A network analysis of cross-occupational skill transferability for the hospitality industry

Arthur Yan Huang and Tyler Fisher
Rosen College of Hospitality Management, University of Central Florida, Orlando, Florida, USA

Huiling Ding
Department of English, North Carolina State University, Raleigh, North Carolina, USA, and

Zhishan Guo
Department of Electrical and Computer Engineering, University of Central Florida, Orlando, Florida, USA

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Abstract

Purpose – This paper aims to examine transferable skills and viable career transition pathways for hospitality and tourism workers. Future career prospects are discussed, along with the importance of reskilling for low-wage hospitality workers.

Design/methodology/approach – A network analysis is conducted to model skill relationships between the hospitality industry and other industries such as health-care and information technology. Multiple data are used in the analysis, including data from the US Department of Labor Occupational Information Network (O*NET), wage data from the Bureau of Labor Statistics and job computerization data (Frey and Osborne, 2017).

Findings – Although hospitality workers have lower than average skills scores when compared to workers from other career clusters included in the analysis, they possess essential soft skills that are valuable in other industries. Therefore, improving hospitality workers' existing soft skills may help them enhance their cross-sector mobility, which may allow them to obtain jobs with a lower likelihood of computerization.

Practical implications – The findings shed light on workforce development theories and practice in the hospitality industry by quantitatively analyzing cross-sector skill correlations. Sharpening transferable soft skills will be essential to enhancing hospitality workers' career development opportunities.

Originality/value – To the best of the authors' knowledge, this is the first study that specifically examines the skill taxonomy for the hospitality industry and identifies its connection with other in-demand career clusters.

Keywords Transferable skills, Employability, Network analysis, Career mobility, Career transition, Career agility

Paper type Research paper

1. Introduction

The COVID-19 pandemic has disrupted the global labor market. In the USA alone, tens of millions of workers experienced layoffs and furloughs in March and April of 2020 and sought employment and job adaptations (Stevenson, 2020, p. 2). Autor and Reynolds (2020)

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project economic restructuring changes stimulated by COVID-19, which cast differential impacts on workers from different industries (Earl *et al.*, 2019). Low-wage service workers are among the hardest hit because of their lack of employment access and reliance on contingent arrangements for income (Remeikis, 2020; Stevenson, 2020). While the job market has started to recover since April 2020, the employment levels have still been behind the pre-pandemic levels (US Bureau of Labor Statistics, 2020a, 2020b).

Before the COVID-19 pandemic, many service jobs in the hospitality and tourism industry have already faced a high risk of computerization (Frey and Osborne, 2017). COVID-19 has accelerated the job automation process. For instance, restaurants had to turn to new technologies such as mobile/online ordering, scan-and-go systems, third-party delivery systems, cybersecurity and similar technologies to continue operations (Ben-Achour, 2020; Cansler, 2021; WARC, 2020). Jobs in the accommodation and food service subsector are predicted to have a 73% likelihood of automation (Manyika *et al.*, 2017). Home quarantines led to shoppers' increasing reliance on mobile/online ordering, which might have resulted in the decline of frontline employees (Rockeman, 2020). With artificial intelligence (AI) technologies such as robotics and machine learning capable of automating repetitive tasks, jobs with high levels of routine (e.g. sales managers, receptionists, customer service agents) are more likely to be substituted by AI (Bowen and Morosan, 2018). Given the disruption of workflows caused by AI, it is imperative for workers, particularly those whose job positions have a high likelihood of automation, to actively prepare themselves for upskilling and reskilling for the future of work.

1.1 Upskilling and reskilling in accelerating automation: increasing needs and challenges

A growing body of research has been published on workers' upskilling and reskilling. While upskilling focuses on learning new skills for performance improvement or promotion in the same profession, reskilling requires learning entirely new skills for career changes or role shifts in response to technological innovation or organizational changes (Lout, 2020; Sherwin, 2021). Research shows that over half of American workers need to continually improve their skills to have a successful career (Pew Research Center, 2016). Service workers face more significant barriers in upskilling due to their lack of basic literacy, numeracy and digital problem-solving skills (Bergson-Shilcock, 2017). Thus, hospitality and tourism service employees fall short of employers' soft skill expectations (Singh and Jaykumar, 2019). As an essential skill to have now, technological literacy will become increasingly important as technology infiltrates many, if not all, aspects of jobs. Workers will most likely be required to use programs or hardware that may not even exist when hired. As a result, workers must improve their technical skills to adapt to digital innovations in the future (Next Tourism Generation Alliance, 2019, p. 66).

New technologies such as AI and robotics can potentially help create 133 million new jobs (Milano, 2019; World Economic Forum, 2020). These technologies have led to the disappearance or alteration of traditional occupations, the emergence of new ones and a widening digital skills gap (Milano, 2019). Technologies can lead to "permanent scarring" in the labor market, as job tasks are increasingly automated (Stevenson, 2020). For workers who lose jobs due to automation, it would be critical that they are sufficiently prepared to find new employment within one year because research has shown that being out for work for longer than one year can negatively impact long-term economic growth and wage growth (Manyika *et al.*, 2017). However, only 28% of hospitality workers receive short-term or above training (Pew Research Center, 2016). To remain competitive and employable, workers will have to engage in lifelong learning, often through

self-initiated and self-regulated pursuit of in-demand knowledge and skills (London, 2011; Cliath *et al.*, 2000).

To empower low-skilled workers in this increasingly volatile labor market, it is vital to identify the skills that help enhance employability across industries. Hospitality workers will benefit from knowing whether such skills are associated with salary increases and how such skills are interrelated with other industries to facilitate across-industry occupational changes. On the one hand, the hospitality industry should invest more in human resources development to support sustainable employment (Chang and Busser, 2020; Golubovskaya *et al.*, 2019; Shulga and Busser, 2019). On the other hand, hospitality workers should seek work opportunities in alternative industries when external shocks threaten their financial stability amid rapid labor market changes. This research will identify skills that can facilitate occupational shifts across industries.

1.2 Careers and skill relationships in a changing labor market

With college costs rising, higher education has been disrupted by online learning, massive online open courses and the rise of micro-credentials based on short-term training as an alternative to traditional degrees (Gallagher, 2018). Skill-centered pre-hire assessment technologies use natural language processing to identify skills in resumes, which allows micro-credentials and skills to play increasingly important roles in job searches, particularly for jobs that do not require college degrees (Bersin, 2017b; Ding, 2020; Milord, 2019). Emphasizing skill-based hiring has risen as a new norm (Reddy, 2020). To keep non-credentialed workers competitive in today's job market, increasing attention has been paid to skills, credentials, assessment or tests for short-term, non-degree certificates (Whiting, 2019).

