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RESEARCH ARTICLE

Does artificial intelligence improve hospitality employees' individual competitive productivity? A time-lagged moderated-mediation model involving job crafting and meaningful work

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ABSTRACT

Artificial intelligence (AI) continues to transform the hospitality industry. While adopting AI can lead to employee anxiety, less is known about how these affected employees can benefit and become more competitive. This study advances the challenge-hindrance framework in the AI context to investigate how employees respond to the advances of these technologies and the resulting changes in their competitive productivity. Data collected from 235 employees in the hospitality industry through a two-wave method was analysed using PLS-SEM. Findings indicate that although the advancement of AI leads to workplace anxiety, such innovation can trigger job crafting through the conservation of resources theory. These effects can positively impact competitiveness and productivity, particularly for employees who find their work meaningful. This study extends the challenge-hindrance framework and offers guidance for the hospitality industry to better integrate AI for service professionals to become more competitive and productive.

1. Introduction

According to Pereira et al. (2023), artificial intelligence (AI) can take many forms, such as service robots, mobile apps, chatbots and big data application algorithms. Despite the multiple forms, a common thread of argument is they are increasingly transforming jobs in different industries including the hospitality industry (Paluch et al., 2021). For instance, hotels have increasingly deployed service robots to undertake roles such as guest ambassadors, housekeepers, and waiters (Brougham & Haar, 2017). Moreover, the integration of AI for automating tasks has been aimed at delivering impeccable customer services and optimising backend operations (Oosthuizen, 2022). Furthermore, utilising smart technologies enabled by the Internet of Things (IoT) has facilitated interconnectivity among different systems. This leads to cost reductions, improved operational efficiency and heightened customer satisfaction (Brougham & Haar, 2017). While hotels have shown enthusiasm towards AI adoption, research shows that the response from their employees has been more guarded. One primary reason is due to apprehensions surrounding job security and potential replacement (Ding, 2022; Tan, Gim, et al., 2023).

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Ongoing research has generally focused on the 'dark side' of AI, including areas concerning job displacement (Wulff & Finnestrand, 2023), insecurity (Malik et al., 2023) and turnover (Pan & Froese, 2023). Quite evidently, attention directed towards exploring the potential positive impacts of AI, such as employee productivity, remains relatively unexplored (Ding, 2022; Tan, Gim, et al., 2023). This disparity in research is particularly striking given that the fundamental aim of AI implementation is to bolster organisational efficiency and productivity. As such, an important research gap worth addressing is to investigate how AI might augment employee productivity, thereby enhancing overall organisational performance. Accordingly, this study aims to achieve the research objective of understanding the psychological processes that can manifest the promised benefits of AI to improve employees' workplace productiveness.

In this regard, this study used individual competitive productivity (ICP) as a form of positive corollary that could be manifested with AI. As the word implies, CP is a combination of both competitiveness and productivity. According to Winzar et al. (2022), CP can be operationalised at the macro (national), meso (organisational) and micro (individual) levels. This study focuses on ICP, which Baumann et al. (2019) explained how through adopting AI can improve job performance, objectively and subjectively. The results of this investigation are theoretically insightful and valuable as they pinpoint a hitherto neglected factor of the positive impact of the use of automation and smart technologies.

Secondly, this study leveraged the challenge-hindrance framework. The challenge-hindrance framework is based on the idea that some aspects of work are seen as motivating and energising (challenge appraisals), while others are seen as inhibiting growth and preventing good work (hindrance appraisals). LePine (2022) developed further insights by indicating that the challenge and hindrance perspectives are not mutually exclusive; a situation can be appraised simultaneously as a challenge and hindrance. This study builds upon the work of LePine (2022) by not examining the situation as being one of these two dimensions. Instead, this study argues that the situation can be simultaneously appraised in the same model. This allows a holistic understanding of how employees respond to the increased use of AI at work in the hospitality sector.

Thirdly, no studies have explained how AI triggers behaviours such as job crafting and its potential to mitigate employee anxieties while fostering productivity. As highlighted earlier, the implementation of AI would trigger workplace anxiety due to concerns of job insecurity and loss of resources (Pan & Froese, 2023). In this regard, job crafting emerges as a promising avenue for safeguarding employees' resources. This is drawn from the principles of the conservation of resources (COR) theory (Karatepe & Kim, 2023). Thus, there exists a compelling argument that AI implementation may offer opportunities for employees to proactively shape their roles and tasks to align with their strengths and interests.

Along the same line of arguments, meaningful work is another construct largely ignored in the field of AI (Wulff & Finnestrand, 2023). Meaningful work – characterised by the perception of one's tasks as having inherent worth, significance, or aligning with a higher purpose – is a crucial aspect of workplace well-being and productivity (Tan, Gim, et al., 2023). As such, Bailey (2016) argued that organisations have the moral obligation to create a work environment that fosters meaningful work. On this note, through the adoption of AI, many routine tasks are expected to be automated, creating space for individuals to focus on work that is central to organisational missions. This shift offers the potential for employees to engage in tasks that require creativity, critical thinking, and problem-solving – elements that are often integral to experiencing meaningful work (Albrecht et al., 2021). In other words, employees with a positive outlook towards work would welcome AI as AI allows them to do higher-value work. For the hospitality industry, AI could support hospitality employees to provide more personalised guest services and create more authentic connections with them. Despite the increasing prevalence of AI adoption in hotels, there remains a significant gap in understanding how meaningful work can support the ecosystem (Wulff & Finnestrand, 2023). Thus, there is a pressing need for further research to explore these dynamics comprehensively and inform strategies for leveraging meaningful work in ways that enhance acceptance of AI.

