

PROFESSIONAL CHARACTER AS A FOUNDATION FOR HOSPITALITY 4.0 SERVICE EXCELLENCE

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ABSTRACT

The growth of artificial intelligence, robotics, service automation, intelligent service ecosystem and digital transformation has led to Hospitality 4.0. While technology has boosted the efficiency and customization of services, numerous studies have pointed to the appearance of difficulties such as lessened interpersonal interaction, de-personalization of services and a reduced human element in the customer experience. However, studies on Hospitality 4.0, future competencies and professional character integration are still restricted. This study intends to critically evaluate the relationship between Hospitality 4.0, Human Centered Future Skills and Professional Character and establish a conceptual framework explaining the interaction between the three. The research adopted the methodology of the conceptual article with the backing of a narrative literature review of relevant international scientific articles published from 2019 to 2026. The analysis was undertaken by means of literature mapping, thematic synthesis and concept integration from three key domains. The results of the study show that the primary elements of Human Centered Future Skills include communication, cooperation, adaptability, digital literacy, emotional intelligence, critical thinking, lifelong learning and human technology collaboration. Findings also suggest the competencies are based on the Professional Character that encompasses empathy, honesty, responsibility, respect, accountability and service orientation. Based on the synthesis, the study builds the Human Centered Future Skills Framework (HCFS Framework) with professional character as the principal cornerstone to accomplish ethical, humanistic and human centered Hospitality 4.0 service excellence.

Keywords: *Hospitality 4.0; professional identity; future skills; service excellence; human centered service quality.*

INTRODUCTION

Digital transformation has altered the architecture of hospitality service design, delivery, recovery, and evaluation. Artificial intelligence, service robotics, the Internet of Things, big data analytics, and automated interfaces now connect customers, employees, organizations, and data in real time. This development has produced Hospitality 4.0 : a smart service paradigm in which value is co created through interconnected technological and human actors rather than through isolated service encounters. Although the technological infrastructure is important, Hospitality 4.0 is more accurately understood as a sociotechnical transformation because the value of digital capability depends on organizational configuration, employee judgment, customer participation, and the quality of human technology interaction (Buhalis et al., 2023; Buhalis et al., 2024; Doborjeh et al., 2022).

The expansion of technology-mediated encounters creates a technology–humanity paradox. Customers value speed, accuracy, convenience, availability, and personalization, yet hospitality remains grounded in recognition, welcome, trust, empathy, and emotional responsiveness. Robots and automated systems may perform routine tasks reliably, but their contribution to experience varies according to the customer’s goals, the relational intensity of the encounter, and the possibility of meaningful human intervention. Consequently, technology can improve functional performance while simultaneously weakening perceived warmth, dignity, and connection, especially when automation is imposed in emotionally sensitive or uncertain situations (Khoa et al., 2023; Larivière et al., 2025; Rana et al., 2025).

This paradox challenges technology determinist explanations that equate adoption with improvement. Artificial intelligence and robotics create affordances prediction, memory, consistency, scalability, and automation but they do not determine the moral purpose, relational tone, or distributive consequences of their use. Employees and organizations decide what data are collected, whether algorithmic recommendations are questioned, when automated interaction should yield to human support, and how failures are communicated and repaired. The quality of Hospitality 4.0 therefore rests not simply on technological sophistication, but on the professional capabilities and values through which technology is interpreted and enacted (Fornells Herrera et al., 2024; Khoa et al., 2023; Xu et al., 2023).

Future skills research has responded by identifying communication, collaboration, adaptability, digital literacy, critical thinking, problem solving, creativity, emotional intelligence, lifelong learning, and human technology collaboration as essential capabilities for increasingly digital work. This literature has moved beyond a narrow focus on technical proficiency, yet competencies are still commonly framed as resources for employability, productivity, innovation, and resilience. Such framing explains what employees should be able to do, but less clearly explains the values that determine why, for whom, and in what manner those

abilities should be exercised. Communication can be persuasive without being transparent, digital literacy can support intrusive profiling, and adaptability can normalize practices that undermine employee or customer dignity (Chaka, 2020; Ikenga & van der Sijde, 2024; Mudzar et al., 2022).

