digital Creativity*, 33(4), 289–304.
- Huang, Y. L. (2025, December 31). Intangible cultural heritage workshops: Bringing traditional craftsmanship to life. *People's Daily*, p. 12.
- Huang, Y. L., Han, Y., & Ma, Z. Z. (2026). Research on the practical forms and optimization paths of intangible cultural heritage dissemination empowered by digital-intelligent technologies. *Studies in Ethnic Arts*, (3), 45–54.
- Huang, Y. X., & Li, L. H. (2026). Research on the digital preservation of Miao embroidery as intangible cultural heritage in Bijie. *Western Leather*, (3), 28–30.
- Jenkins, H. (2006). *Convergence culture: Where old and new media collide*. New York University Press.
- Li, J., & Shen, Y. (2024). Youth engagement and continuous learning mechanism in digital heritage inheritance. *Journal of Cultural Heritage Management and Sustainable Development*, 14(2), 210–225.
- Liu, Z. Y., & Yang, C. X. (2026). Paradigm transformation and risk governance in the digital preservation of cultural heritage driven by artificial intelligence. *Academic Exploration*, (2), 113–120.
- Manovich, L. (2001). *The language of new media*. MIT Press.
- Ministry of Culture and Tourism of the People's Republic of China. (2021, June 9). *The 14th Five-Year Plan for the protection of intangible cultural heritage*. https://zwgk.mct.gov.cn/zfxxgkml/fwzwhyc/202106/t20210609_925092.html
- Standing Committee of the National People's Congress of the People's Republic of China. (2011). *Law of the People's Republic of China on intangible cultural heritage*.
- Tan, Z. Y., & Li, H. F. (2024). The logic, mechanisms, and innovative pathways of digital technology-enabled protection and transmission of intangible cultural heritage. *Nanjing Journal of Social Sciences*, (1), 112–119.
- Wang, X., & Liu, Q. (2023). Value circulation and feedback mechanism of craft heritage digital empowerment. *International Journal of Heritage Studies*, 29(5), 567–582.
- Yan, W. J., Chen, Y. S., & Yan, X. Y. (2026). Research on the construction and practical pathways of a “protection–development–dissemination” closed loop for Yao embroidery as intangible cultural heritage under the empowerment of the digital economy. *Journal of Guangdong University of Science and Technology*, (22), 78–83.
- Yang, H. (2026, July 3). *Digital-intelligent protection and innovation of intangible cultural heritage*. http://paper.people.com.cn/rmlt/pc/content/202607/03/content_30172472.html

- Zhai, S. S. (2026, June 3). *Reshaping the cultural expression of intangible cultural heritage through knowledge graphs*. <http://www.nopss.gov.cn/n1/2026/0603/c461625-40733124.html>
- Zhang, Y., & Wang, H. (2026). Creation-as-transmission: Digital co-creation mechanism for intangible cultural heritage living inheritance. *AI & Society*, 41(3), 10124.
- Zhao, G., Huang, Y., & Yang, L. (2026). From “workstations” to “workshops”: Practices and reflections on the living preservation of intangible cultural heritage in China. *Guizhou Intangible Cultural Heritage*, (7), 22–28.
- Zhao, L. L., & Gao, Y. (2025). Research on the digital transmission of intangible cultural heritage empowered by the metaverse from the perspective of field theory. *Heilongjiang Social Sciences*, (1), 103–109.
- Zhou, Z. D., Wang, H., Wang, L., Li, X. M., Zhou, S., & Yao, T. C. (2026). ChatKG: A framework for constructing intangible cultural heritage knowledge graphs based on large language model and prompt engineering. *Library Journal*, 45(4), 82–97. <https://www.libraryjournal.com.cn/CN/Y2026/V45/I4/82>