2. Adoption of AI and mixed effects on hospitality employees

The adoption of AI is a growing trend in the hotel industry. The increased competitiveness of this industry, coupled with the need to streamline business flow and optimise performance provide further reasons for hotels to adopt these technologies. To this end, some scholars such as Ding (2021) collectively called these technologies as STARA, which stands for smart technologies, artificial intelligence, robotics, and algorithms. Zhang and Prebensen (2024) refer to such trend as hospitality 5.0. Specifically, hospitality 5.0 refers to the use of technology such as contactless automation, mobile technology, robotics, artificial intelligence, and virtual and augmented reality in various touchpoints during the customer's journey (Li et al., 2024). Often, these technologies are used to provide a more efficient and personalised service to guests thereby improving the overall guest experience.

Despite these developments, the effect of AI on employees in hotels remains unclear (Nam et al., 2020). In particular, little is known in theory and practice of employee reactions and adaptation to the changing work environment due to the hotel's adoption of AI (Ding, 2021). As employees are critical stakeholders of any organisation and AI can significantly affect the work environment, it is crucial to better understand how the adoption of AI may affect employees in their efforts towards pursuing individual as well as organisational growth (Bulchand-Gidumal et al., 2024; Li et al., 2024; Tan et al., 2022). It is important both academically and professionally to gain a better understanding of employees' perception of the adoption of AI and how AI can affect employee anxiety, job handling and individual productivity.

The awareness of AI, as explained by Ismatullaev and Kim (2024), focuses on how employees perceive the impact of these technologies on their work. Khaliq et al. (2022) reiterated that the presence of AI tends to result in job insecurity, job burnout and a desire to leave one's job, particularly in the hotel industry. Accordingly, employees may classify awareness as a form of stressor that inhibits their achievement towards their work outcomes. However, the same set of work-related factors can result in positive work outcomes (Benítez-Núñez et al., 2024). Such a phenomenon can occur when these factors are seen as challenging and are coupled with potential gains that contribute to the employees' feelings of achievement (LePine, 2022). Thus, reactions can be mixed; one employee may feel insecure and depressed about the adoption of workplace automation. Another can leverage their sense of insecurity to activate problem-solving resources such as learning new skills to enhance productivity and employability. Arguably, performance benefits provided by AI should not come at the expense of employees, and instead could ideally spur employee performance including competitiveness to improve the overall organisational performance. Figure 1 captures these dynamic interactions.

3. Theoretical background and hypotheses development

3.1. Challenge-hindrance framework

The challenge-hindrance framework is the dominant theory that this study would leverage. Tang et al. (2024) have demonstrated that within the challenge-hindrance framework, the hindrance appraisal of work situations leads to negative emotions such as anxiety, fear, and worry. These findings come as no surprise, as threats are frequently associated with adverse consequences in the future. Likewise, studies have also argued that perceiving a work situation as a challenge would trigger a positive appraisal. For instance, Cheng et al. (2023) postulated that when a work situation is seen as an opportunity to improve their skills, individuals would appraise the work as a challenge. This activates a motivational psychological mechanism that encourages them to thrive at their workplace.

The challenge-hindrance framework distinguishes between work-related factors that hinder individual growth and those that promote it (N. P. Podsakoff, Freiburger, et al., 2023). Both forms of work-
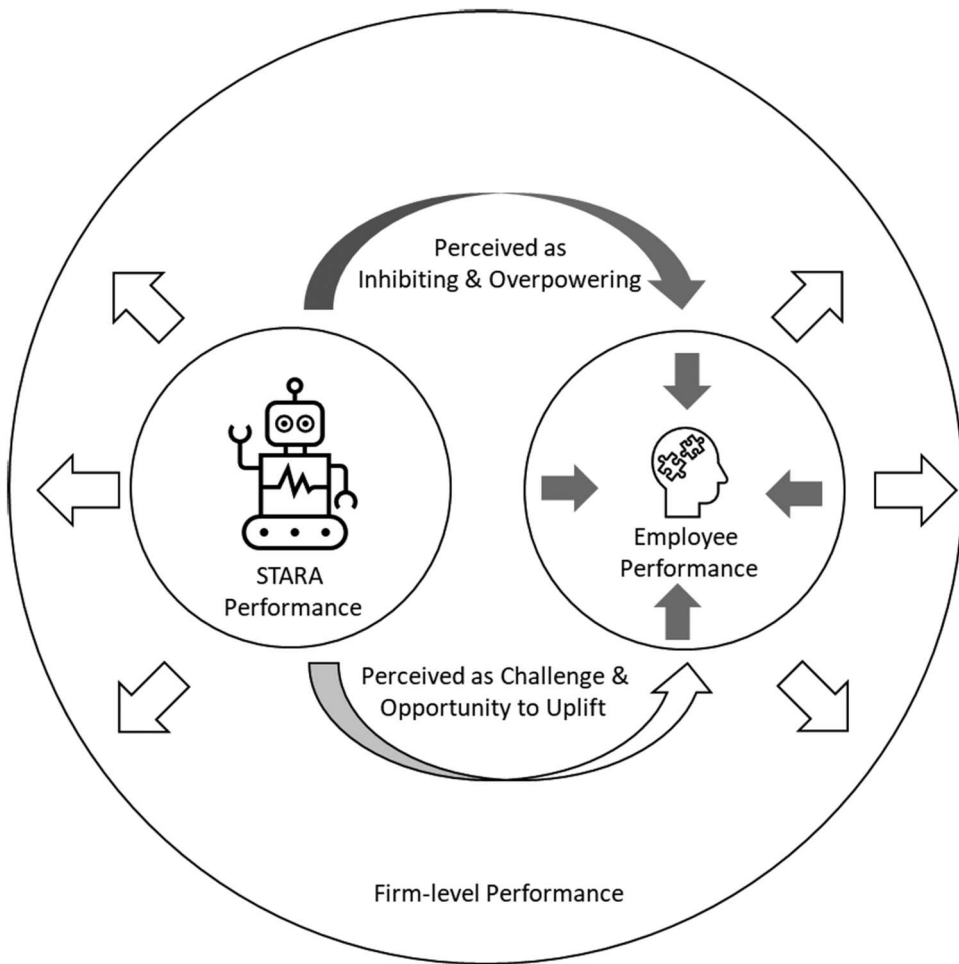
Figure 1. Dynamic interactions between STARA, employees and firm performance.