A parallel literature on professional identity, professionalism, and hospitable service mindset shows that service work is shaped by more than knowledge and technical competence. Professional identity influences commitment, engagement, satisfaction, and retention, while service mindset emphasizes a disposition to create experiences characterized by attentiveness, generosity, and meaningful connection. However, identity research often focuses on who professionals understand themselves to be, and professionalism research commonly focuses on adherence to standards. These perspectives do not fully explain the moral relational qualities that direct judgment when technologies, organizational targets, and user needs conflict (Manfreda et al., 2024; Mount et al., 2022; Wang et al., 2020).

The limitation is therefore deeper than the general observation that technology, skills, and professional values have been studied separately. Hospitality 4.0 research explains technological transformation but insufficiently specifies the human mechanism through which technical capability becomes ethical and meaningful service. Future-skills research identifies competencies but rarely explains the normative foundation that governs their responsible enactment. Professional identity and professionalism research explains commitment and conduct but is seldom connected to responsible AI use, human technology collaboration, or user experienced service quality. This constitutes an integrative explanatory gap: integrative because the constructs developed in different research traditions, and explanatory because the process linking values, competence, implementation, and experience remains theoretically underdeveloped (Buhalis et al., 2024; Chaka, 2020; Manfreda et al., 2024).

A second unresolved problem is the conceptual conflation of Service Excellence and Service Quality. Service Excellence concerns how effectively an organization and its employees design, govern, and perform technology enabled service. Service Quality concerns how that performance is received, interpreted, and experienced by users. A system may be operationally efficient, accurate, and consistent while users experience it as inaccessible, impersonal, unfair, or humiliating. Distinguishing implementation performance from experiential outcome is therefore necessary to avoid treating internal operational metrics as sufficient evidence of a positive human experience (Larivière et al., 2025; Rana et al., 2025; Sousa et al., 2024).

To address these limitations, this article develops the Human Centered Future Skills Framework through an antecedent, mechanism, implementation, outcome logic. Professional Character is proposed as the normative antecedent that directs judgment and conduct; Human Centered Future Skills translate values into context-sensitive capabilities; Hospitality 4.0 Service Excellence represents technology-

enabled implementation; and Human Centered Service Quality represents the ethical, relational, and experiential outcome perceived by users. The novelty lies not merely in combining established constructs, but in assigning them differentiated theoretical functions and specifying a coherent pathway that can be examined through direct, indirect, and context dependent relationships (Jaakkola, 2020; Manfreda et al., 2024; Paul & Criado, 2020).

Accordingly, this study critically synthesizes the fragmented literature, clarifies construct boundaries, develops the HCFS Framework, and formulates testable propositions. It asks how Hospitality 4.0 research explains the relationship among technology, employees, and service experiences; which competencies are necessary for human-centered work; how character, identity, professionalism, and service mindset explain normative conduct; and through what mechanism character, competence, implementation, and user-experienced quality can be connected. The study contributes a character-grounded account of digital service transformation and a process outcome distinction that supports more precise future research and practice (Jaakkola, 2020; Snyder, 2019; Torraco, 2005).

METHODOLOGY

1. Research Design and Review Questions

This study employed a conceptual research design supported by a structured integrative narrative literature review. The design was selected because the purpose was not to calculate a pooled effect size, but to clarify construct boundaries, critically compare perspectives that developed in separate research traditions, and construct an explanatory framework linking professional values, workforce competencies, technology enabled service implementation, and user-experienced service quality. Conceptual research is appropriate when relevant constructs are established but their relationships remain fragmented or theoretically underdeveloped, whereas an integrative review permits the synthesis of conceptual and empirical studies with heterogeneous designs and theoretical assumptions (Jaakkola, 2020; Paul & Criado, 2020; Snyder, 2019; Torraco, 2005).

The review process was structured to improve transparency while retaining its interpretive and theory-building orientation. PRISMA 2020 principles were used, where applicable, to document record identification, deduplication, screening, eligibility assessment, and final inclusion. PRISMA was applied as a reporting framework and does not imply that the study was a conventional systematic review or meta-analysis (Page et al., 2021; Rethlefsen et al., 2021).