Driven by accelerating technological changes, work and careers have evolved. Instead of having stable, lifelong careers, today's workers have an average of four-year tenure in individual jobs and can work eight to ten different jobs before retiring in their mid-60s (Bersin, 2017a). According to the Bureau of Labor Statistics, in January of 2020, workers in business management had the highest median tenure (4.9 years). In contrast, service workers (2.9 years), workers in leisure and hospitality (2.3 years) and food service workers (1.9 years) had the lowest tenure across industries (Bureau of Labor Statistics, 2020). Moreover, since 86% of workers in the leisure and hospitality industry hold nonsupervisory occupations (Bureau of Labor Statistics, 2021), they might not spend their entire career in one company or within the same industry.

It is crucial for hospitality workers to identify knowledge and skills to explore in-demand skilled jobs across industries. Fortunately, hospitality workers have existing skills applicable to other sectors (Martins *et al.*, 2020, p. 2). Transferable skills that service industry workers already have can help them transfer into fast-growing health-care and IT sectors, which are projected to grow 33% and 10%, respectively, between 2018 and 2028 (Rodriguez-Montemayor, 2018). Frontline jobs in health care (e.g. nurses, nursing aides, receptionists) and IT (helpdesk, customer service) require transferable skills such as effective communication with patients/clients, empathy, organizational skills (e.g. precision in documenting data) and digital skills (e.g. capturing, managing and retrieving data). In addition, despite the long-held assumption that frontline jobs face limited career advancement opportunities (Frank *et al.*, 2006), current documented practices indicate the existence of career pathways for career opportunities in healthcare (CarrerSTAT, 2017) and IT industries (Western Governors University, 2020). Therefore, this project aims to analyze critical skills to help hospitality workers with successful job transitions to the health-care and IT industries.

How can workers reskill or upskill toward career opportunities with greater job security and higher pay? This important and complex question has profound implications on equity of opportunities, social mobility and shared prosperity (Rodriguez-Montemayor, 2018; Martin *et al.*, 2016; Ross and Bateman, 2018; Qureshi, 2019) and calls for multi-sector, interdisciplinary solutions. While many scholars have investigated skill development within individual occupations, few studies have examined workers' career advancements and transitions. Current work arrangements (e.g. non-contingent arrangements, on-demand jobs) in the hospitality industry do not support frontline workers' financial stability (De la Mora Velasco *et al.*, 2021; Huang *et al.*, 2021). Therefore, hospitality workers need support to prepare for cross-industry career jumps. No clear theoretical framework exists, however, which can assist hospitality workers in transitioning to in-demand industries.

This study applies data analytics to uncover cross-sector occupational relationships to support hospitality workers' career transitions. A critical database in the context of reskilling and upskilling is the Occupational Information Network (O*NET), which is one of the most comprehensive and publicly available databases about job requirements and descriptions (Karakatsanis *et al.*, 2017). This study conducts network analysis to examine the relationships between career skills to pinpoint suitable career paths for hospitality workers. To the authors' knowledge, this is the first time that skill network analysis is conducted for hospitality workers to explore viable cross-sector career pathways. The results have implications on public policy and business strategies that support hospitality workers' career transitions to foster social mobility.

The following section reviews existing literature on hospitality workers' career transitions before developing four hypotheses and testing based on the O*NET data. The study identifies overlapping skills required by the hospitality, healthcare and information technology industries.

2. Literature review

A literature review was conducted to provide empirical and theoretical underpinnings for cross-industry career transitions. EBSCOhost's and Gale OneFile's hospitality and tourism databases were searched using the following keywords in published abstracts: "upskill," "reskill," "career transition," "O*NET," "automation," "computerization," "COVID-19," "pandemic," "career agility," "career advancement," and "continuing education." A total of 62 articles were identified. The following subsections review the relevant and recent literature.

2.1 Transferrable skills in career transitions

Research has developed taxonomies for career transitions. Heppner (1998) identified three types of career transition, namely, task change or "a shift from one set of tasks to another set within the same job and same location" (p. 137); position change, i.e. "a shift in jobs, with the same employer or to a different employer or location, but with only a slight shift in job duties (e.g. a secretary moving to a different department within the same company)" (p. 137); or occupation Change, i.e. "a transition from one set of duties to a different set which might include a new work setting (e.g. a farmer becoming a factory worker)" (p. 137). As a unique type of career transition, cross-industry transfers refer to moving from one industry (such as hospitality and tourism) to another (such as health care). Limited research has been conducted on workers' cross-sectoral career changes (Snell *et al.*, 2016; Szivas *et al.*, 2003), mainly related to the hospitality and service sectors. Szivas *et al.* (2003) focus on the inflow of workers to the service sector from other industries. Snell *et al.* (2016) discuss how, for workers, a better understanding of possible ways to identify and improve their transferrable

skills can support their transition to new jobs. However, further examinations are needed to understand the instrumental skills for career transitions to specific career clusters.

While developing and improving skills has been a part of many workers' careers, "pandemics [such as COVID-19] increase the need for sector-transferable skills and sector-mobile workers" (Martins *et al.*, 2020). For example, during the COVID-19 pandemic, temporary workers have been hired from different sectors to work in essential jobs, which makes the concept of cross-industry mobility highly relevant (Baum *et al.*, 2020). Snell *et al.* (2016) indicate that transferable skills are cultivated through formal and informal training and learning to perform occupation-specific tasks. Martins *et al.* (2020) argue that workers with transferable skills have greater flexibility to meet demand from different industries. Both Snell *et al.* (2016) and Martins *et al.* (2020) suggest that cross-industry career mobility can be enhanced by creating clusters of workers with similar skills. With the adequate adaptation of shared skills, workers become more competitive with greater career mobility (Alabdulkareem *et al.*, 2018).