The Spirit of Labor in the Formation and Development of the Chinese Nation

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Abstract

The achievements of the Chinese nation depend on the labor of its constituent ethnic groups, yet the relationship between productive practice, material exchange, and the spirit of labor requires clearer sociological explanation. This article examines how labor contributes to the formation and development of the Chinese nation through an ethnological and sociological perspective. It adopts a literature-based conceptual approach, drawing on selected academic publications and official documents published between 2017 and 2026. The analysis distinguishes the production of material conditions, the development of economic interdependence, the expansion of social relations, and the recognition of shared contributions. It argues that labor sustains collective life and cultural transmission, while exchanges of labor products connect differentiated livelihoods and create opportunities for enduring cooperation. These economic connections can promote interactions, exchanges, and integration among ethnic groups when supported by equitable participation, public institutions, and mutual recognition. The spirit of labor is examined through the established formulation of respecting labor, loving labor, working diligently, and working honestly, rather than through an assumed timeless ethnic character. The article concludes that understanding the Chinese nation's achievements requires attention to both the collective creation of material and cultural wealth and the social processes through which such contributions become mutually recognized.

Keywords

Chinese nation; Spirit of labor; Economic interdependence; Interethnic interactions; Cultural inheritance; Ethnology

1. Introduction

The achievements of the Chinese nation rest on work carried out by people of all ethnic groups. This proposition concerns more than the number of communities represented in an account of national history. It concerns the relationship between their contributions. Products must reach people who need them; skills must be practiced and passed on; productive facilities must be maintained. An achievement remains available to later generations because someone

undertakes this continuing work. Labor is therefore relevant both to the creation of wealth and to the persistence of the social capacities on which collective life depends.

The relationship between creation and connection deserves particular attention. A community can produce something valuable without its members having extensive contact with those who eventually use it. Equally, people can trade frequently while sharing few other areas of life. The question is how work performed in different settings becomes part of a common undertaking, and when the resulting economic relationships acquire a wider social significance. Answering it requires following what happens between production and collective identification.

Contemporary official formulations give this inquiry a clear point of departure. Xi's speech at the 2024 national conference on ethnic unity situates the joint creation of Chinese history and culture alongside economic interdependence among ethnic groups (Xi, 2024). The official English report preserves this emphasis on economic interdependence (Xinhua, 2024). Read together, these statements invite an investigation of the practical relationships through which contributions become connected. The broad historical proposition guides the inquiry; the explanation must specify who produces, who exchanges, and how relationships are sustained.

Recent literature supplies several relevant perspectives, although the sources address different questions. The reception of pluralistic unity concerns the relationship between ethnic diversity and the Chinese nation (Liu, 2018). Research on the moral meaning of labor asks how work is evaluated in relation to national life (He, 2022). Neither perspective can simply replace an account of production and exchange. Their relevance lies in bringing cultural affiliation and the value of work into the same discussion. The argument developed here asks how the labor of particular people contributes to achievements understood as common, without assuming that the participants do identical work or hold identical views.

Its central contention is that material exchange gives differentiated labor a significance beyond its immediate place of production. Producers come to depend on capacities located elsewhere, and repeated dealings create occasions for cooperation. The extension of these relationships into common institutions can support interethnic interactions, exchanges, and integration. Recognition matters because people must also be able to understand how their work and the work of others enter shared achievements. The spirit of labor is examined in this setting, as an orientation toward worthwhile and dependable work rather than as an inherited characteristic assigned to an ethnic population.

The inquiry is conceptual rather than a reconstruction of a single historical path. It follows productive contributions into exchange and then examines the durability and normative meaning of the resulting relationships. A product may circulate before its producers receive acknowledgment. Conversely, public praise need not explain how an achievement was made. These differences between activity and recognition delimit the argument.

2 Research Perspective and Method

2.1 An Ethnological and Sociological Perspective

Ethnology draws attention to how ethnic affiliations, cultural practices, and relations between groups develop within wider social settings. Sociology contributes an analysis of labor organization, exchange, institutions, and social recognition. Their combination shifts the research focus from isolated cultural traits to relations among people engaged in practical activities. The unit of explanation is consequently not an ethnic group imagined as an internally

uniform producer. It is a relationship involving workers, households, enterprises, markets, and public institutions, within which ethnicity may become relevant in different ways.