related factors can lead to increased strain and exhaustion, but they have been shown to have different effects on attitudes and behaviours (Horan et al., 2020). The framework emphasises that individuals can interpret the same stressor in varying ways. These different interpretations can ultimately influence how the stressor contributes to different results and consequences. Accordingly, this study positions the perceptions and responses of hospitality employees facing AI within the challenge-hindrance framework (Horan et al., 2020). This study argues that the increasing adoption of AI is a potential factor adding to stress or opportunities at work. If work stressors such as the adoption of automation and smart technologies are perceived as a challenge, this can lead to employees finding positive ways to manage and overcome the challenge thereby improving outcomes including job satisfaction (LePine, 2022). Perceived as hindrances, these work stressors can decrease job satisfaction. The theoretical framework integrating the proposed interrelationships between the variables as discussed above is shown in Figure 2.

3.2. Challenge-hindrance appraisals of awareness of AI on workplace anxiety

Workplace anxiety is an experience of nervousness and concerns related to job responsibilities and associated tasks (Muschalla et al., 2010). Specifically, workplace anxiety is influenced by both
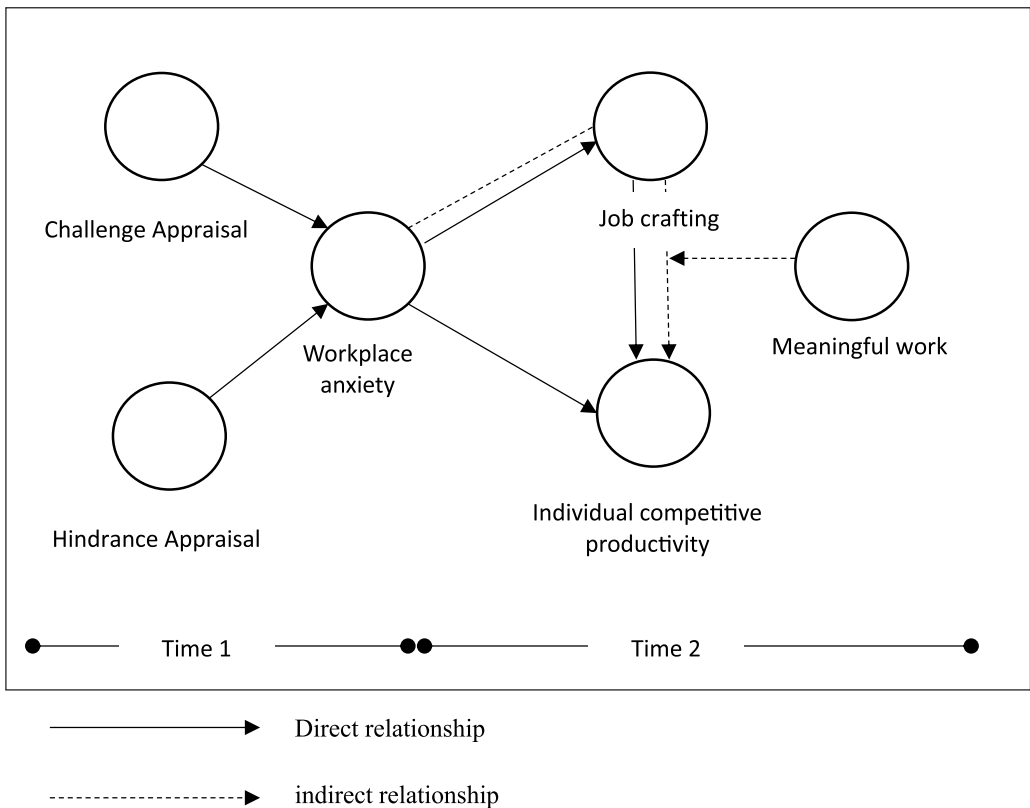
Figure 2. Research model.

individual differences and workplace factors and is considered a response towards a stressor at work (Wang et al., 2022). Research also indicates that workplace anxiety is a subcategory of performance anxiety, encompassing apprehensions about different facets of work such as job interviews (Zhang et al., 2021), information overload (Wang et al., 2022) and understaffing (Miller et al., 2019). However, the effects of dealing with workplace anxiety and the psychological mechanism leading to or reducing it have not yet been extensively researched (Gao et al., 2024).

Accordingly, this study expects employees to have different views on how AI influence their work processes. To be more specific, when an individual views AI as a potential obstacle, this can trigger a negative psychological reaction concerning future job security. This results in adverse emotions like workplace anxiety. Similarly, employees positioning AI as a challenge could trigger more positive emotional responses and be more proactive in managing this anxiety through professional development. Following the above arguments, the first set of hypotheses is:

H1a: Challenge appraisal toward awareness of AI negatively influences workplace anxiety.

H1b: Hindrance appraisal toward awareness of AI positively influences workplace anxiety.

3.3. Workplace anxiety and job crafting behaviour

Undoubtedly, AI is among the key disruptive forces in recent years that are transforming workplaces and the relevancy of skills (Deepa et al., 2021). Hence, employees may look for ways to manage their anxiety and can perform job crafting to protect and enhance their resources.

Wrzesniewski and Dutton (2001, p. 180) explained that job crafting is a proactive work behaviour initiated by employees to 'shape, mould, and redefine their jobs'. According to the CORtheory, individuals are frequently driven to obtain and safeguard resources that are significant to them. This includes energy, time, and personal attributes (Hobfoll, 1989). This study argues that during times of rapid changes, employees will make adjustments to their work to adapt by capitalising on the opportunities generated by the disruption (Ilies et al., 2024).