2.2 Soft skills, learning agility and possible roles in career transitions

Numerous studies have defined soft skills and underlined their critical role for career transitions. O*NET describes soft skills as "developed capacities that facilitate learning or the more rapid acquisition of knowledge" (O*NET Skills, 2020). Soft skills are defined as "non-job-specific skills relating to an individual's ability to operate effectively in the workplace" (Snell *et al.*, 2016). Some authors even consider soft skills as a "mindset" (Tsey *et al.*, 2018). Much attention has been paid to soft skills and their importance for various careers (Keevy, 2016; Viswanathan, 2009; Anthony and Garner, 2016; Pulko and Parikh, 2003; Tsey *et al.*, 2018; Yadin, 2012; Ritter *et al.*, 2018; Sasirekha and Jayalakshmi, 2016; Freitas and Routledge, 2013; Ibrahim *et al.*, 2017; Vetráková *et al.*, 2019). Vetráková *et al.* (2019) find out that, when evaluating job candidates, leaders in the hotel industry rank soft skills much higher than other skills taught on the job, which confirms the importance of soft skills to both employers and employment assistance agencies. Soft skills can be classified into five areas: personal effectiveness, relationship and service skills, impact and influence skills, achievement skills and cognitive skills (Snell *et al.*, 2016). "Generic and independent of job or industry," soft skills play an essential role in supporting career transitions (Tsey *et al.*, 2018).

Transferrable soft skills have attracted increasing attention. For example, through the analysis of over 150 million unique online job postings in the USA, Project Lead The Way (www.pltw.org/) and Burning Glass (www.burning-glass.com/) identify six transferrable soft skills most demanded and valued by the labor market across industries, which are communication, collaboration, creative and critical thinking, problem-solving, customer service and organizational skills. Similarly, the US Department of Labor identifies six transferrable soft skills: communication, enthusiasm and attitude, teamwork, networking, problem-solving and critical thinking and professionalism (US Department of Labor, 2012). Economic Modeling Inc., or Emsi, a talent analytics company, groups these skills as "human skills," which are as crucial as "technical skills" (Burrow, 2020). As tacit knowledge resisting direct instruction or rote memorization, the transferable skills identified above align well with learning agility (e.g. curiosity, openness, flexibility, vision, innovation, willingness to learn and high tolerance ambiguity) (Eichinger and Lombardo, 2004). Gravett and Caldwell (2016) identify four types of learning agility: mental agility, people agility, results agility and change agility, which can be developed by enhancing verbal abilities, visual/spatial abilities, intrapersonal skills and interpersonal skills. These skills can serve as a good starting point to examine possible ways to prepare workers for career shifts by identifying and

strengthening existing transferrable skills developed and used in their current jobs while helping them cultivate new skills. Therefore, the first hypothesis is as follows:

H1. Focusing on soft (or non-technical) skills will allow hospitality and tourism employees to transfer more easily to other in-demand sectors.

Service jobs, particularly those in the hospitality industry, are often considered "low skill" because of their limited technical requirements (Walmsley *et al.*, 2020; Williamson, 2017). Lacking basic skills, service workers suffer from lower wages and instability in employment (Bergson-Shilcock, 2017, p. 14). Constrained by their limited level and skills, service workers can suffer from a skills gap when searching for jobs in other sectors. Meanwhile, employers have recognized the need for upskilling and reskilling their workers. For example, a survey of executives from companies with more than $100m in annual revenues reveals that over 80% believe that retraining and reskilling are essential for addressing the skills gap (Illanes *et al.*, 2018). Therefore, the second hypothesis is as follows:

H2. Improving technical and systems skills will enhance hospitality and tourism workers' ability to transition to other in-demand sectors.

Despite skill gaps, some service employees do not consider training and skill development essential to their future work life (Pew Research Center, 2016). Over half of service workers have no post-secondary education (Vetráková *et al.*, 2019; Fitzpayne *et al.*, 2017). Almost 90% of low-skill workers have no more than a high school diploma (Bergson-Shilcock, 2017, p. 11). Finding the right training program for these workers can support their career transitions (Ross and Bateman, 2018). Although community colleges and vocational schools are vital in providing workforce retraining, only 14% of community college students move on to a four-year college for further education (Jacoby, 2018). To help workers acquire marketable skills, two-year colleges should work with employers to better align the educational offerings with the labor market needs and to help cultivate in-demand skills (Jacoby, 2019).

Complementing traditional two-year or four-year college degrees, certificate programs and short-term credential programs receive increasing attention in workers' reskilling and upskilling (Jacoby, 2019). More and more workers are looking for courses not necessarily related to a degree but specialized enough to help them move up their career ladders (Jacoby, 2018). Besides, other informal training outside of degrees and certificates may be more likely to be financially supported by their employers (Bergson-Shilcock, 2017). Adult workers participating in training programs are at least 7% more likely to have full-time employment and a higher income, even if they do not complete a degree or a certificate program (Strada Education Network, Gallup, Inc., and Lumina Foundation, 2019). Earning credentials would also help workers expand their career opportunities within and across industries (Bergson-Shilcock, 2017). The third hypothesis is as follows:

H3. Increased skill levels will see associated wage increases.

With increasing automation and a quickly changing labor market, skill gaps are expected to grow (Milano, 2019). To be career agile, workers have to "adapt to technological change and engage in continuous learning" (Coetzee *et al.*, 2020, p. 2). The three critical elements for career agility include technological adaptability, learning agility and career navigation (Coetzee *et al.*, 2020). Technological adaptability correlates with organizational needs for technical capital and the increasing prominence of digital literacies as a core workplace skill (Coetzee *et al.*, 2020). Learning agility refers to the ability to learn from experiences and

apply the learned lessons to new situations, which can improve work performance and career transition (Lombardo and Eichinger, 2000; Bedford, 2011; Dries *et al.*, 2012; Dai *et al.*, 2013; Kaiser and Craig, 2005). Gravett and Caldwell (2016) identify four types of learning agility along with required skills: mental agility (openness, curiosity, willingness to learn and experiment), people agility (self-knowledge, flexibility and people skills), change agility (high tolerance of ambiguity, adaptability) and results agility (resourcefulness, vision and innovation) (Eichinger and Lombardo, 2004; Hallenbeck, 2016). It is worth noting that employees with learning agility can contribute to organizational agility by developing improved processes while cultivating a learning-agile culture, a key differentiator of high-performing organizations (Gravett and Caldwell, 2016). These learning agility skills correlate strongly with four learning capacities needed to enable lifelong learning, a key driving factor for upward social mobility: resilience, resourcefulness, reflectiveness and reciprocity (Claxton, 2002). Career navigation plays a critical role in individual attempts to advance or transition in careers. It refers to the individual willingness and ability to explore the business environment to take advantage of new career opportunities that fit their preferences and skills (Coetzee *et al.*, 2020). It requires self-knowledge, understanding of conditions and requirements of jobs of interest, active pursuit of new career opportunities, implementation of plans for career advancements, career transitions and lifelong learning (ACT, 2020).