The Chinese nation and its constituent ethnic groups must also remain analytically distinct without being treated as opposing categories. Contemporary debate about the term *minzu* demonstrates why terminology requires care (Ma, 2017). The recent reception of Fei Xiaotong's account of pluralistic unity further highlights the importance of examining diversity within an interconnected national formation (Liu, 2018). Here, pluralistic unity provides a broad research orientation: differentiated contributions should be studied through their connections. It does not authorize attributing an unchanged modern identity to every population or occupational practice in earlier periods.

The expression interactions, exchanges, and integration among all ethnic groups follows the official English formulation of the 2021 Central Conference on Ethnic Affairs speech (Xi, 2021b). The terms direct attention to related aspects of social life. Encounters bring people into contact; exchanges circulate products and experience; more durable relationships allow participation in common institutions. These working distinctions help organize the discussion, but they are not a chronological formula. A workplace, for example, can bring these activities together, whereas a distant commercial relationship may involve exchange with little personal contact.

2.2 Sources and Analytical Procedure

The reference window covers the ten calendar years from 2017 to 2026; it does not delimit the history being discussed. Selection was based on relevance to ethnic relations, work, practical learning, exchange, and recognition. The resulting literature is used for conceptual analysis rather than presented as an exhaustive review. In particular, Liu's conference report documents a recent discussion of pluralistic unity, rather than serving as a substitute for Fei's original work (Liu, 2018). Published research and official texts are read according to their respective purposes, with no new interviews, survey results, or historical observations attributed to this study.

The procedure is to separate the claim being examined from the evidence available for it. Official documents establish contemporary formulations; they cannot demonstrate how every earlier productive relationship operated. An observational case can show how commercial and residential arrangements became connected in a particular locality, but it cannot supply a general causal effect. Where the discussion moves beyond these sources, the reasoning is stated as an analytical inference. The aim is to identify the relationships a fuller historical or field investigation would need to examine: how a contribution is made, how it reaches others, and how its significance becomes recognized.

3 Labor and the Collective Creation of National Achievements

3.1 Producing the Conditions of Collective Life

Consider the labor required for a useful object to remain available. Producing it is only part of the undertaking. Materials have to be obtained, equipment kept usable, and the result carried to a place where it can serve a purpose. These activities can involve different people with no single person directing the whole process. The object nevertheless depends on their work. This elementary observation gives collective creation a specific meaning: a contribution belongs to a wider achievement because other contributions make its production and use possible.

At the level of the Chinese nation, the same reasoning calls attention to how contributions from different communities become connected. It does not require each ethnic group to participate equally in every activity. Nor does it assign particular occupations to ethnic identities. A person's work changes with training, migration, available resources, and access to employment. The analytical task is to establish how people in these changing circumstances contribute to productive undertakings that extend beyond their immediate households. Ethnic affiliation is one part of the social setting in which the work is organized, not an explanation of competence or effort in itself.

This approach alters what an account of achievement needs to record. An invention or a completed work may receive extensive attention while the maintenance that allows its continued use remains unnoticed. Instruction can be similarly difficult to see: its results appear in what another person later becomes capable of doing. Omitting these activities makes the achievement appear more self-contained than it is. Including them reveals a dependence across tasks and generations. The contribution of ordinary workers then enters the explanation through the work required, rather than being added afterward as a general statement that everyone played a part.

Physical and intellectual labor also meet within these practical relationships. A design requires judgment about materials and use; putting it into practice can expose problems that call for further thought. Workers may improve a method while carrying it out. Separating intellectual creation entirely from execution would miss this possibility and obscure where knowledge develops. The point is not that every participant performs every kind of task. It is that the eventual result may depend on information moving between people who know different aspects of the work. Their cooperation can contribute something that none of their activities would supply independently.

The monetary value attached to a task provides an incomplete guide to this contribution. Teaching a successor or keeping a tool in working order may generate little income at the time, yet the continuation of production can depend on it. An analysis of shared achievement should ask what other work an activity enables and what would be lost if it ceased. Such questions recognize differences in contribution without turning the discussion into a ranking of ethnic groups. They also connect the creation of wealth to its continuing availability, which is essential to understanding why labor matters for historical continuity.

