The Moderating Role of Firm Flexibility in the Human Capital-Competitive Advantage Relationship: Evidence from Kenyan Manufacturing Firms

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ABSTRACT

Organizations are increasingly restructuring their operations and business strategies to enhance flexibility and gain a competitive advantage. To promote workforce flexibility, companies now prioritize core human capital competencies that align with their overall strategic goals, rather than focusing solely on the specific skills needed for individual positions. As a result, researchers have increasingly emphasized managerial and worker competencies, applying the resource-based view (RBV) theory to show that variations in competitive advantage can be attributed to the differences in human capital resources across firms. Despite the growing emphasis on human capital, research has mainly centred on firm performance, often neglecting the direct examination of human capital capabilities and the intermediate outcomes that are crucial for transforming a company's best practices into profitability. The relationship between firm flexibility and competitive advantage has been somewhat overlooked in the strategic management literature, particularly concerning human capital. This study aims to fill this gap. The research examined 274 manufacturing firms from various sectors, utilizing a proportional allocation method to ensure that the sample sizes corresponded to the sizes of those sectors. An email containing a link to an online survey was distributed to each selected firm. The study revealed a statistically significant and strong positive correlation between a firm's human capital and its competitive advantage. Additionally, the findings demonstrated a positive and statistically significant correlation between the predictors, including the interaction term, and competitive advantage. While the regression analysis suggests that firm flexibility significantly moderates the relationship between human capital and competitive advantage, this moderating effect accounts for only a small additional variance in competitive advantage. Therefore, further research may be required to validate this moderating role.

Keywords: Human Capital, Firm Flexibility, Competitive Advantage, Manufacturing Firm

INTRODUCTION

Due to the characteristics of today's global economy, phenomena such as globalization, rapid technological growth, and the use of modern technologies to produce diverse products do not inherently create a competitive advantage for organizations. Consequently, to gain a competitive advantage and enhance their survival, organizations must concentrate on factors like human and intellectual capital (Pasban & Nojedeh, 2016). Organizations are increasingly designing their structures and business strategies to be more adaptable to improve their competitive advantage. Companies are now focusing on developing core human capital competencies that align with their overall strategic goals, rather than competencies required for specific positions within the organization, thereby increasing worker flexibility (Jin et al., 2010). Despite the growing emphasis on human capital in organizations, research has predominantly centred on firm performance (e.g., Nzuve & Bundi, 2010; Tumwine et al., 2014; Munjuri et al., 2015) and the relationship between human resource practices and profit performance (Wright et al., 2001), rather than directly addressing human capital capabilities and intermediate outcomes (Jin et al., 2010). Within strategic management literature, the focus on firm flexibility and competitive advantage, particularly concerning human capital, has been somewhat neglected. Therefore, understanding the relationship between human capital, firm flexibility, and competitive

advantages is crucial. This knowledge can enable firms to implement more effective business strategies (Jin et al., 2010).

Manufacturing Sector in Kenya

The government's renewed commitment to the manufacturing sector, announced by His Excellency the President of Kenya on November 28th, 2017, presented a great opportunity for the country to make significant progress toward critical economic goals outlined in Vision 2030. The National Government's goal was to increase the manufacturing sector's contribution to the Gross Domestic Product (GDP) from 9.2 per cent to 15 per cent by 2022. Several policy initiatives and strategies, including Vision 2030, the Kenya Industrial Transformation Programme (KITP), the National Trade Policy, the Investment Policy, and Buy Kenya Build Kenya (BKBK), have been devised to boost Kenya's manufacturing sector (KAM, 2018). The manufacturing sector's contribution to GDP, over the last 10 years, has faced significant challenges, which has seen its contribution to GDP drop significantly from 11.08% recorded in 2011 to 7.8% in 2022. Nonetheless, Kenya hopes to reverse this trend through the Manufacturing 2030 Vision that seeks to increase the sector's contribution to GDP to 20% by 2030. The value of manufacturing output increased by 17.6% from KShs 2,700.2 billion in 2021 to 3,175.3 billion in 2022. Intermediate consumption increased by 17.3% in 2022, leading to an increase in value added by 18.1% in the same period. Compensation of employees in the sector grew by 8.1% to KShs 250.1 billion in 2022 from KShs 231.4 billion in 2021. The manufacturing sector created 352.6 thousand jobs in both the public and private sectors, which is an increase from 336.8 thousand jobs created in 2021. In 2022, the private sector created 329.6 thousand jobs, up from 313.5 thousand recorded in 2021, while the public sector exhibited a slight decline from 23.3 thousand jobs created in 2021 to 23 thousand jobs created in 2022. Over the 2017-2022 period, manufacturing sector jobs accounted for an average of 12% of total wage employees in the country. Given that a manufacturing GDP of 7.8% in 2022 was equivalent to 352.6 thousand jobs, holding other factors constant, a manufacturing GDP contribution of 20% by 2030 will yield about 1 million jobs (KAM, 2024).