Hence, if employees perceive that their jobs or opportunities for advancement are threatened by the implementation of these technologies, they may experience stress and negative outcomes such as workplace anxieties. job dissatisfaction and burnout. In such situations. employees with workplace anxiety are less likely to engage in job crafting because they will use their resources to cope with this anxiety (McCarthy et al., 2016). This process drains their personal resources, affecting their attitude and proactive behaviour at work (Zhang & Jin, 2023). In other words, anxious employees conserve their resources to avoid further depletion, making them less likely to engage in job crafting. Therefore, the next hypothesis is:

H2: Workplace anxiety negatively influences job crafting.

3.4. Role of workplace anxiety on individual competitive productivity

The hospitality industry faces intense competition due to factors such as small profit margins, rising customers' expectations and the increasing use of AI (Khaliq et al., 2022). Research into the competitiveness of this sector has been studied by different scholars such as Winzar et al. (2022). These studies involve pinpointing the origins of a competitive edge, analysing strategies for competition, and investigating how a commitment to competitiveness fosters innovation. However, Winzar et al. (2022) contend that there is a need for a more thorough and intricate examination of an organisation's relative competitiveness, encompassing various levels of analysis. Consequently, they propose introducing the concept of 'competitive productivity (CP)', which combines elements of competitiveness and productivity. Put simply, CP entails both a mindset and proactive behaviours geared towards outperforming competitors or enhancing one's performance.

As highlighted earlier, the three levels of CP implies that the effectiveness of one level will affect the next level (Winzar et al., 2022). In another word, the sum of CP at the individual level (ICP) within an organisation contributes to the creation of firm-level CP (FCP). All FCPs within a nation are combined to become the CP at the national level (NCP). From this perspective, examining how job crafting influences ICP is logical given that ICP is the cornerstone that would culminate in FCP and NCP.

According to Baumann et al. (2019, p. 124), ICP is both an 'attitude and behaviour directed at outperforming the competing individuals and past performance through pragmatism'. Franken and Brown (1995) argue that motivation and competitiveness are inextricably related as competition satisfies the drive for success and offers a chance to improve performance. This, in turn, motivates individuals to put in more effort. Research by Barigozzi et al. (2018) further advance this idea; employees become more productive when their intrinsic motivation is enhanced. This leads to an increase in the number of motivated and productive workers in a company. In the context of this study, it is reasonable to assume that anxious employees having to deal with AI adoption can experience less motivation at work, thereby leading to a drop in productivity. Therefore, this research hypothesises that:

H3. Workplace anxiety negatively influences ICP.

3.5. Role of job crafting on individual competitive productivity

The job crafting literature describes a positive phenomenon between job crafting and performance (Karatepe & Kim, 2023). In work environments where innovation is important, job crafting behaviour can facilitate innovation, skill and knowledge development and organisational change (Mansour &

Tremblay, 2020). Similarly, job crafting enhances job design and increases productivity (Mansour & Tremblay, 2020). Within the context of the hospitality industry, job crafting has the potential to facilitate the integration of AI in the organisation. This allows employees to find new ways to contribute more productively to the success of the organisation. Job crafting may also foster organisational change as the organisation becomes more effective in utilising the new technologies in combination with its human resources. In sum, this study expects that job crafting will positively influence ICP.

H4: Job crafting positively influences ICP.

3.6. Mediating effect of job crafting in the relationship between workplace anxiety and individual competitive productivity

Hypotheses 2–4 demonstrate that job crafting plays a crucial role in connecting workplace anxiety and ICP. As highlighted earlier, the adoption of AI in workplace is an event that causes anxiety among employees, which in turn, manifests undesirable consequences such as a reduction in work engagement (McCarthy et al., 2016). Scholars such as Zampetakis (2022) further highlight that employees, in the face of such anxiety, may use job crafting behaviour to reduce some of these negative outcomes. Such arguments are aligned with the COR theory stating that different forms of resources are needed for employees to recover from work demands (Halbesleben et al., 2014). This recovery helps to prevent further depletion of resources. One effective way to achieve such recovery is through job crafting, which involves adjusting the demands of the job to the job resources available to the employee (Shi et al., 2021). Consistent with this argument, the next hypothesis is:

H5: Job crafting mediates the relationship between workplace anxiety and ICP.

3.7. Moderated-mediating effect of meaningful work

In recent years, the notion of meaningful work has gained importance among employees (Tan et al, 2023) . According to scholars such as Tyssedal (2022), meaningful work is about employees doing something that connects with their values, piques their interests, and aligns with their moral compass. Studies have found that meaningful work takes important precedence over other job characteristics including salary and promotion (Duarte-Lores et al., 2021). To this end, making work more meaningful is one of the objectives of introducing AI to workplaces (Smids et al., 2019). This is because as AI can assist with tasks that are repetitive, mundane, or dangerous, employees are now able to focus on higher-value tasks that could enhance the meaning of their work. In this regard, this study argues that people who see work as being more meaningful would devote more time, dedication and effort to proactively alter their work activities. Doing so gives them personal significance and establishes relationships that align with their work objectives. In other words, the more meaningful the work, the higher the expectation for it to strengthen the potential positive effect of job crafting on ICP. Hence, this research hypothesises that:

H6: Meaningful work positively moderates the indirect relationship between work anxiety and ICP through job crafting.