To move across industries without retraining or reskilling is challenging, particularly for low-skilled workers (Snell *et al.*, 2016, p. 8). Having sector-transferable skills will help them both withstand external shocks (such as the COVID-19 pandemic) in their current industries and change careers across industries (Martins *et al.*, 2020). Workers and employers must understand how improving these transferrable skills would enable workers to move between jobs and across industries (Snell *et al.*, 2016). In the following section, the O*NET data is analyzed to demonstrate how the hospitality industry's skills overlap with various growing industries such as health care and information technology and examine the hypotheses.

3. Data

This research gains insight from three publicly available occupational databases: O*NET Skill Data, Job Wage Data and Job Computerization Data.

3.1 Occupational information network skill data

O*NET is one of the most comprehensive skill taxonomy databases and a primary source of occupational information in the USA (www.onetonline.org/). This database covers work performed in the US economy and defines the occupations for which data is collected.

The O*NET system documents and regularly updates specific job-level data for over 900 different job titles. This research's primary data focus on three aspects: jobs skills, job zones and career clusters. While workers' competency includes skills, knowledge and abilities, we decided to focus on skills because of the increasing shift to skill-based hiring practices. Skills are closely connected with job descriptions and represent what workers can focus on to prepare for job requirements based on the O*NET database. In addition, skills described in the O*NET system are easily understandable to the public (e.g. "active listening"), which provides better clarity for analysis. The skills data from jobs analyzed in this study range from June 2010 to August 2020 (the most recent version of when the paper was written). A unified data table is developed based on jobs skill importance values, job zones and career clusters.

3.2 Job wage data

The job wage data was obtained from O*NET and Wage Estimates databases from the US Bureau of Labor Statistics website, with the latter most recently updated in May 2019 (US Bureau of Labor Statistics, 2019). The original database includes over 800 occupations using the Standard Occupational Classification (SOC) System. For the jobs that do not have a mean annual wage listed, the annual mean wages are calculated by multiplying the hourly wage multiplied by 2,080 h (annual full-time working hours). This method is consistent with other annual estimates (US Bureau of Labor Statistics, 2019).

Hospitality workers face numerous career challenges such as, transportation, childcare, financial barriers, time commitment, the need to keep current jobs while being retrained and the cognitive and emotional workload of coursework (McDaniels, 2017). This study focuses on the long-term career shifts that hospitality workers may consider in response to automation, skill gaps and governmental funding for tuition-free college for non-degree workers (Miller-Adams, 2020). For this population, mean wages can serve as an indicator for motivating workers to persevere in their retraining endeavors to achieve financial prosperity.

3.3 Job computerization data

The job computerization data was obtained from Frey and Osborne (2017). The authors estimated the probability of computerization for 702 occupations from the O*NET database by integrating machine learning-based evaluations and experts' assessments. The following variables associated with jobs are used to estimate the likelihood of job computerization (between 0 and 1): perception and manipulation, creative intelligence and social intelligence.

4. Methodology

The three databases are merged based on the SOC code and job titles. After compiling all three data sets in one workbook, formulas were created to compare job skills against each other in a cross-tabular format; this workbook is also used as the foundation for further analysis and visual representation of the data. Finally, a graph-based network analysis investigates the connections between jobs and career clusters based on shared skills. The skill network visualization provides direct insight for identifying patterns and relationships between jobs across career clusters. It took nine weeks to complete the literature review, data formatting and data cleaning for the analysis, followed by seven weeks of data analysis and data visualization.

4.1 Skills

O*NET includes 35 skills for individual jobs and assigns a point value to each skill based on the Importance (IM) and Level (LV). In this section, data and comparisons presented are based on the Importance (IM) rating of the skill. The data value of individual skills is converted to a 100-point scale (0 being not important and 100 being extremely important) based on a formula provided by O*NET (O*NET OnLine, 2020). Skills are considered necessary for a job if they rank 50 or above on the 100-point scale (O*NET Skills, 2020). The 35 skills are gathered in six major categories, i.e. basic skills, complex problem-solving skills, resource management skills, social skills, systems skills and technical skills (O*NET Skills, 2020).

4.2 Job zones

Job zones are assigned based on the education, experience and training necessary to perform the job (O*NET OnLine, 2020). They are ranked on a one-to-five scale, with one requiring little or no preparation and five requiring extensive preparation (O*NET, 2020). Regarding education, O*NET states that most jobs in Job zone 3 or higher require education beyond a high school diploma, such as vocational training or post-secondary degrees.

4.3 Career clusters

Career clusters are defined as "occupations in the same field of work that require similar skills" (O*NET OnLine, 2020). O*NET identifies 16 career clusters overall, but this paper focuses on data from five representative career clusters: hospitality and tourism (44 jobs); information technology (25 jobs); health science (105 jobs); transportation, distribution and logistics (71 jobs); and business administration (71 jobs).

4.4 Jobs by career cluster and job zone

Figure 1 shows the distribution of jobs by cluster and job zone. Out of the selected clusters, only the hospitality and tourism cluster have jobs in Job zone 1, with the majority of all jobs falling into Job zone 2. Health science has slightly under 50% of its jobs being in Job zone 5, accounting for over 90% of all jobs in Job zone 5 for this study. This is notable in terms of the potential for upward mobility for hospitality and tourism careers. The hospitality and tourism industry has only two jobs in Job zone 4 and none in Job zone 5. This high