The review addressed four questions: (1) How does Hospitality 4.0 literature explain the relationship among technology, employees, organizational practices, and service-user experiences? (2) Which cognitive, digital, social, emotional, adaptive, and relational competencies are consistently identified as necessary for

human-centered work in digitally mediated service environments? (3) How do professional character, professional identity, professionalism, and hospitable service mindset explain the normative foundations of professional judgment and conduct? and (4) Through what theoretical mechanism can professional character, human-centered competencies, technology-enabled implementation, and user-experienced service quality be connected? The unit of analysis included construct definitions, theoretical assumptions, empirical findings, proposed relationships, contextual conditions, methodological limitations, and relevance to the HCFS Framework (Snyder, 2019; Torracco, 2005).

2 Information Sources, Search Period, and Search Strategy

The principal searches were conducted in the bibliographic databases Scopus and Web of Science. Supplementary searches were undertaken through ScienceDirect, Taylor & Francis Online, Sage Journals, and Wiley Online Library. Google Scholar and backward and forward citation searching were used to identify additional relevant and seminal studies. The contemporary evidence base covered January 2019 to 30 June 2026 to capture the rapid development of artificial intelligence, service robotics, automation, Industry 4.0, Industry 5.0, and post-pandemic technology-mediated services. Earlier publications were retained only when they provided seminal theoretical or methodological foundations essential to construct definition or framework development (Page et al., 2021; Rethlefsen et al., 2021; Snyder, 2019).

Search terms were developed from the review questions and organized into four conceptual blocks: (1) Hospitality 4.0 and technology-mediated services; (2) future workforce and human centered competencies; (3) professional character, professional identity, professionalism, and service mindset; and (4) service excellence, customer experience, and human-centered service quality. Paired-block searches were used because requiring all constructs in a single query would have excluded studies contributing evidence to only one relationship in the proposed framework (Rethlefsen et al., 2021; Snyder, 2019).

The principal Boolean structure combined terms such as “Hospitality 4.0,” “smart hospitality,” “service automation,” “artificial intelligence in hospitality,” “service robot*,” “technology-mediated service,” “Industry 4.0,” and “Industry 5.0” with “future skill*,” “future competenc*,” “digital competenc*,” “human-centered competenc*,” “emotional intelligence,” “critical thinking,” and “human-machine collaboration.” Additional searches combined “professional character,” “professional identity,” professionalism, “professional identity formation,” “hospitable service mindset,” empathy, integrity, accountability, and “service orientation” with hospitality, tourism, service industries, and high-contact services. A third combination linked “service excellence” and “technology enabled service” with “service quality,” “customer experience,” “human-centered service,” dignity, inclusion, trust, and personalization. Search strings were adapted to the syntax of

each information source, including phrase searching, truncation, title, abstract, keyword fields, language, publication year, and document type filters (Page et al., 2021; Rethlefsen et al., 2021).

Table 1. Distribution of Records Identified by Information Source

Source	Records identified
Scopus	63
Web of Science	15
ScienceDirect	36
Taylor & Francis Online	76
Sage Journals	7
Wiley Online Library	11
Google Scholar and citation searching	87
Total	295

Table 1 outlines the number of records retrieved from each information source included in the review. Before duplicate removal, the search produced 295 records in total. Google Scholar and citation tracking generated the highest number of records ($n = 87$), followed by Taylor & Francis Online ($n = 76$) and Scopus ($n = 63$). ScienceDirect contributed 36 records, while Web of Science, Wiley Online Library, and Sage Journals yielded 15, 11, and 7 records, respectively.

Table 2. Search Strategy, Eligibility Criteria, and Analytical Scope

Component	Specification
Review design	Conceptual article supported by a structured integrative narrative literature review
Sources	Scopus; Web of Science; ScienceDirect; Taylor & Francis Online; Sage Journals; Wiley Online Library; Google Scholar; backward and forward citation searching
Period	January 2019–June 2026; earlier seminal methodological/theoretical sources retained
Inclusion	Peer-reviewed English-language studies; hospitality, tourism, or transferable high-contact service context; substantive relevance to at least one review question; sufficient conceptual or methodological detail
Exclusion	Purely technical studies without service implications; superficial mention of skills/character; non-transferable settings; editorials, conference abstracts, duplicates, unavailable or opaque reports
Quality indicators	Purpose and construct clarity; methodological transparency; theoretical relevance; explanatory contribution; scholarly credibility
Unit of analysis	Definitions, assumptions, findings, proposed relationships, limitations, and HCFS relevance