4. Methodology

4.1. Respondents and data collection

Respondents in this study were existing employees in the hospitality industry acquired with the assistance of China's Gree group. Gree group was selected as it is one of the major state-owned enterprises in Zhuhai and holds a AAA credit rating (Gree, 2022). They have also established several five-star hotels in the area (Gree, 2022). A letter was sent to the HR managers to gain permission for the data collection. The researchers used convenience sampling for reasons of

accessibility and timeliness. A similar sampling method has been used by Lim et al. (2023). To reduce biases that could arise, a filtering question, asking if respondents have experienced AI in their work, was included in the survey to ensure that only eligible employees participated. Similar methods of data collection were observed in studies such as Monzani et al. (2021) and Olugbade and Karatepe (2018). Second, the survey, which was translated from English to Chinese, was back-translated to English to maintain the original meaning of the questions. It was further pretested by researchers and practitioners to address ambiguous terms in the survey. The study used both 5-point and 7-point Likert scales in response to recommendations by P. M. Podsakoff, Podsakoff, et al. (2023). By doing so, this study introduced methodological separation as variation in response formats can discourage respondents from using the same response pattern across different parts of the survey. Finally, this study employed two different surveys, collecting data from employees on two time periods, spaced four weeks apart.

The two-wave method of data collection involves gathering data at two distinct points in time, allowing researchers to effectively study the causes (antecedents) and effects (outcomes) of specific phenomena over time (Podsakoff et al., 2012). During the first wave, data was collected to identify and measure the antecedents, which are factors hypothesised to influence the outcome. The second wave of data collection occurs after a designated period and focuses on measuring the outcomes that could have been influenced by the antecedents identified in the first wave. By using this two-wave approach, researchers can establish temporal precedence, a critical aspect in understanding causal relationships (Podsakoff et al., 2012). This method of data collection has been widely practised by different scholars including Lim et al. (2023).

In Time 1, 300 survey questionnaires were distributed to the employees via the human resource department. It encompassed questions relating to employees challenge appraisals and hindrance appraisals related to their awareness of AI as well as workplace anxiety. 267 responses were received. At Time 2, 267 survey questionnaires were distributed, containing items related to job crafting, meaningful work, and ICP. 235 of the 267 responses in Time 2 corresponded to the survey data collected in Time 1, as confirmed through the utilisation of identification codes. Consequently, the final sample size consisted of 235 responses, resulting in an 88.01% response rate.

Using the G*power technique, 235 responses represented 99.9% power, exceeding the recommended number of respondents. This response number surpasses the recommended sample size of 160 in partial least squares structural equation modelling (PLS-SEM) (Kock & Hadaya, 2018). Table 1 provides an overview of the survey participants.

Table 1. Profile of respondents.

	$n = 235$	%
Gender		
Male	143	60.85%
Female	92	39.15%
Year of Birth		
Before 1946	1	0.43%
1946–1965	2	0.85%
1966 −1980	42	17.87%
1981–1994	86	36.60%
After 1994	104	44.26%
Highest Education level		
Secondary and below	22	9.36%
College	65	27.66%
Bachelor's degree	81	34.47%
Master's degree	64	27.23%
Doctorate degree	3	1.28%
Employment status		
Having a full-time job	159	67.66%
Having a part-time job	76	32.34%

4.2. Instruments

Both challenge and hindrance appraisals (four items each measuring on a 7-point Likert scale) of AI in the Time 1 survey were operationalised by Ding (2021). Examples of items measuring challenge appraisals are 'The job uncertainty generated from AI will help me to learn a lot', and 'The job uncertainty generated from AI will make the experience educational'. For hindrance appraisals, sample items include 'The job uncertainty generated from AI will hinder any achievements I might have', and 'The job uncertainty generated from AI will restrict my capability'.

For job crafting, this study followed Zhang and Parker (2019) and Tims et al. (2012) operationalisation of classifying the 21-item instrument as a higher-order construct of four dimensions. Sample items include 'I try to develop my capabilities'. All items are measured on a 5-point Likert scale. The 8 items measuring workplace anxiety were adopted from McCarthy et al. (2016). Measured using a 5-point Likert scale, sample items include 'I am overwhelmed by thoughts of doing poorly at work', and 'I worry that I will not be able to successfully manage the demands of my job'.

The 9 items measuring ICP on a 7-point Likert scale are adapted from Baumann et al. (2019). Sample items include 'I am knowledgeable and up-to-date with market developments', and 'I am oriented toward positive customer service to retain customers for repeat business'.

Finally, meaningful work is measured using 10 items adopted from Steger et al. (2012). Similar to job crafting, meaningful work is presented as a higher order construct comprising three dimensions of meaning-making through work, greater good motivation and positive meaning at work. This aligns with existing literature such as Steger et al. (2012) and Tan et al. (2019). Measuring on a 5-point Likert scale, sample items include 'I understand how my work contributes to my life's meaning', and 'I have found a meaningful career'.

4.3. Analytical method

PLS-SEM was selected as the analytical method because it is effective for small sample sizes, and can operate without any assumptions about data distribution (Hair et al., 2017). Besides, it can incorporate reflective-formative second order constructs which meet the requirements of this study (Hair et al., 2018). To recapitulate, meaningful work is presented as a higher order construct comprising three dimensions of meaning-making through work, greater good motivation and positive meaning at work. Similarly, job crafting is conceptualised as a higher order construct involving four dimensions of increasing structural job resources, decreasing hindering job demands, increasing social job resources and increasing challenging job demands. Following Tavera-Mesías et al. (2022), this study used the repeated indicators approach to obtain the latent variable score for each of the dimensions for both meaningful work and job crafting.

5. Results

5.1. Measurement model

From Table 2, the outer loading of most items are above the threshold value of 0.708. Only a few of them such as ICP1 and ICP3 did not achieved the benchmark score. However, they are not deleted as their Cronbach Alpha (CA), composite reliability (CR) and average variance extracted (AVE) exceeded the minimum threshold (Ramayah et al., 2018). Heterotrait-monotrait ratio (HTMT) is used to determine the discriminant validity of the model. Table 3 shows that discriminant validity has been achieved at HTMT less than 0.85.