3.2 Sustaining Historical Continuity

Continuity requires people to do something with what they inherit. Tools can survive while the ability to use them disappears; a technique can remain recorded after people have stopped practicing it. The continued existence of an object or a name therefore tells only part of the story. Work sustains the relationship between an inherited resource and a living capacity. A later generation has to acquire enough competence to use that resource, judge its results, and decide what needs to change. This makes the transmission of productive capacities an important subject for ethnological investigation.

Gibson's discussion of making and learning offers a useful way to approach this subject (Gibson, 2019). Practical knowledge is acquired in activity, where a learner encounters materials, attempts a task, and responds to the result. Applied to the present question, this perspective draws attention to the work of teaching and correction. A successful outcome becomes evidence that someone can act competently, not simply repeat an explanation. Inheritance then depends on relationships in which such competence can be acquired. The contribution of a teacher may

continue through the later work of learners, including work undertaken outside the teacher's own locality.

Changes in the organization of work need not interrupt every connection with an earlier practice. Knowledge learned in a household may be carried into another productive setting; a worker may adapt an established technique to different equipment. The connection has to be investigated through what is retained and how it is used. It cannot be settled merely by observing either change or similarity. For the Chinese nation's development, this directs attention to the active transmission of capacities across changing social arrangements. Continuing labor makes inherited achievements available under new conditions, rather than leaving continuity to depend on the preservation of an unaltered form.

3.3 The Transmission of Labor Experience Through Interethnic Cooperation

Transmission across generations is only one part of this process. Cooperation can also carry experience between people from different ethnic backgrounds. To undertake a task together, participants have to make some of their knowledge intelligible to one another. They may demonstrate a method, explain a practical difficulty, or revise how tasks are coordinated. In these situations, knowledge becomes available through the work that participants are trying to accomplish. Learning is connected to a shared purpose, and a technique can acquire a wider range of users without erasing the contribution of those who developed it.

This account is consistent with the emphasis on cultural exchanges and mutual learning in the joint creation of Chinese culture (Xi, 2024). Its relevance to labor is specific: cooperation can make experience acquired in one setting useful to people working elsewhere. Productive capacities are extended through these relationships, while the resulting products can circulate beyond those directly involved. The transition from inheritance to exchange is therefore already present in the organization of work. People need ways both to acquire capacities they do not possess and to obtain products they do not make. Material exchange gives these connections a further social reach.

4 Material Exchange and Economic Interdependence

4.1 From Differentiated Production to Exchange

Exchange makes the results of one person's work available for another person's use. Where productive activities differ, this can connect needs that cannot be met within a single household or locality. A producer relies on materials or equipment made elsewhere, while others rely on the product that producer supplies. The importance of the relationship lies in this dependence between activities. Goods are not merely evidence that two communities encountered each other; they can enter the work and livelihoods through which those communities continue to exist. The movement of products thus deserves attention as part of the organization of collective life.

The category of labor products is deliberately broader here than means of production. Tools and other productive inputs enter further work; consumption goods meet needs more directly. Both can connect livelihoods across communities. How they are transferred also matters. A purchase, a gift, and a provision made under a public arrangement need not establish the same expectations between participants. Elder-Vass's treatment of gifts and Yan's anthropological discussion make it difficult to assume one universal obligation of return (Elder-Vass, 2020; Yan, 2020/2023). The form of a transfer must be specified before its implications for a social relationship can be assessed.

Economic interdependence concerns the continuation of these connections. A useful question is what happens when a supply or outlet becomes unavailable. If one activity can continue only with considerable difficulty because another has stopped, the relationship involves a consequential dependence. The scale may be local or much wider; personal familiarity is not a prerequisite. For the present argument, this gives material exchange its explanatory weight. The products of different people's labor become part of the conditions under which others work and live. Economic interdependence makes those contributions relevant beyond the setting in which they originate.

4.2 Repetition and Cooperative Expectations

Repeated dealings can make this dependence more manageable. Participants learn whether a partner delivers what was agreed, understands a requirement, or responds adequately when something goes wrong. Knowledge of this kind can influence the next decision to cooperate. Over time, a relationship may carry expectations that are absent from a single completed sale. This is one plausible route from exchange to sustained cooperation. Its evidence would be found in subsequent decisions and conduct, including the reasons participants give for returning to a relationship, rather than in transaction counts alone.