LITERATURE REVIEW AND THEORY

Competitive Advantage

Competitive advantage denotes an organization's capability to sustain a superior position compared to its rivals (Porter, 1985). In the manufacturing industry, the most frequently mentioned competitive advantages include delivery speed, delivery reliability, quality, price/cost, and product customization. Delivery reliability refers to the consistent provision of the correct product at the appropriate time, while delivery speed focuses on the prompt delivery of products. Quality relates to consistently meeting or surpassing customer expectations with products. Price/cost refers to providing the lowest price in the market for products that match or exceed the quality of competitors, and product customization involves offering features, options, and models that cater to customer needs (Jin et al., 2010). Human capital serves as a vital source of lasting competitive advantage for a business (Hitt et al., 2001). Consequently, investing in the human capital of the workforce can improve both employee performance and financial outcomes (Pfeffer, 1998). Organizations that possess superior human capital resources aligned with their overall strategy tend to outperform their competitors and achieve long-term success (Carmeli & Schaubroeck, 2005). The rationale for this claim is as follows: (1) the skills and knowledge of the workforce enhance the firm's productivity, making human capital a valuable resource; (2) developing and continuously updating these skills and knowledge requires time and financial investment, which may not be feasible for all organizations, rendering human capital a scarce resource; (3) tacit knowledge, gained through social interactions within the firm, makes human capital an imperfectly imitable resource; and (4) since factors like background and experience contribute to individual development, the process of building human capital is unique to each person, making it a non-substitutable resource (Barney, 1991; Lado & Wilson, 1994). Human capital resources differentiate companies from one another and are critical to a company's competitive advantage(Carmeli & Schaubroeck, 2005). Moreover, human capital shapes a manufacturing firm's workforce infrastructure, management engagement, and training programs, all of which are essential for successfully implementing strategic initiatives such as Six Sigma and lean manufacturing (Henderson & Evans, 2000).

A company's strong human capital serves as a basis for its flexibility (Wright & Snell, 1998), which subsequently aids in adaptive performance and improves the organization's overall flexibility (Pulakos et al., 2000). For example, employees with adequate technical expertise are capable of swiftly applying their skills to new tasks and adopting innovative methods for existing ones. Strong interpersonal abilities encourage open dialogue, which helps mitigate resistance to change. When an organization has elevated levels of human capital, it can readily and rapidly reassign its workforce. Employees can quickly adjust to new positions, work effectively with unfamiliar colleagues, and make the necessary modifications to enhance performance in various scenarios (Bhattacharya et al., 2005). A seamless transition in a firm's operations fosters flexibility, allowing the organization to respond to customer demands effectively and efficiently. A company's human capital demonstrates greater adaptability when it is coordinated effectively (Kathuria & Partovi, 1999; Suarez et al., 1995). Additionally, the flexibility of a manufacturing firm has a significant effect on its competitive advantage, which is shaped by its scope, mobility, and consistency. These elements are integrated into four categories of functional flexibility: product development, production, procurement, and distribution. The hypothesized research model is illustrated in Figure 1.