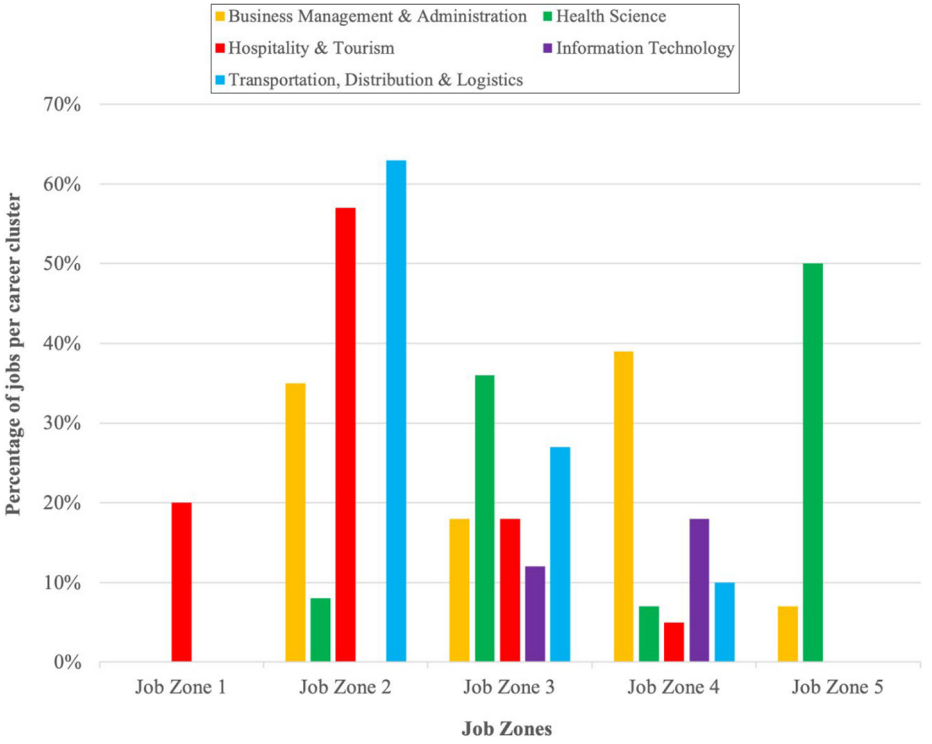

Figure 1.
Percentage jobs by career cluster and job zone

concentration in low job zones indicates that hospitality workers seeking career growth will eventually have to either transition to other career clusters or pursue additional training for career development within the hospitality and tourism sector.

4.5 Mean annual wage

Mean average wages by career cluster and jobs are calculated. Mean wages rise steadily as the corresponding job zone increases. The mean wage for all jobs in this analysis is about $75,000. Out of all career clusters, the health science cluster has the highest mean wage overall at $98,143. Information technology comes second with a mean wage of $95,184. Hospitality and tourism wages are at the bottom at $35,536, over $20,000 below the next closest cluster (transportation, distribution and logistics) at $57,172. Business management and administration is closest to the overall mean at $76,847. Figure 2 illustrates the number of jobs for each career cluster broken out by the annual mean wage bin (grouped in $10,000 bins). 145 out of 247 jobs have mean wages under $60,000. The majority of jobs with a mean wage of $100,000 or above are in health science and business management and administration clusters. The hospitality and tourism cluster has no jobs with $100,000 or above wages, and only 3 out of 41 are $60,000 or above. By contrast, information technology has no jobs below the $50,000 wage.

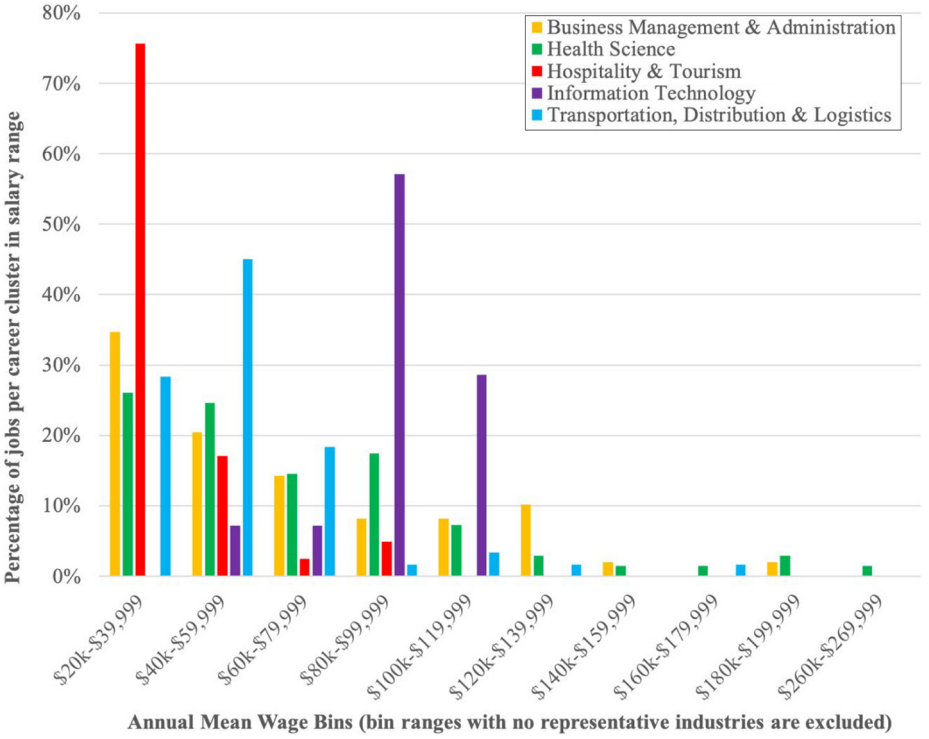

Figure 2.
Number of jobs by career cluster and annual mean wage bin

5. Findings

5.1 Soft skills and cross-sector career transferability

The analysis supports that basic and social skills (soft skills) for the hospitality and tourism cluster have closer scores to health science and information technology clusters than other skill groups (*H1*). Some clear trends emerge when ranking all skills from high to low by importance for these five clusters. Active listening is the top skill for 4 of 5 career clusters, except information technology (ranked 3rd). All career clusters share the same top ten skills: active listening, speaking, critical thinking, reading comprehension, monitoring, social perceptiveness, judgment and decision-making, coordination, complex problem solving and writing. The average score of each skill varies by career clusters, and workers should focus on the top skills to increase their cross-cluster mobility.

Figure 3 shows the mean value of each skill group by career cluster. Among all career clusters, hospitality and tourism jobs have the lowest means in all skill groups except for social skills. Compared with other clusters examined, the most significant discrepancies that hospitality and tourism jobs seem to face are in systems and technical skills, in which these jobs are rated the lowest. As the most significant skill gap that hospitality and tourism workers may face in career transitions, technical skills can be cultivated through targeted technical training to prepare workers for their desired industries. Basic and social skills are