5.2. Structural model

The first step is to check for possible multicollinearity. Table 4 shows that multicollinearity is not a serious consideration as variance inflation factor (VIF) did not exceed 3.3. Table 4 further elucidates

Table 2. Convergent validity.

Indicator	Outer loading	CA	CR	AVE
CA1	0.903	0.885	0.886	0.718
CA2	0.928			
CA3	0.763			
CA4	0.782			
HA1	0.847	0.903	0.905	0.775
HA2	0.896			
HA3	0.910			
HA4	0.867			
ICP1	0.607	0.879	0.885	0.512
ICP2	0.756			
ICP3	0.694			
ICP4	0.628			
ICP5	0.728			
ICP6	0.721			
ICP7	0.800			
ICP8	0.830			
ICP9	0.645			
JC_CJD	0.867	0.796	0.800	0.623
JC_HJD	0.800			
JC_SJR	0.727			
JC_STR	0.758			
MW_GG	0.881	0.916	0.925	0.857
MW_MM	0.949			
MW_PM	0.945			
WA1	0.700	0.931	0.939	0.677
WA2	0.803			
WA3	0.826			
WA4	0.868			
WA5	0.872			
WA6	0.834			
WA7	0.845			
WA8	0.823			

Note: CA = Challenge appraisal, HA = Hindrance appraisal, ICP = individual competitive productivity, JC_CJD = Increasing challenging job demands, JC_HJD = Decreasing hindering job demands, JC_SJR = Increasing social job resources, JC_STR = Increasing structural job resources, MW_GG = Greater good motivation; MW_MM = Meaning-making through work, MW_PM = positive meaning at work, WA = Work Anxiety.

that among the two forms of challenge-hindrances appraisals, only hindrance perspective of AI established a positive significant relationship with work anxiety (H1b. $\beta = 0.155$, $p < 0.05$), but not challenge appraisal (H1a. $\beta = 0.002$, $p = 0.484$). Hence, H1b is supported but H1a is rejected. There is a positive effect of work anxiety on job crafting, therefore rejecting hypothesis 2 (H2. $\beta = 0.247$, $p < 0.001$). Surprisingly, the results on the effect of work anxiety on ICP did not follow the postulated direction, as there was a positive significant relationship between workplace anxiety and ICP (H3. $\beta = 0.109$, $p < 0.05$). Expectedly, job crafting positively influences ICP (H4. $\beta = 0.631$, $p < 0.001$), as well as mediates the relationship between work anxiety and ICP (H5. $\beta = 0.156$, $p < 0.05$). Hence, H3 is rejected while H4 and H5 are supported.

Additionally, Table 4 reveals the R^2 values of the various endogenous constructs. It shows that 57% of the variance in work anxiety can be explained by both challenge and hindrance appraisals,

Table 3. Discriminant validity.

	CA	HA	ICP	JC	MW	WA
CA						
HA	0.253					
ICP	0.357	0.151				
JC	0.419	0.233	0.834			
MW	0.449	0.108	0.481	0.637		
WA	0.084	0.257	0.332	0.338	0.093	

Note: CA = Challenge appraisal, HA = Hindrance appraisal, ICP = individual competitive productivity, JC = job crafting, MW = Meaningful work, WA = Work Anxiety.

Table 4. Structural model.

	Hypotheses	Path Coefficient	Standard Error	t-value	5.00%	95.00%	VIF	f^2	R^2
H1a	CA → WA	0.002	0.061	0.039(NS)	−0.098	0.101	1.066	0.001	0.570
H1b	HA → WA	0.155	0.055	2.839**	0.062	0.245	1.066	0.053	
H2	WA → JC	0.247	0.071	3.481***	0.132	0.366	1.000	0.097	0.088
H3	WA → ICP	0.109	0.049	2.209**	0.027	0.19	1.110	0.022	0.524
H4	JC → ICP	0.631	0.087	7.270***	0.486	0.771	1.766	0.386	
H5	WA → JC → ICP	0.156	0.050	3.129**	0.081	0.242			

Note: CA = Challenge appraisal, HA = Hindrance appraisal, ICP = individual competitive productivity, JC = job crafting, MW = Meaningful work; *p < 0.1; **p < 0.05, ***p < 0.001, NS: not significant.

making it a substantial model. Likewise, 52.4% of the variances in ICP are explained by job crafting and work anxiety (substantial model). However, only 8.8% of job crafting is explained by work anxiety, making it a moderate model. This research further assessed the effect sizes (f^2) based on Cohen (1988) benchmarks. On this note, small effect sizes have been noticed for hindrance appraisals on work anxiety (f^2 = 0.053), work anxiety on job crafting (f^2 = 0.097), and work anxiety on ICP (f^2 = 0.022). A strong effect size is observed for job crafting on ICP (f^2 = 0.386).

Taking reference from Cheah et al. (2021), further examination was done on the role of meaningful work in moderating the indirect relationship between work anxiety and ICP. Table 5 shows that the value index of meaningful work for moderated mediation effect is significant (index = 0.035, P < 0.1) indicating that the mediated effect of work anxiety on ICP through job crafting is dependent on meaningful work. The results also revealed that at higher levels of meaningful work, the indirect effect of work anxiety on ICP through job crafting (β = 0.190, p < 0.05) is higher compared to the indirect effect at lower meaningful work (β = 0.122, p < 0.05). This demonstrates that an increase in meaningful work would increase the indirect effect. Given that the moderator is a continuous variable, Preacher et al. (2007) suggested the use of the Johnson-Neyman's plot to illustrate the effect at different levels of the index. In this regard, the plot (see Figure 3) further supports the results. Hence, H6 is supported.