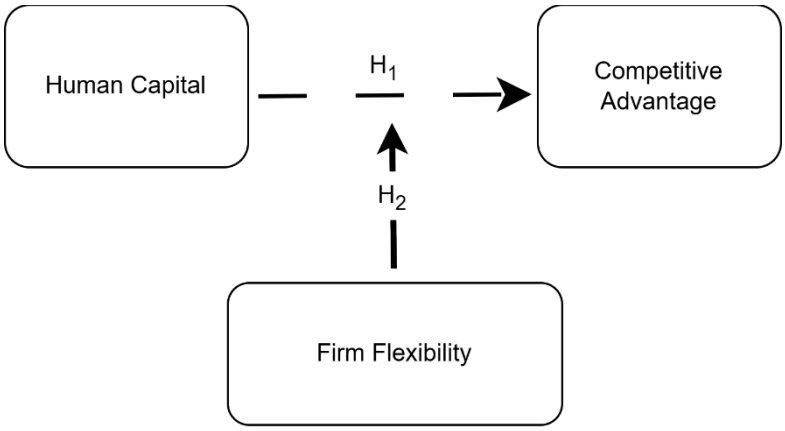

Figure 1: Relationship between Human Capital, Flexibility, and Competitive Advantages in a Manufacturing Firm.

Human Capital

Organizations have traditionally relied on factors such as product and process technology, protected market niches, and access to financial resources to shape their competitive strategies. However, in today's entrepreneurial environment—marked by market globalization, heightened competition, and rapid technological change—tangible assets no longer guarantee long-term competitive advantage (Munjuri et al., 2015). Therefore, to secure a competitive edge and enhance their survival, organizations must prioritize human and intellectual capital (Pasban & Nojedeh, 2016). A firm's human capital is assessed by the knowledge and skills possessed by its managers and employees, which are valuable to the organization (Wright et al., 2001; Jin et al., 2010). Managerial competencies can be categorized into three types: technical, interpersonal, and conceptual abilities (Katz, 1974; Porter, 1980). Technical skills refer to a manager's specialized and analytical abilities within their field, which are essential for making sound decisions and effectively resolving technical conflicts (Benson et al., 1991). Human skills involve a manager's capacity to work well with others, fostering collaboration, motivating individuals to achieve their goals, and facilitating communication. According to (Beatty, 1993), conceptual skills enable a manager to view an organization from a broad systems perspective. This ability allows them to understand the relationships between departments, the firm and its stakeholders, and how departmental decisions impact the firm, as well as how the firm's decisions affect its stakeholders.

Advanced technologies have significantly transformed firm operations and have replaced many low-skilled jobs. However, fully leveraging these technologies requires highly skilled workers (Upton, 1995; Youndt et al., 1996). The technological skills, problem-solving abilities, operational knowledge, and creativity of these workers elevate them from routine roles to knowledge workers, thereby providing firms with distinct competencies (Youndt et al., 1996). Interpersonal skills are also crucial, particularly in a collaborative work environment (Norman et al., 2002). For instance, in a just-in-time (JIT) system, a reduction in work-in-process

inventory shifts individual tasks to more collaborative efforts (Johnson & Manoochehri, 1990). These valuable managerial and worker competencies extend beyond specific "jobs" and serve as the foundation for human resource management practices like selection, training, and performance evaluation (Jin et al., 2010). As a result, researchers have increasingly emphasized these competencies, applying the resource-based view (RBV) theory to show that variations in competitive advantage can be attributed to the differences in human capital resources across firms (Barney, 1991; Wright et al., 2001). Although advanced technologies have dramatically altered firm operations and replaced many low-skilled jobs, maximizing the potential of these technologies requires highly skilled workers (Upton, 1995; Youndt et al., 1996). Workers' technological skills, problem-solving abilities, operational knowledge, and creativity elevate them from routine to knowledge workers, hence providing the firm with distinct competencies (Youndt et al., 1996). Workers' interpersonal skills are also important, especially in a teamwork environment(Norman et al., 2002). In a JIT system, for example, a reduced work-in-process inventory shifts independent individual jobs to more collaborative tasks (Johnson & Manoochehri, 1990). These valuable managerial and worker competencies transcend a single "job" and have become the foundation for human resource management processes and practices such as selection, training, and performance evaluation (Jin et al., 2010). With a greater emphasis on these competencies, researchers have applied the resource-based view (RBV) theory and discovered that differences in competitive advantage can be accounted for by the heterogeneity of human capital resources across firms (Barney, 1991; Wright et al., 2001).