Table 2 summarizes the methodological boundaries of the review, including its design, information sources, publication period, eligibility criteria, quality indicators, and units of analysis. The review adopted a structured integrative narrative approach to combine conceptual and empirical evidence from hospitality, tourism, and transferable high-contact service contexts. Literature was selected not merely on the basis of journal ranking or citation frequency, but primarily according to construct clarity, methodological transparency, theoretical relevance, explanatory contribution, and relevance to the proposed HCFS framework. The unit of analysis extended beyond study findings to include definitions, assumptions, proposed relationships, limitations, and the contribution of each source to explaining the relationship among Professional Character, HCFS, Hospitality 4.0, Service Excellence, and Human-Centered Service Quality.

3 Eligibility Criteria and Study Selection

Studies were included when they: (1) were peer-reviewed journal articles written in English; (2) were published between January 2019 and June 2026, except for clearly identified seminal sources; (3) were situated in hospitality, tourism, service management, or a transferable high-contact service context; (4) explicitly addressed technology-mediated service, future workforce competencies, professional character or related normative constructs, service excellence, service quality, or customer experience; (5) provided sufficient conceptual or methodological detail; and (6) contributed substantively to construct clarification, relationship development, contextual explanation, or framework construction (Paul & Criado, 2020; Snyder, 2019).

All retrieved records were consolidated in a single screening file. Duplicate records were identified through exact DOI matching followed by comparison of titles, authors, publication years, and journal information. The search identified 295 records, of which two duplicates were removed, leaving 293 unique records for title and abstract screening. A total of 211 records were excluded at this stage, and 82 reports were sought for retrieval. Four reports could not be obtained, leaving 78 full text reports for eligibility assessment. Forty eight reports were excluded for conceptual, methodological, contextual, or publication-related reasons, resulting in a final analytical corpus of 30 core studies. These counts must correspond exactly to the retained screening workbook and the adapted PRISMA 2020 flow diagram (Page et al., 2021; Rethlefsen et al., 2021).

Table 3. Study Selection Flow

Selection stage	Number
Records identified	295
Duplicate records removed	2
Unique records screened	293
Records excluded after title and abstract screening	211

Selection stage	Number
Reports sought for retrieval	82
Reports not retrieved	4
Full-text reports assessed for eligibility	78
Full-text reports excluded	48
Core studies included in the critical synthesis	30

Full-text exclusion reasons were documented in the screening workbook and should be reported in the final PRISMA diagram by category, such as predominantly technical focus without service implications, insufficient relevance to the focal constructs, non-transferable context, superficial treatment of constructs, insufficient conceptual or methodological transparency, and ineligible publication type. No exclusion category should be reconstructed through estimation (Page et al., 2021; Rethlefsen et al., 2021).

Table 4. PRISMA 2020 Reporting Fields Requiring Final Verification

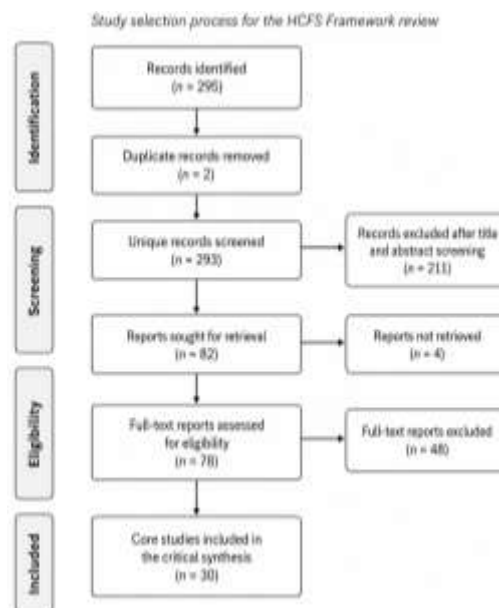


Table 4 summarizes the identification, screening, eligibility assessment, and final inclusion of studies. Of the 295 records initially identified, two duplicates were removed, leaving 293 records for title and abstract screening. A total of 211 records were excluded at this stage, and 82 reports were sought for retrieval. Four reports could not be obtained, leaving 78 full-text reports for eligibility assessment. Of these, 48 were excluded for predefined conceptual, methodological, contextual, or publication-related reasons. The remaining 30 studies formed the final corpus for critical synthesis. The synthesis proceeded through descriptive coding, critical comparison, and explanatory integration, ultimately supporting the proposed

pathway from Professional Character to Human Centered Future Skills, Hospitality 4.0 Service Excellence, and Human Centered Service Quality.