Finally, the model's predictive power was assessed using the PLS Predict procedure. Researchers such as Brougham and Haar (2017) and Ding (2021, 2022) tend to concentrate primarily on determining the significance and direction of the model coefficients rather than evaluating the ability of a model to predict new occurrences. This study argues that evaluating the predictive power is just as important. This serves the practical purpose of providing certainty into the future and making it relevant for practitioners. Table 6 shows that the model demonstrates a medium predictive power as majority of indicators in the PLS-SEM's root mean square error (RMSE) yield a lower value than the linear model benchmarks.

6. Discussion

This study investigates how AI is affecting employee anxiety, job crafting and individual productivity. The results showed that the hindrance perspective of AI increases workplace anxiety. Using the COR theory, workplace anxiety can lead to resource loss for employees, particularly in terms of job security and career opportunities. This, in turn, can result in job dissatisfaction, burnout, or turnover intention. These findings are not entirely surprising given the multiple reports highlighting the worry that

Table 5. Moderated-mediation relationship.

Probing moderated indirect relationship	Indirect effect	5%	95%	t-value
Low level of meaningful work	0.122	0.058	0.205	2.744**
High level of meaningful work	0.190	0.100	0.306	3.094**
Mean level of meaningful work	0.156	0.081	0.243	3.116**
Index of moderated mediation	0.035	0.005	0.072	1.715*

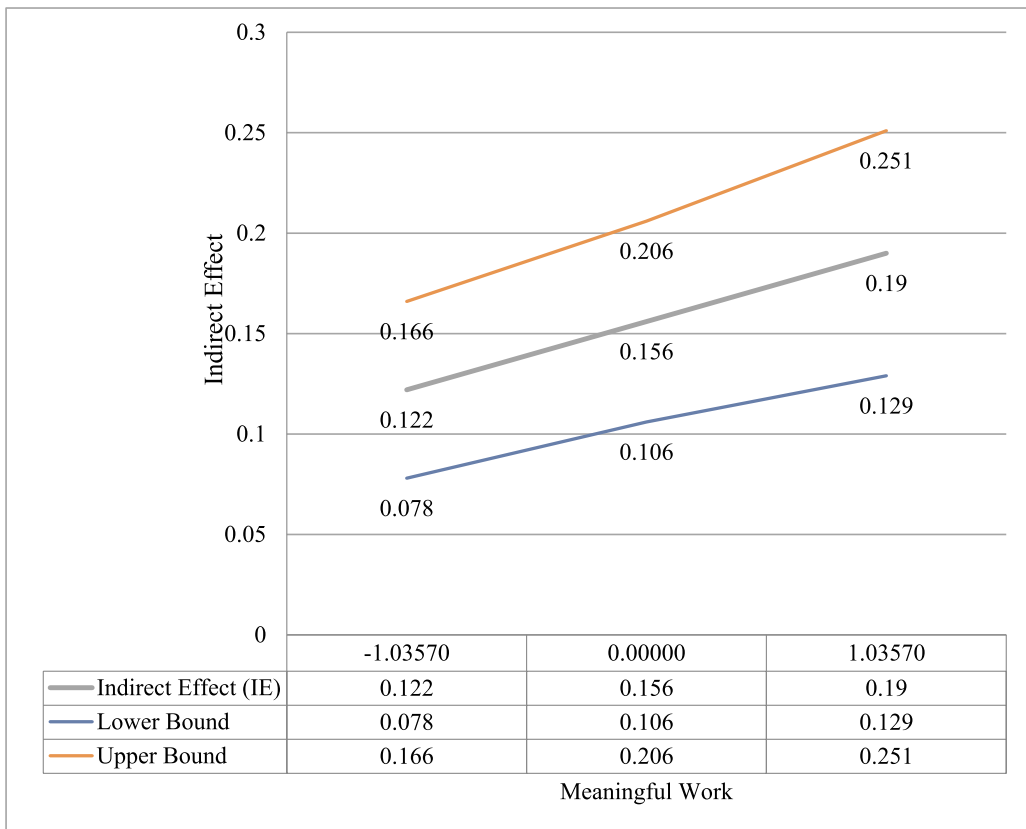Note: *p < 0.1; **p < 0.05, ***p < 0.001, NS: not significant.

Figure 3. Moderated-mediation plot.

employees experience of (1) AI eliminating their jobs (Khaliq et al., 2022) and (2) their inability to unlearn and relearn new skills in the face of adoption of AI (Vrontis et al., 2021). In the same vein, the results demonstrate that challenge appraisal did not have any significant relationship with work anxiety. This highlights that those who perceive the advance of AI as an opportunity to learn new skills are not likely to experience any anxiousness or job insecurity.

Another important finding from this study is that workplace anxiety due to AI adoption leads to job crafting. This, in turn, enhances ICP. Results from this study challenge the widely held assumption that anxiety is bad for job performance. The results showed otherwise. This study uncovers workplace anxiety as a multifaceted concept that can have positive as well as negative outcomes depending on its specific nature. Indeed, research findings on anxiety and performance are complex, varied,

Table 6. PLS predict.

	Q^2 predict	PLS-SEM_RMSE	LM_RMSE	PLS-LM (RMSE)
ICP1	0.042	1.435	1.469	−0.034
ICP2	0.048	1.263	1.327	−0.064
ICP3	0.051	1.301	1.342	−0.041
ICP4	0.040	1.256	1.264	−0.008
ICP5	0.049	1.149	1.100	0.049
ICP6	0.037	1.203	1.220	−0.017
ICP7	0.066	1.110	1.100	0.010
ICP8	0.067	1.194	1.177	0.017
ICP9	0.044	1.178	1.234	−0.056

Note: ICP = individual competitive productivity.

and inconsistent (see APA, 2019; Hillebrandt & Barclay, 2022; McCarthy et al., 2016). Another probable explanation is that respondents may be displaying high-functioning anxiety. This can trigger a 'fight' response, pushing themselves to work harder to combat the anxiety. Mellifont (2019, p. 436) pointed out that 'high functioning anxiety' reflects the 'nagging feeling that no matter how much you do, it will never be enough'. Individuals identified with high-functioning anxiety tend to adopt proactive behaviour in meeting deadlines and troubleshooting work problems (Mellifont, 2019). They would likely engage in job crafting when faced with changes in the workplace that create anxiety and find ways to ensure strong performance.