Trust in this setting should not be understood only as personal affection. People can cooperate because contracts, professional standards, dispute procedures, and public regulation make commitments more dependable. Personal familiarity and institutional assurance may reinforce one another, but either can remain limited. This matters for interethnic relations because economic cooperation need not wait for complete cultural familiarity. Fair procedures can enable people to work together while retaining different customs and affiliations. Cooperation then provides further opportunities for understanding, rather than requiring cultural sameness as its initial condition.

Economic complementarity is a possibility that must be socially organized, not a sufficient explanation in itself. Resources in different locations do not generate exchange without transport, information, and arrangements for reaching agreements. Skills do not become accessible to others without opportunities to learn, collaborate, or obtain their products. Intermediaries can connect participants who would otherwise remain apart, although dependence on a small number of intermediaries may also limit participation. These considerations explain why infrastructure and institutional arrangements belong within an account of material exchange. They are part of how productive differences become workable relationships rather than simply existing alongside one another.

4.3 From Market Connection to Wider Participation

Sun and Liu examine this relationship in their study of Uyghur jade traders in Nanyang (Sun & Liu, 2022). Market-related livelihoods brought migrants into continuing contact with the locality. The study follows the connection between commercial activity and residential organization, including the move into government-built public rental housing in 2017. Its value here is the attention to how a livelihood relationship develops alongside a community. Work creates reasons to remain in a place, but the conditions of residence also affect the possibilities for participation there.

This distinction matters to the argument. Employment or trade can establish an economic connection while leaving access to wider social life uncertain. Housing and public services can affect whether people are able to maintain a livelihood and participate beyond it. In this interpretation, institutions are part of the explanation of how an economic relationship develops.

They help determine its reach and durability. Studying them alongside exchange avoids attributing all subsequent relationships to commerce, while retaining the important role of work in bringing people into a shared locality in the first place.

5. From Economic Relations to Interethnic Integration

5.1 Interaction and Practical Communication

The next step concerns how material relationships become relations among people. Exchange creates reasons to meet, communicate, and coordinate. Participants explain needs, negotiate expectations, and respond to the consequences of another person's work. These encounters can make unfamiliar practices intelligible through concrete problems rather than abstract descriptions. Learning why a production schedule matters or how a quality judgment is made can provide knowledge about another person's circumstances. The proposed mechanism is practical communication grounded in interdependence, not the assumption that exposure to any difference necessarily produces understanding.

Repeated cooperation may also alter the terms in which people encounter one another. Someone initially recognized mainly through a broad ethnic label may become known as a skilled worker, reliable partner, experienced teacher, or helpful neighbor. Such relationships do not require ethnic affiliation to disappear. They add social knowledge that cannot be contained by a single categorical description. The importance of labor is that competence and contribution can become observable in joint activity. Whether this changes wider attitudes remains an empirical question rather than an automatic extension of an individual relationship.

Evidence on intergroup contact makes this qualification necessary. Paluck and colleagues' reassessment identifies both supportive findings and important limitations in the available experimental evidence (Paluck et al., 2019). Comparative work on intercultural relations likewise directs attention to the conditions in which groups encounter one another (Berry, 2017). These sources are not direct tests of the historical argument advanced here. They help frame a narrower proposition: opportunities for contact must be assessed alongside the organization, fairness, and continuity of the relationships in which contact occurs.

5.2 Cooperation and Shared Social Relationships

Economic interdependence can support cooperation when participants have reasons to maintain a relationship beyond immediate advantage. Joint problems may require coordination, and dependable cooperation can become valuable to both sides. For example, a general analytical scenario might involve producers and distributors jointly addressing quality or delivery problems. The significance is not the example's particular trade. It is the possibility that shared practical responsibilities generate expectations that extend beyond a completed transaction. Research should then establish who participates in decisions, how obligations are distributed, and whether the relationship remains reciprocal in practice.

Integration becomes a stronger claim when relationships extend across more than one setting. Work-based cooperation may coexist with neighborhood interaction, participation in local associations, and access to common public services. Such overlapping relationships can make a community less dependent on a single transaction or intermediary. They also make disagreement more manageable when participants can draw on shared procedures and continuing relationships. The argument is therefore cumulative: material exchange creates connections, repeated cooperation can stabilize them, and wider participation can give those connections a more durable social basis.