4. Methodological and Conceptual Quality Appraisal

Quality appraisal was conducted to determine the interpretive weight assigned to each source rather than to calculate a pooled quality score. The appraisal was informed by principles for evaluating narrative reviews, including SANRA, and methodological guidance for conceptual research (Baethge et al., 2019; Byrne, 2016; Jaakkola, 2020). Each potentially eligible study was evaluated across six criteria: clarity of purpose, methodological transparency, construct clarity, theoretical relevance, explanatory contribution, and scholarly credibility. Each criterion was classified as adequate, partially adequate, or inadequate. Studies with multiple inadequate ratings were excluded unless they represented seminal theoretical work indispensable to construct definition.

Table 5. Quality Appraisal Criteria

Criterion	Appraisal focus
Clarity of purpose	Explicit statement of the research purpose or conceptual problem
Methodological transparency	Adequate explanation of design, sources, participants, analysis, or conceptual-development procedure
Construct clarity	Clear definition and differentiation of focal and related constructs
Theoretical relevance	Contribution to at least one construct or relationship in the HCFS Framework
Explanatory contribution	Explanation of mechanisms, conditions, relationships, or consequences beyond description
Scholarly credibility	Peer-reviewed status and appropriate engagement with relevant scholarship

5. Data Extraction and Critical Synthesis

A structured extraction matrix recorded author and year, journal and context, study design and sample where applicable, theoretical perspective, focal constructs, construct definitions, key findings, proposed relationships, assumptions concerning technology and human agency, ethical and relational implications, reported limitations, relevance to the review questions, and contribution to the HCFS Framework. Studies were organized into four analytical streams: Hospitality 4.0 and technology-enabled service transformation; future workforce and human-centered competencies; professional character, professional identity, professionalism, and hospitable service mindset; and service excellence, customer experience, and human-centered service quality. The categories were not mutually exclusive, and studies contributing to multiple relationships were cross-coded (Snyder, 2019; Torraco, 2005).

The synthesis proceeded through three stages. Descriptive coding identified recurring concepts, including automation, personalization, communication, digital literacy, adaptability, critical thinking, emotional intelligence, empathy, integrity, accountability, professional identity, human-machine collaboration, service excellence, and perceived service quality. Critical comparison examined convergence and disagreement across the literature streams, inconsistent definitions, conceptual overlap, assumptions of technological determinism, differences between employee and customer perspectives, and the distinction between organizational implementation performance and user-experienced outcomes. Explanatory integration then organized the constructs according to their theoretical functions by asking which construct provides normative direction, which translates values into capabilities, where those capabilities are enacted, what outcome is experienced by users, and which contextual conditions strengthen or weaken the proposed relationships. Concepts were retained because they performed a defensible explanatory role supported across more than one literature stream, rather than merely because they appeared frequently (Jaakkola, 2020; Paul & Criado, 2020; Snyder, 2019; Torraco, 2005).

6. Development of the Conceptual Framework

The HCFS Framework was developed iteratively through construct comparison, boundary clarification, relational mapping, and theoretical refinement. A relationship was retained when it was supported across more than one literature stream, addressed a clearly identified explanatory limitation, and contributed a distinct function to the transition from professional values to service user outcomes. Professional character was positioned as the normative antecedent because empathy, integrity, responsibility, respect, accountability, and service orientation provide direction for professional judgment. Human Centered Future Skills were positioned as the competency mechanism because communication, collaboration, adaptability, digital literacy, critical thinking, emotional intelligence, lifelong learning, and human machine collaboration translate values into context sensitive capabilities. Hospitality 4.0 Service Excellence was positioned as the implementation construct because it concerns how employees and organizations configure, govern, and perform technology enabled services. Human Centered Service Quality was positioned as the user experienced outcome because it reflects whether services are perceived as functional, personalized, dignified, empathetic, inclusive, trustworthy, ethical, and meaningful (Jaakkola, 2020; Paul & Criado, 2020).