The positive effect of job crafting on ICP is expected and in line with the broader literature (see Karatepe & Kim, 2023; Oprea et al., 2020; Robledo et al., 2019; Zampetakis, 2022). More important is the finding of the moderating role of meaningful work in this relationship. The moderated-mediation results indicated the motivational properties of this construct. Results from this study showed that when employees find their work meaningful, it fosters their willingness to take proactive actions to acquire new skills. This can generate positive outcomes in their work. It reiterates the point that the way employees view their job is a significant indicator of their behaviour in the workplace. This mental evaluation of the work environment and perceiving the job as being purposeful can impact an employee's motivation to apply their skills and abilities at work. This result aligns with studies by Van Wingerden and Van der Stoep (2018) which further highlight the meaningful work – performance relationship.

7. Implications

7.1. Theoretical implications

In summary, this study contributes to the literature in multiple ways. First, it provides a perspective on how challenge and hindrance attitudes towards AI can influence workplace anxiety. In doing so, this study enhances the understanding of how AI impact employees psychologically. Findings demonstrating that workplace anxiety has a significant positive impact on both job crafting and ICP reaffirm an alternate perspective; workplace anxiety can act as a form of resource that possesses motivational properties, driving employees to achieve better performance.

Second, this research extends the challenge-hindrance framework by considering the psychological mechanisms (i.e. workplace anxiety and job crafting) that underlie individuals' perspectives on AI, which enhance their ICP in these changing work circumstances. These findings represent an important contribution to the field, as they suggest that job crafting is a critical resource that plays a key role in the workplace to enhance employees' ICP. Overall, this article is one of the first to (1) simultaneously examine the challenge-hindrance perspective of automation and smart technologies' awareness, and (2) identify the psychological mechanisms in supporting employees to thrive amid these changes.

A further contribution is the finding of a moderating effect of meaningful work on the relationship between workplace anxiety, job crafting and ICP. Leveraging the COR theory, this study highlights the positive impact of meaningful work to strengthen the positive relationships of these variables. Thus, this research updates the challenge-hindrance framework with the COR theory.

This study also provides predictive analytics for the model and its findings. The capacity of empirical research studys to conduct predictive analyses holds particular importance in social science studies, as it can assist in developing insights for practitioners (Shmueli et al., 2019). Eventually, these insights facilitate organisation to design effective manpower policies that would enable the organisation to continue functioning.

7.2. Managerial implications

There are several important managerial implications from the findings of this study. Facing new technologies such as AI, results showed that simply investing in these technologies is not sufficient.

Organistions leadership and management must be mindful of the employees' perspectives towards integrating AI in work processes. Creating a positive vision of how AI could move the organisation and its employees forward and supporting employees to proactively find ways to adjust and enhance their jobs are crucial. These could help shape workplace anxiety and foster the positive outcomes of job crafting and productivity. When employees feel that the advancement of AI could benefit their performance, it is natural that they would embrace the technology and help shape its transformation.

Leaders should create an environment where hospitality employees can recraft their jobs. For example, hospitality employees who enjoy interacting with guests can craft their jobs by spending more time being guest ambassadors. In the process, employees will acquire new knowledge or deepen existing knowledge. As job crafting is employee initiated, organisations need to provide the necessary resources to allow job crafting to happen. At the same time, hiring the employees with the right aptitudes such as being adaptable and agile are essential towards ensuring job crafting happens.

Finally, the moderating role of meaningful work shows the importance of this construct among respondents in the hospitality industry. Meaningful work may be achieved, for example, through job crafting that would increase the skill variety, task identity, and task significance, as well as employees' autonomy levels (Hackman & Oldham, 1976). Besides, organisations need to help employees to better understand the purpose of their work. In this respect, managers play an essential role in offering individual attention to help employees understand their priorities and perceptions of their work.

8. Limitations and future research directions

First, this study specifically looks at employees within China's hospitality sector. As a result, the applicability of the findings to other industries and geographic locations may be restricted. Consequently, future studies could consider duplicating this model in alternative industries and regions to facilitate comparative analysis.

Second, future researchers can leverage the strengths of the mixed method. While a quantitative method is adequate to achieve the purpose of this study, concepts such as meaningful work is a highly perceptive experience (Afota et al., 2024). On the same note, studies such as Zhong et al. (2022) have indicated variables such as gender, age, education and experiences could potentially influence outcomes. Thus, a future direction is to examine these relationships. Another avenue for future research would be to investigate how different factors generate different forms of workplace anxiety and how these can impact job crafting. The way a change, hindrance or challenge is perceived by employees is critical to their responses. Accordingly, the defensive or proactive stance of employees has important repercussions on how employees cope with these changes and challenges.At the same time, future researchers can examine into the respective dimensions of meaningful work and job crafting to provide more nuance results on how it can further facilitate the adoption of new workplace technologies. In sum, further research into these directions can lead to a better academic and practical understanding of how different types of employees cope with the advancement of automation and smart technologies.

9. Conclusion

In this industry age where the appearance of AI is evident, significant changes in how employees work can be expected. This study provides insights on how organisations can make use of the challenge-hindrance mentality to turn it into strategic advantages for organisations. Through various initiatives such as job crafting, this study demonstrates that not only it can mitigate its potential negative impacts but also leverage its benefits to make hospitality professionals more competitive and productive.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Data availability statement

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

Ethics

Ethics clearance obtained from James Cook University Ethics Committee.

Informed consent

Informed consent was obtained from all participants included in the study.

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