Conflict is relevant to this explanation because durable relations are not necessarily free of disagreement. Differences over quality, payment, access, or responsibility can arise within any interdependent arrangement. What matters is whether participants can address them through procedures regarded as credible and whether disagreements remain specific rather than becoming judgments about whole ethnic groups. Fair dispute handling may preserve cooperation and demonstrate the value of common rules. Unresolved exclusion can have the opposite effect. A sociological account of integration must therefore examine the handling of ordinary problems as closely as it examines successful transactions or public celebrations of cooperation.

5.3 Recognition and Identification With Chinese Culture

Connections alone do not explain how particular contributions are recognized as part of the Chinese nation's achievements. Recognition involves interpretation. Workers, communities, educators, and public institutions identify whose labor made an outcome possible and how that outcome relates to broader collective life. Accounts of common achievements become more convincing when they identify concrete contributions and relationships rather than presenting unity as an unexplained conclusion. In this respect, historical and cultural interpretation is not an alternative to material analysis. It explains how people understand the significance of material relationships in which they participate.

This relationship gives identification with Chinese culture a practical dimension. People can encounter shared inheritance as something to which their own families and communities have contributed, and which others have also helped sustain. Such recognition need not erase specific memories, techniques, or affiliations. It can place them within an account of interconnected creation. The proposed connection between labor and identification thus has two requirements: contributions must be materially connected, and their significance must become understandable across communities. Neither an object alone nor an official label can establish both requirements without further social processes.

These connections also explain why the common character of an achievement does not begin only when it receives national recognition. Cooperation may already unite contributions from different settings within the production and use of a good. Public interpretation can make that relationship visible and place it within a wider historical understanding. The distinction between practical connection and recognized connection is therefore useful: the former concerns how an achievement is produced, while the latter concerns how its contributors understand and evaluate their relationship to it. Studying both keeps the analysis grounded in productive activity while explaining the importance of shared recognition.

6. The Spirit of Labor as a Shared Normative Orientation

6.1 A Clear Definition

In the official English text, Xi (2021a) defines the spirit of labor through "working with pride, enthusiasm, diligence, and honesty" (Section 30). The corresponding Chinese formulation concerns respect for labor, love of labor, diligent labor, and honest labor. That definition is retained here. The same passage distinguishes the spirit of labor from the spirit of model workers and the spirit of workmanship; their related purposes do not make them interchangeable.

The definition establishes what conduct is valued. How people come to value it remains a separate question. A worker may encounter these standards in instruction, in expectations

attached to a task, or in judgments about a completed result. Shared work can give them a practical reference: another person's diligence affects what one can accomplish, while an honest account of materials or performance makes cooperation more dependable. These are settings in which the standards can acquire significance. They do not demonstrate that all participants interpret work identically or that the contemporary formulation describes every earlier period.

6.2 Respecting Labor and Recognizing Contributions

Respect for labor begins with recognizing productive activity as necessary and socially valuable. In the present argument, it must also include attention to workers whose contributions are less visible or less publicly celebrated. Recognition of collective achievement becomes incomplete when it honors the final result but neglects those who cultivated materials, maintained equipment, taught skills, or performed routine services. An account centered on the contributions of all ethnic groups should therefore examine the distribution of recognition, rather than assume that the language of shared achievement already guarantees equal respect.

He connects moral understandings of labor with questions about the nation and state in contemporary China (He, 2022). This provides a relevant caution: the public value attached to labor and the experience of particular workers need not coincide. Applied to the present framework, respect should be investigated through both representations and relationships. Researchers can ask whose work is acknowledged, who can participate in decisions, and whether workers experience fair treatment. These questions preserve the affirmative importance of labor while preventing moral praise from concealing differences in actual recognition.

6.3 Valuing Diligent and Honest Work

An orientation of love for labor cannot be reduced to celebrating hardship. Its social content concerns whether people can understand their activity as meaningful, develop competence, and see its contribution to others. Continuing participation in useful work can connect personal effort with collective needs. However, this orientation is difficult to sustain where contributions are dismissed or opportunities remain restricted. The argument therefore links the cultivation of positive attitudes toward labor with the organization of work and participation, rather than treating an attitude as an individual quality detached from social circumstances.