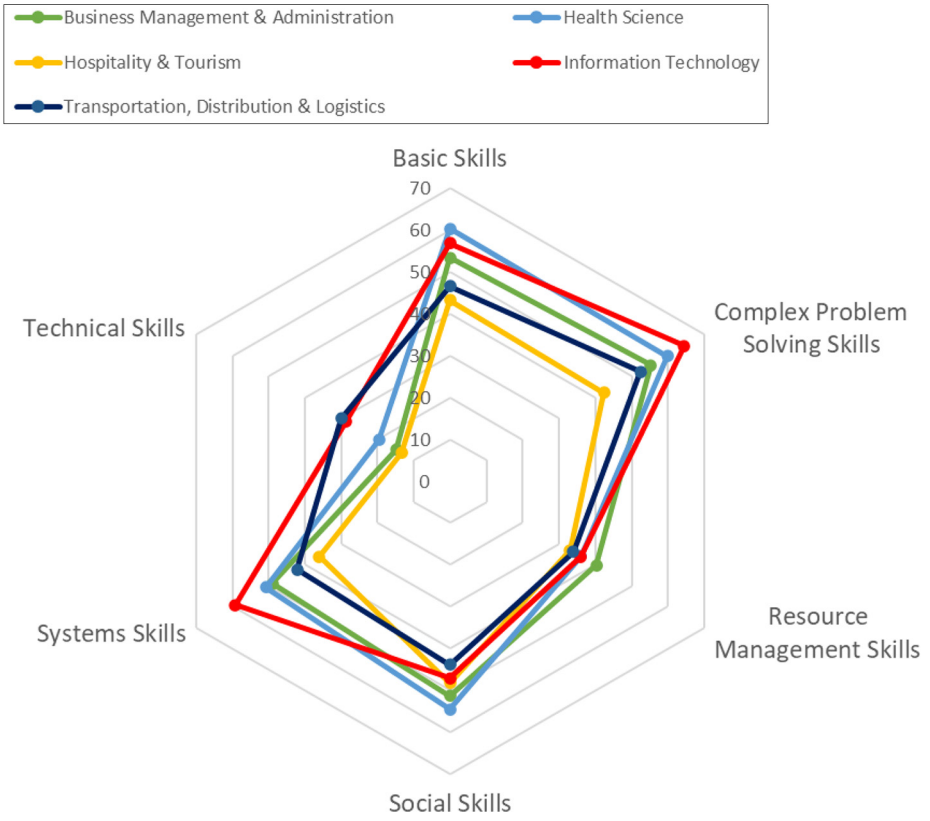

Figure 3.
Mean skill scores of skill groups by career cluster

the two highest mean skill groups in the hospitality career cluster, which workers should leverage in transition to other career clusters.

Synchronous upward movements for some skill groups when incorporating the career clusters in the job zone, skill groups and the mean skill scores are identified. In the hospitality and tourism cluster, all skill groups except technical skills move steadily upwards with each other. While social skills remain the top skill group across the four job zones, complex problem-solving skills are the second most crucial skill group in Job zone 4. In the business management and administration cluster, the technical skill group is a low outlier, along with resource management skills. In contrast, the other four skill groups are closely grouped. Like the hospitality and tourism cluster, complex problem-solving skills become increasingly important as the job zone rises and are ranked the most important for Job zones 4 and 5. Health science follows a similar pattern, with closely grouped basic skills, complex problem-solving skills, social skills and systems skills. Resource management skills and technical skills, in contrast, are placed at the bottom. Basic skills and complex problem-solving skills in health science maintain the highest mean scores for Job zones 3, 4 and 5. The information technology cluster tends to have a wide separation among all its skill groups: complex problem-solving skills have the highest mean score, whereas resource management skills and technical skills report the lowest scores. Next, skill group means and medians are examined for only Job zones 1–3 for the clusters. While hospitality and tourism still lag in technical skills and systems skills, other skill groups (e.g. social and resource management skills) are comparable to other clusters.

5.2 Technical and systems skills and cross-sector career transferability

The data partially support that improving technical and systems skills will most effectively enhance hospitality and tourism workers' ability to transition to other in-demand sectors (*H2*). As shown in Figure 4, out of the five career clusters examined, the hospitality and tourism cluster has the lowest mean annual wage for Jobs in zones 1, 3 and 4. Job zone 1 only has jobs from the hospitality and tourism cluster. Overall, mean skill scores rise steadily before plateauing in the $70k–$140k range. Then the scores rise and plateau again in the $150k–$260k range. This indicates that improving skills will help improve wages steadily up to $70k annual mean wages, at which point there is a minimal variance of mean skill scores as wages rise. This study identifies slightly different wage ranges that skill scores help reach by skill groups.

The data further suggest that steady improvement of basic, complex problem solving, resource management, social and systems skills would allow wage movement up to the $50k–$70k range. While technical skills have the lowest means for all mean wage bins in all clusters, targeted training in technical skills for specific career fields may still be necessary. As technical skills may not be transferrable, workers should not focus on specific technical skills if they are undecided about entering a particular career cluster. While systems skills seem to influence wage growths, technical skills see minor change across wage groups, indicating that these technical skills may not play a prominent role in career transitions. However, systems and technical skills appear to be more valued in the healthcare and information technology clusters, which might require hospitality workers to get prepared for the transition into such career clusters through systematic training.

5.3 Skill levels and wages

The analysis confirms that increased skills are overall associated with higher wages (*H3*); however, the relationship starts to level off after reaching certain wage thresholds. This suggests that workers should pay attention to areas other than skills to continue an upward wage progression after certain job levels. Figure 5 shows the critical skills shared by