The framework incorporates direct, indirect, and conditional relationships. Professional character may influence service user experience directly through respectful, honest, and accountable conduct, while its broader influence in technology mediated service is proposed to operate through competency development and organizational implementation. Organizational culture, leadership, technological maturity, employee discretion, service intensity, emotional sensitivity,

and opportunities for meaningful human intervention were identified as potential boundary conditions. These relationships constitute conceptual propositions rather than empirically confirmed causal effects (Arthur et al., 2021; Crossan et al., 2017; Manfreda et al., 2024).

The model also spans multiple levels of analysis. Professional character and Human Centered Future Skills primarily operate at the employee level; leadership, organizational culture, technology governance, technological maturity, and service excellence operate predominantly at the organizational or service system level; and Human Centered Service Quality is evaluated at the service-user level. Future empirical research should therefore consider multilevel, longitudinal, and mixed-method designs when testing the framework (Crossan et al., 2017; Huang & Rust, 2021; Rožanec et al., 2023).

RESULTS AND DISCUSSION

The results and discussion are structured into seven sections: (1) Human Centered Future Skills Framework; (2) Conceptual Propositions; (3) Theoretical Contributions; (4) Practical Implications; dan 5). Limitations and Future Research;

1. Human Centered Future Skills Framework



Figure 1. Human Centered Future Skills Framework

Figure 1 illustrates the Human Centered Future Skills Framework as a four-stage conceptual pathway linking professional values to service-user outcomes. Professional Character constitutes the foundational antecedent and includes empathy, integrity, responsibility, respect, accountability, and service orientation. These attributes provide ethical direction and shape how hospitality professionals interpret their roles, interact with customers, and use technology. Human Centered Future Skills function as the competency mechanism through which professional values are translated into practice. Communication, collaboration, adaptability,

digital literacy, critical thinking, emotional intelligence, creativity, lifelong learning, and human technology collaboration enable employees to respond effectively to complex and technology-mediated service environments (Arthur et al., 2021; Chaka, 2020; Manfreda et al., 2024).

Hospitality 4.0 Service Excellence represents the implementation stage of the framework. It includes the responsible deployment of artificial intelligence, robotics, the Internet of Things, big data analytics, service automation, and smart service ecosystems. In this model, technology is not treated as an independent determinant of service excellence. Its contribution depends on whether employees and organizations possess the character and competencies required to use it ethically, intelligently, and relationally. Human Centered Service Quality is positioned as the ultimate outcome and is reflected in personalized, empathetic, inclusive, ethical, meaningful, and sustainable service experiences (Buhalis et al., 2024; Huang & Rust, 2021; Li et al., 2021).

The framework proposes a sequential relationship in which Professional Character shapes Human-Centered Future Skills, these skills guide the implementation of Hospitality 4.0 practices, and technology enabled service excellence contributes to Human Centered Service Quality. The dashed feedback pathways indicate that the process is iterative rather than strictly linear. Service experiences, customer feedback, and technological outcomes should continuously reinforce professional character, competency development, and organizational learning. The core philosophy of the framework “technology enhances, but humanity connects” emphasizes that technological advancement creates value only when it is directed by professional ethics, human judgment, empathy, and meaningful interpersonal engagement. These relationships should be understood as theoretical propositions that require subsequent empirical testing rather than as confirmed causal effects (Crossan et al., 2017; Jaakkola, 2020; Rožanec et al., 2023).

2. Conceptual Propositions

The propositions transform the HCFS Framework from a descriptive taxonomy into a testable explanatory model. They clarify that technology does not enter as an autonomous causal force and that the influence of character is neither purely direct nor purely symbolic. Instead, values are proposed to operate through competencies and implementation practices, with organizational and service-context conditions shaping the strength of the relationships (Jaakkola, 2020; Manfreda et al., 2024; Rana et al., 2025).

Table 6. Conceptual Propositions of the HCFS Framework

Proposition	Statement
P1	Professional Character is positively associated with the development and ethical enactment of Human Centered Future Skills.