Diligent labor concerns sustained and conscientious effort. In interdependent production, that effort matters beyond an individual's immediate task because delays, mistakes, and careful improvements affect others. Honest labor concerns the reliability of what people do and claim: accurate information, dependable performance, and the avoidance of deception. Both qualities can become practically intelligible through cooperation. People experience why another person's diligence or honesty matters to their own work. This does not establish a universal historical origin for these values. It explains a plausible social setting in which their significance can be learned and reinforced.

Normative expectations should apply to organizations as well as individual workers. A request for honest work is weakened if information about compensation or obligations is misleading. A demand for diligence is incomplete if workers lack the resources or preparation needed to perform adequately. Studying the spirit of labor therefore requires examining whether the surrounding organization supports the conduct it praises. This is especially important when participants enter cooperation with unequal experience or access to information. Shared standards gain credibility when they govern the relationship itself, rather than functioning only as expectations imposed on those with the least influence over its conditions.

6.4 From Practical Standards to Shared Recognition

The relationship between practice and spirit is consequently reciprocal, but not circular. Labor supplies situations in which standards can be learned, tested, and evaluated. Public recognition and teaching can then express those standards more explicitly and guide subsequent conduct. The two processes require separate evidence: an account of cooperative work demonstrates a practical relationship, while statements, evaluations, and patterns of recognition demonstrate its normative interpretation. Keeping them distinct allows a researcher to investigate how a shared spirit of labor develops instead of assuming its presence whenever productive activity is observed.

A shared standard concerns what participants can reasonably expect of one another. It can remain meaningful when their occupations, affiliations, and local practices differ. In this respect, the spirit of labor need not be explained as a quality inherent in a population. Its social significance can be examined in the way contributions are evaluated and dependable work is recognized across those differences. This connects labor's normative meaning to the article's central problem: people contribute through particular activities, but those activities can sustain a common undertaking. Recognizing that relationship gives the value of work a reference beyond individual accomplishment.

7. Discussion and Research Implications

The argument identifies a material basis for interethnic connection without reducing social integration to economic calculation. Production creates what people need; exchange relates differentiated activities; cooperation can stabilize expectations; broader institutions can expand participation; recognition can make the significance of contributions understandable. Each relationship adds something that the preceding relationship alone cannot supply. This explains why labor and the exchange of its products are central to the argument while institutions, communication, and cultural interpretation remain necessary. The sequence is an analytical explanation of connected processes, not a universal chronology imposed on every historical setting.

Its principal implication for ethnology is to examine contributions relationally. Instead of compiling separate lists of what each ethnic group created, research can follow how people, skills, products, and institutions became connected. For sociology, the implication is to investigate how economic relations extend into social participation and moral recognition. These perspectives converge on a common problem: the relationship between differentiated contribution and shared achievement. They also provide a way to connect discussions of national continuity with ordinary productive practices, without assuming that continuity means the absence of historical change.

The institutional conditions require particular attention. Equal participation, protection of legitimate rights, fair exchange, accessible public services, and credible dispute resolution influence whether economic connection supports durable cooperation. The argument does not suggest that moral exhortation can replace these arrangements. Nor should the spirit of labor be used to classify some communities as inherently diligent and others as deficient. Such judgments would undermine the relational approach. A stronger analysis examines how opportunities and recognition are organized and how people from different backgrounds can contribute to and benefit from collective development.

Further empirical work should compare settings in which exchange produces different degrees of social connection. Interviews, observation, and the analysis of organizational records could

trace entry into work, repeated cooperation, dispute handling, skill transmission, and participation beyond the workplace. Longitudinal evidence would be particularly useful for distinguishing an initial commercial encounter from a durable relationship. Investigators should also examine workers' own understandings of contribution and belonging. Such research would test the proposed mechanisms rather than simply collect favorable examples. The present article supplies an analytical framework, not numerical estimates or newly collected findings.