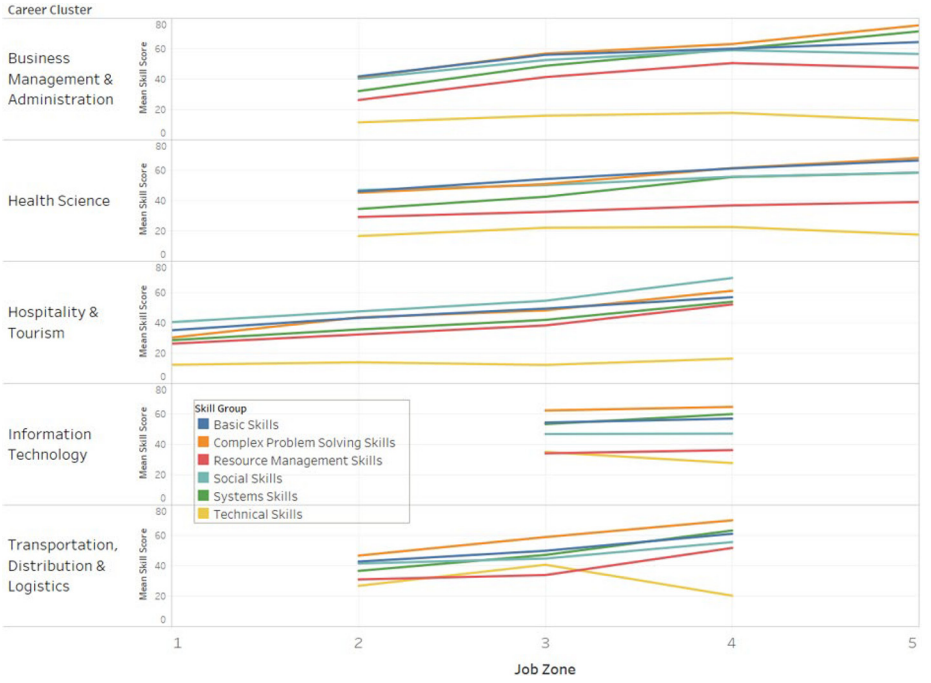

Figure 4.
Mean skill scores by career cluster and job zone

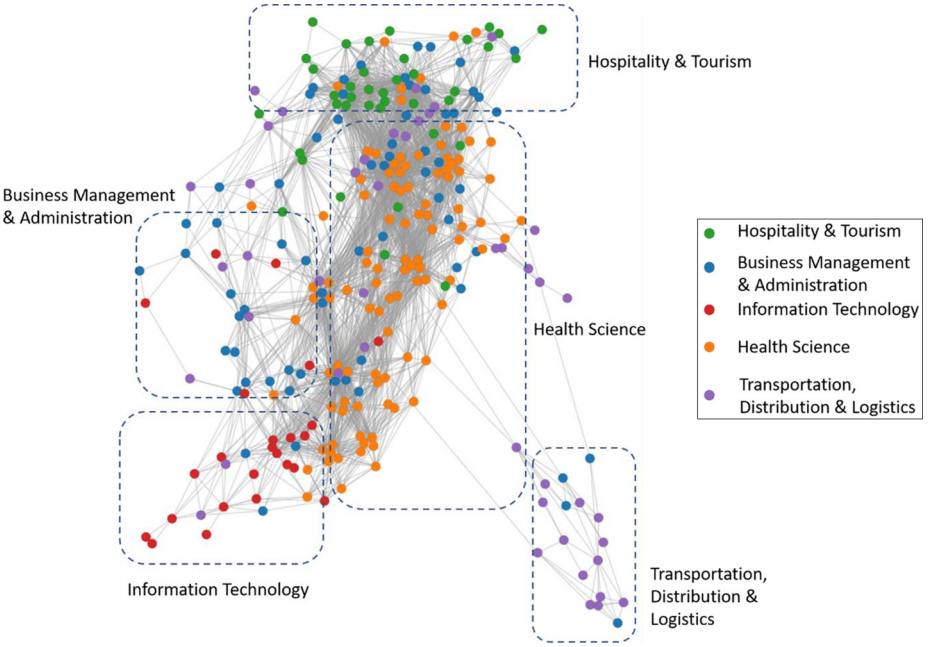

Figure 5.
Network analysis of number of top 10 skills (scores ≥ 50) shared by jobs between career clusters

different career clusters using network analysis. Consistent with the O*NET standards, only skills with a standardized score greater than or equal to 50 are included in each career cluster for better identifying the patterns among career clusters.

The distance among representative career clusters is proportionate to the number of shared skills. Strong skill connections are revealed between the hospitality and tourism career cluster and the health science career cluster. As Figure 3 indicates, the transferable skills (e.g. basic skills, social skills, resource management skills) can serve as the stepping stones for hospitality and tourism workers to transition to healthcare career clusters when workers develop additional technical training skills. Other career clusters ranked in shared skills include business management and administration, transportation, distribution and logistics and information technology. The fewest connections exist between hospitality and tourism and information technology clusters. It suggests that hospitality and tourism workers may take more effort to transition into the information technology cluster. Therefore, it is critical to develop such a skill network for hospitality and tourism workers, as they are experiencing structural changes and new developmental stages.

Table 1 shows the mean and median computerization probability by cluster and job zone. For the business management and administration cluster, Job zone 2 has a mean of 86% likelihood of computerization while job zone 3 is 56%. Job zone 1 has an 85% mean for the hospitality and tourism cluster, while Job zone 2 sits at a 72% mean. Out of 44 jobs, 26 hospitality and tourism jobs have a 70% likelihood of computerization. Jobs with such computerization levels are considered at high risk for computerization (Frey and Osborne, 2017). This finding suggests a great need for service workers in Job zone 1 to reskill and upskill to secure stable employment in the future. Other career clusters such as health care provide ample career opportunities in Job zones 2 and above with a much lower risk of computerization.

6. Conclusion and discussion

6.1 Conclusion

This research uses network analysis to understand skill transferability for hospitality and tourism workers based on three representative job and skill databases. The findings provide

Table 1.
Mean and median computerization probability by career cluster and job zone

Career cluster	Job zone	Mean computerization probability	Median computerization probability
Business management and administration	2	0.86	0.94
	3	0.56	0.73
	4	0.20	0.23
	5	0.09	0.04
Health science	2	0.57	0.61
	3	0.37	0.34
	4	0.37	0.04
	5	0.04	0.00
Hospitality and tourism	1	0.85	0.87
	2	0.72	0.83
	3	0.34	0.16
	4	0.01	0.01
Information technology	3	0.43	0.43
	4	0.20	0.22
Transportation, distribution and logistics	2	0.74	0.84
	3	0.57	0.61
	4	0.28	0.18

data-based evidence of hospitality workers' career transition prospects and viable cross-sector career pathways. The data confirms that the hospitality sector offers a large portion of low-skilled, low-paying jobs with a high concentration in Job zone 1. Workers have lower salary levels and career stability than the health-care and IT sectors. In terms of skill groups, hospitality and tourism rank the lowest in technical skills and systems skills.

This study's analysis indicates that focusing on soft (or non-technical) skills will allow hospitality employees to transfer to other in-demand sectors more easily; however, additional training on technical skills would be needed to facilitate hospitality workers' smooth career transitions into the health-care and IT sectors. This research also identifies the top ten skills across these three sectors: active listening, speaking, critical thinking, reading comprehension, monitoring, social perceptiveness, judgment and decision-making, coordination, complex problem solving and writing. Therefore, workers in hospitality can leverage and strengthen these top soft skills while learning new technical skills to prepare for cross-sector transitions.

Furthermore, the analysis suggests that it is possible to move wages to the $50k–$70k range by improving basic, complex problem solving, resource management, social and systems skills. As systems and technical skills are more valued in the health-care and IT clusters, hospitality workers will need systematic training to develop such skills. In terms of technical skills, targeted training for specific career fields is necessary but often not transferrable to other career clusters. Therefore, workers interested in cross-sector career transitions can benefit from technical skill training once they know which career cluster they are pursuing.