Proposition	Statement
P2	Human Centered Future Skills mediate the relationship between Professional Character and Hospitality 4.0 Service Excellence.
P3	Hospitality 4.0 Service Excellence is positively associated with Human Centered Service Quality when implementation preserves dignity, empathy, inclusion, and meaningful human intervention.
P4	Professional Character has a direct positive relationship with Human Centered Service Quality in addition to its indirect relationship through HCFS and Service Excellence.
P5	Human centered organizational culture and leadership strengthen the relationship between Professional Character and HCFS enactment.
P6	The positive effect of HCFS on Human Centered Service Quality is stronger in high contact, emotionally sensitive, and high-uncertainty contexts.
P7	Technological maturity improves Service Excellence only when accompanied by responsible digital literacy and effective human technology collaboration.
P8	The relationship between Service Excellence and Service Quality weakens when implementation metrics prioritize efficiency while neglecting dignity and relational needs.

Table 6 converts the HCFS Framework into a set of testable conceptual relationships. Propositions 1– 4 describe the main explanatory pathway, beginning with Professional Character, continuing through Human Centered Future Skills and Hospitality 4.0 Service Excellence, and ending with Human Centered Service Quality. Propositions 5–8 specify the conditions under which this pathway may become stronger or weaker. Human-centered leadership and organizational culture are expected to reinforce the enactment of character, while high-contact and emotionally sensitive contexts increase the importance of human-centered competencies. Technological maturity contributes to service excellence only when supported by responsible digital literacy and effective human–technology collaboration. Conversely, the relationship between service excellence and service quality may weaken when organizations prioritize efficiency while overlooking dignity, empathy, inclusion, and relational needs. Collectively, these propositions position technology as an enabling resource whose value depends on professional character, human capabilities, and ethically grounded implementation.

3. Theoretical Contributions

The first theoretical contribution is the repositioning of Professional Character as the normative antecedent of digitally mediated service capability. Hospitality 4.0 research has largely emphasized artificial intelligence, robotics, automation, smart environments, and data driven personalization. The HCFS Framework extends this literature by arguing that technological capability alone does not determine whether service is ethical, empathetic, or human-centered.

Empathy, integrity, responsibility, respect, accountability, and service orientation provide the moral direction through which professional judgment and technological discretion are exercised (Arthur et al., 2021; Crossan et al., 2017; Huang & Rust, 2021).

The second contribution is the conceptualization of Human Centered Future Skills as the mechanism that translates professional values into observable capabilities. Communication, collaboration, adaptability, critical thinking, emotional intelligence, digital literacy, lifelong learning, and human technology collaboration are not treated as value neutral skills. Their contribution depends on whether they are enacted transparently, responsibly, and in ways that preserve dignity and informed choice. This reframing connects future skills scholarship with professional character and explains how values become actionable in complex technology mediated encounters (Chaka, 2020; Flores et al., 2020; Nguyen Ngoc et al., 2022).

The third contribution is the conceptualization of human technology collaboration as a professional and ethical competence rather than merely a technical allocation of tasks. Effective collaboration requires employees to understand technological capabilities and limitations, evaluate algorithmic recommendations, communicate technology assisted decisions, accept responsibility for their consequences, and intervene when automated outputs conflict with contextual or ethical needs. This extends sociotechnical and service-robot research by placing human judgment, accountability, and relational competence at the center of digital service transformation (Huang et al., 2021; Rožanec et al., 2023; Wirtz et al., 2018).

The fourth contribution is the distinction between Hospitality 4.0 Service Excellence as an implementation construct and Human Centered Service Quality as a user experienced outcome. Service excellence concerns how effectively organizations configure, govern, and perform technology enabled service, whereas service quality concerns how that performance is perceived in terms of functionality, dignity, empathy, inclusion, trust, and meaningfulness. This process outcome distinction explains why technologically mature and operationally efficient services may still be experienced as impersonal, intrusive, inaccessible, or insensitive (Li et al., 2021; Lin & Mattila, 2021; Rana et al., 2025).

Taken together, these contributions establish a multilevel antecedent, mechanism, implementation, outcome architecture. Professional Character and Human Centered Future Skills primarily operate at the employee level; leadership, organizational culture, technology governance, and service excellence operate mainly at the organizational or service-system level; and Human Centered Service Quality is evaluated by service users. The framework incorporates direct, indirect, conditional, and feedback relationships, thereby moving human centeredness from a broad normative aspiration to a differentiated and empirically testable theoretical system (Jaakkola, 2020; Paul & Criado, 2020; Rožanec et al., 2023).