The proposed sequence also suggests distinct indicators. Dependence on goods or skills concerns the material relationship; repeated dealings concern continuity; joint problem solving concerns cooperation; participation in common institutions concerns social extension; and accounts acknowledging others' contributions concern recognition. These should not be merged into a single measure of integration without justification. A setting may show strong commercial dependence but limited social participation, or extensive personal contact but little recognition of shared contributions. Comparing such configurations would reveal where the connections proposed here hold and where additional explanations are necessary. It would also make the framework open to revision through evidence.

8. Conclusion

The labor of all ethnic groups contributes to the Chinese nation's achievements through relationships that extend beyond a particular task or locality. Continuing work keeps productive capacities available to later generations. Exchange allows products made in different settings to enter other people's livelihoods, establishing economic connections that can develop into cooperation and wider social participation. This is the material basis on which the article connects labor with interethnic interactions, exchanges, and integration. The connection requires attention to its institutional conditions; neither the circulation of a good nor the assertion of a shared achievement explains the entire process.

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The data supporting this study are available from the corresponding author upon reasonable request.

References

- Berry, J. W. (Ed.). (2017). *Mutual intercultural relations*. Cambridge University Press.
<https://doi.org/10.1017/9781316875032>
- Elder-Vass, D. (2020). Defining the gift. *Journal of Institutional Economics*, 16(5), 675–685.
<https://doi.org/10.1017/S174413741900033X>
- Gibson, M. (2019). Crafting communities of practice: The relationship between making and learning. *International Journal of Technology and Design Education*, 29(1), 25–35. <https://doi.org/10.1007/s10798-017-9430-3>
- He, X. (2022). Moral labour, the nation and the state in contemporary China. In I. Ahmad & J. Kang (Eds.), *The nation form in the global age: Ethnographic perspectives* (pp. 225–245). Palgrave Macmillan.
https://doi.org/10.1007/978-3-030-85580-2_9
- Liu, H. (2018). International symposium on the formation and development of the Chinese nation with multi-ethnic groups—To commemorate the 30th anniversary of the publication of Fei Xiaotong's theory of the Chinese nation with multi-ethnic groups. *International Journal of Anthropology and Ethnology*, 2, Article 4.
<https://doi.org/10.1186/s41257-018-0011-5>
- Ma, R. (2017). Reconstructing “nation” (minzu) discourses in China. *International Journal of Anthropology and Ethnology*, 1, Article 8. <https://doi.org/10.1186/s41257-017-0003-x>
- Paluck, E. L., Green, S. A., & Green, D. P. (2019). The contact hypothesis re-evaluated. *Behavioural Public Policy*, 3(2), 129–158. <https://doi.org/10.1017/bpp.2018.25>
- Sun, Q., & Liu, D. (2022). A case study of the construction of inter-embedded multi-ethnic community of urban migrants in Nanyang. *International Journal of Anthropology and Ethnology*, 6, Article 14.
<https://doi.org/10.1186/s41257-022-00076-7>
- Xi, J. (2021a, November 10). *CPC's great spirit will always be an invaluable asset to the Party and the country*. Qiushi. https://en.qstheory.cn/2021-11/10/c_681466.htm
- Xi, J. (2021b, August 27). *Heighten the sense of national identity and improve the Party's work on ethnic affairs in the new era*. State Ethnic Affairs Commission.
<https://www.neac.gov.cn/seac/c103372/202301/1160266.shtml>
- Xi, J. (2024, September 28). *Zai quanguo minzu tuanjie jinbu biao Zhang dahui Shang de Jianghua* [Speech at the national conference commending models for ethnic unity and progress]. The People's Government of Beijing Municipality. https://www.beijing.gov.cn/ywdt/dzyjs/202409/t20240928_3908617.html
- Xinhua. (2024, September 29). *Xi urges boosting building of community for Chinese nation*. The State Council of the People's Republic of China.
https://english.www.gov.cn/news/202409/29/content_WS66f95efec6d0868f4e8eb667.html
- Yan, Y. (2023). Gifts. In F. Stein (Ed.), *The open encyclopedia of anthropology*. <https://doi.org/10.29164/20gifts> (Original work published 2020)

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