Finally, the skill network analysis reveals that hospitality and tourism jobs have stronger connections with the health science career cluster than the IT career cluster regarding shared skills. Therefore, it would likely be more manageable for hospitality workers to transition into healthcare occupations than IT careers. Identifying appropriate training programs that fit workers' interests, needs and constraints (e.g. time and finance) with early connections with potential employers would be essential to motivate workers interested in career transitions and enhance their career mobility and readiness.

6.2 Theoretical implications

This study supports that focusing on improving soft skills will allow hospitality and tourism employees to transfer more easily to growing industries such as health care and IT. Skill groups containing many soft skills provide hospitality and tourism workers with reasonable steps to transition to other career clusters. The findings highlight that the basic and social skills that hospitality and tourism workers have are often listed as essential skills for other career clusters. Therefore, hospitality and tourism workers should highlight their skills in these areas to potential employers in or outside the hospitality and tourism sector. As more industries merge hospitality into their business models (Next Tourism Generation Alliance, 2019), hospitality and tourism workers can bring these valuable skills to new sectors.

The analysis further posits that hospitality and tourism workers should focus on the industry-specific technical skills required by targeted jobs during the transition process. Additionally, complex problem-solving skills seem the most critical group for higher job zones offering higher salaries. Other skills ranked by importance are basic skills, social skills, systems skills and resource management skills. By improving basic, complex problem solving, resource management, social and systems skills, workers can move their wages to the $50k–$70k range. However, as wages increase towards and above the $100,000 annual wage threshold, factors other than skills become more critical. Therefore, in

upskilling or reskilling hospitality and tourism workers, it is vital to leverage existing soft skills, provide support to develop complex problem-solving and systems skills and focus on developing industry-specific technical skills.

Hospitality and tourism workers face unprecedented challenges and opportunities with the increasing adoption of new technologies at work and the uncertainties brought by the COVID-19 pandemic. Hospitality workers in Job zone 1 need to focus on reskilling and retraining to enable stable employment and financial stability. Although the hospitality and tourism industry will likely remain labor-intensive in the short term, many entry-level jobs will face the continued risk of job computerization in the long run. The findings underscore the importance for hospitality employers and workers to invest in workers' new skill development for career development within or outside the hospitality industry. Further empirical research is needed to understand the antecedents to hospitality workers' career transition decisions and their psychosocial progress during reskilling and retraining stages.

6.3 Practical implications

The hospitality and tourism sector employs more than 15 million workers in the USA (US Bureau of Labor Statistics, 2020a, 2020b). As technologies continue to reshape the hospitality and tourism labor market, workers and career agencies need to identify crucial career adaptation and development skills. This study attests to hospitality workers' vulnerability from the perspectives of lower annual wages, limited opportunity for advancement and higher risks of job computerization. In addition, the findings highlight the critical roles transferable soft skills can play in facilitating transitions toward alternative career sectors with better employment conditions.

Hospitality and tourism industries can provide the first job for many workers due to the ease of entry (Szivas *et al.*, 2003) and its comparatively low requirement of skills and experiences (O'Mahony and Sillitoe, 2001). While this may attract many workers at first, with lower wages, these positions can serve as stepping stones to other jobs (Heller, 2008; Baum *et al.*, 2020). However, due to their limited skill requirements and overall high turnover, the hospitality and tourism sector has not emphasized skill development and training. These workers need deliberate support in identifying and pursuing viable career paths and transferring their relevant skills and knowledge to new industries. This study identifies the skills that would be required when transitioning to other careers, which provides a strong starting point for low-wage hospitality workers interested in making career developmental plans.

Highlighting the urgent need to provide employees with additional training, this study calls attention to the need to identify ethical and fair solutions that can equitably distribute such responsibilities among key hospitality and tourism stakeholders. Employers typically prioritize technical training over soft skills training. However, this study advocates for job mobility into healthcare and IT fields, it might be morally questionable for employees to jump into another industry when their current employers invest significant resources in technical/non-technical skill development. In other words, employees can play a more prominent role in their non-technical training to help enhance their employability and career opportunities. Meanwhile, governments and other entities in the public sector (e.g. community colleges and four-year universities) can provide more support to help train employees' transferable soft skills and targeted technical skills. Thus, the hospitality industry can strengthen its workforce's career adaptability and resilience amid uncertain times through multiple stakeholders' collaboration and partnerships.

This paper provides data-based insight into transferable skills for multiple career clusters related to hospitality and demonstrates how such skills could support upward wage

mobility and cross-industry transitions. The study also provides a skill-based foundation for developing a cross-industry skill taxonomy for the hospitality industry and the findings support researchers and hospitality professionals in exploring career transition opportunities.

6.4 Limitations and future research

This research has the following limitations. The data analysis focuses on skill data, which is one aspect of job competency. Other job competency elements such as knowledge and dispositions should be further investigated through in-depth interviews and focus groups. Additionally, developing a standardized relationship table would be valuable to provide better definitions across multiple skill taxonomy databases (e.g. O*NET, Emsi, Burning Glass), further verifying the research findings. Additional research can examine different dimensions of job competency and the relevant cross-industry connections across various skill databases.

Another potential area of research is focusing on how hospitality employers can share employees to improve work efficiency. With many hospitality and tourism businesses' operations heavily impacted by COVID-19, exploring ways to better utilize existing workers is essential. Examining individual job connections (e.g. using skill network analysis) can help managers decide where certain employees may be utilized in different companies and capacities to retain full-time employment. This would allow for the more efficient use of labor based on demands while improving workers' welfare.

Future studies can also examine the required soft skills in healthcare, IT and hospitality industries from the perspective of employers and current employees. Such studies could also quantitatively explore to what extent the skills posed by O*NET across three industries match. Mixed methods would help to triangulate data collected through surveys, interviews, focus groups and observations to cross-validate findings and provide more well-rounded and reliable conclusions.

Further research should explore social, behavioral and psychological factors (such as perception of the challenges in entering a new field and social support systems) which can influence hospitality workers' career transitions. Particular attention should be paid to possible ways to help workers capitalize on the skills they currently utilize in their careers and build on those skills when possible. Relevant topics include challenges and barriers faced by workers interested in cross-sector career jumps; strategies to support students and workers interested in career shifts; connections between transferrable skills, learning agility and career agility; and approaches to cultivating learning agility and career agility skills in future workers. As new technologies continue to shape the labor market, the authors plan to update the analysis once newer skill databases become available.

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Corresponding author
Arthur Yan Huang can be contacted at: arthur.huang@ucf.edu