4. Practical Implications

For hospitality education, the framework suggests that digital competence should be taught through ethically and relationally complex scenarios rather than isolated technical exercises. Curricula should integrate responsible AI use, privacy, algorithmic bias, empathic digital communication, escalation decisions, culturally responsive service, and reflective practice. Assessment should examine whether learners can justify when and how technology should be used, not only whether they can operate it (Chaka, 2020; Ikenga & van der Sijde, 2024; Manfreda et al., 2024).

For recruitment and workforce development, organizations should move beyond separate assessments of personality and technical skill. Selection, simulation, and training should examine whether employees can translate empathy, integrity, and accountability into digital judgment, service recovery, and human–technology collaboration. Reflective debriefing, customer journey analysis, and user feedback are especially valuable because character is expressed through context-sensitive judgment rather than declarative knowledge alone (Mount et al., 2022; Manfreda et al., 2024).

For leadership and technology governance, human-centeredness cannot be delegated solely to frontline employees. Leaders determine performance indicators, staffing, data governance, escalation pathways, technology procurement, and the degree to which employees may override automated recommendations. If speed, cost, and automation dominate evaluation, even employees with strong character may be structurally constrained from providing human centered service (Buhalis et al., 2024; Fornells Herrera et al., 2024; Xu et al., 2023).

For quality management, organizations should measure Service Excellence and Human-Centered Service Quality separately but examine their relationship. Internal indicators such as response time, error rate, automation reliability, escalation, and recovery should be compared with user reported dignity, trust, emotional recognition, inclusion, and perceived fairness. Divergence between the two sets of measures identifies where technically successful implementation is failing experientially (Larivière et al., 2025; Rana et al., 2025).

5. Limitations and Future Research

This study is conceptual and does not empirically establish causal direction or effect size. The framework integrates heterogeneous literature from hospitality, tourism, service research, workforce competence, professional identity, and related high-contact service sectors. This breadth supports explanatory integration but may conceal sector specific variation. The screening record also requires final verification of title/abstract and full text exclusions before submission, and the PRISMA diagram should be completed using actual rather than estimated counts (Page et al., 2021; Rethlefsen et al., 2021).

Future research should develop and validate measures for Professional Character, HCFS, Hospitality 4.0 Service Excellence, and Human-Centered Service Quality. Structural equation modeling could examine direct and indirect pathways; longitudinal designs could test whether character-oriented education produces sustained changes; and multilevel studies could investigate how leadership, ethical climate, and technology governance shape individual enactment (Jaakkola, 2020; Manfreda et al., 2024).

Comparative studies across hotels, tourism, healthcare, education, public service, and social services can identify which relationships are generalizable and which depend on contact intensity, vulnerability, culture, or technological maturity. Qualitative research is also needed to examine moments when values, competence, and technology conflict, such as when automated recommendations contradict employee judgment, privacy limits personalization, or efficiency competes with emotional care (Khoa et al., 2023; Rana et al., 2025; Xu et al., 2023).

CONCLUSION

The progression of artificial intelligence, robotics, service automation, and intelligent service ecosystems has expedited the advent of Hospitality 4.0, revolutionizing service sectors via improved efficiency, personalization, and customer experience. This transition engenders a technology-humanity contradiction, wherein escalating technical complexity concurrently heightens the demand for genuine, compassionate, and human centered services.

This study synthesizes the hitherto disparate fields of Hospitality 4.0, Future Skills, and Professional Character via a conceptual paper underpinned by a narrative literature review. The results demonstrate that effective digital transformation necessitates both technological competencies and Human Centered Future Skills, such as communication, collaboration, adaptability, digital literacy, critical thinking, emotional intelligence, lifelong learning, and human-technology collaboration.

This study posits that these qualities are fundamentally based on Professional Character, which includes empathy, integrity, responsibility, respect, accountability, and service orientation. These ideals constitute the ethical framework that directs the implementation of future skills in digitally enabled service contexts.

This synthesis leads to the proposal of the Human Centered Future Skills Framework (HCFS Framework), which identifies Professional Character as the precursor of Human Centered Future Skills, facilitating Hospitality 4.0 Service Excellence and ultimately enhancing Human Centered Service Quality. The framework enhances the literature by transitioning the emphasis from technology-centric service innovation to a human centered perspective. Future research should empirically test the framework and create measurement tools for its essential components across other service industries.

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