Workers and managers with multiple skills and adequate knowledge in a manufacturing firm contribute to a more productive workforce structure, which minimizes the need for extensive layers of management. This enables workers to self-manage and stay highly motivated, allowing the company to operate more efficiently with a leaner workforce (Anell & Wilson, 2000; Jin et al., 2010). The extent of management involvement in strategic initiatives is influenced by the conceptual and interpersonal skills of the managers. Their commitment is crucial for fostering a supportive culture where employees share common goals and can effectively execute these initiatives (Jin et al., 2010). Strong people skills among both managers and workers enhance open communication, essential for achieving synergy within the organization. This collaboration makes team-based work more effective. In summary, superior human capital significantly boosts an organization’s productivity and effectiveness in implementing strategic initiatives aimed at enhancing competitive advantages (Kraatz & Zajac, 2001). Therefore, the following hypothesis is proposed:

Hypothesis 1: A firm’s human capital has no significant relationship with the firm’s competitive advantage

Firm Flexibility

The human capital of a firm strengthens its competitive edge by enhancing flexibility, in addition to being valuable, rare, hard to replicate, and irreplaceable. Outstanding human resources contribute to adaptive performance, which improves the overall flexibility of the organization (Pulakos et al., 2000) . Flexibility pertains to a company's capacity to respond promptly and effectively to evolving customer needs by modifying various functions like product development, production, procurement, and distribution (Jin et al., 2010). This flexibility boosts a firm's adaptability in ever-changing environments and aids in maintaining competitive advantages (Gerwin, 1993; Narasimhan et al., 2004). Flexibility includes multiple areas, such as product development, manufacturing, procurement, and distribution (Prater et al., 2001; Zhang et al., 2005). Product development flexibility refers to the ability to efficiently and effectively launch new products and implement changes (Dixon, 1992; (Koste & Malhotra, 1999). On the other hand, production flexibility indicates an organization's capability to efficiently handle various production volumes and product mixes (Koste & Malhotra, 1999); (Zhang et al., 2003). A firm's human capital enhances its competitive advantages by increasing flexibility, in addition to being valuable, rare, difficult to imitate, and irreplaceable. Exceptional human resources lead to adaptive performance, which boosts the overall flexibility of the firm (Pulakos et al., 2000). Flexibility refers to a company’s ability to respond efficiently and effectively to changing customer demands by adjusting various functions such as product development, production, procurement, and distribution (Jin et al., 2010). This flexibility enhances a firm's adaptability in dynamic environments and helps sustain competitive advantages (Gerwin, 1993; Narasimhan et al., 2004). Flexibility encompasses several areas, including product development, manufacturing, procurement, and distribution(Prater et al., 2001; Zhang

et al., 2005). Product development flexibility refers to the capability to introduce new products and make changes effectively and efficiently(Dixon, 1992; Koste & Malhotra, 1999). Meanwhile, production flexibility denotes a company's ability to manage various production volumes and product mixes efficiently (Koste & Malhotra, 1999; Zhang et al., 2003).

The effectiveness and efficiency of a company's inbound and outbound logistics systems in meeting delivery demands are influenced by procurement flexibility and distribution flexibility, respectively (Prater et al., 2001; Zhang et al., 2005). A range indicates the level of adaptability, whereas mobility reflects the responsiveness within that range, and uniformity demonstrates consistent performance throughout the entire range (Jin et al., 2010). Flexibility, or range, describes a manufacturing firm's capability to provide a diverse array of products, production outputs, and delivery options. This ability enables the firm to compete based on features, configurations, quantities, and methods of delivery. Mobility allows manufacturing companies with considerable flexibility to swiftly and cost-effectively launch new products, adjust existing ones, modify output levels and product mixes, and change logistics systems. Consequently, these companies can rapidly adapt to changes in their environment, improving their competitive advantage. Uniformity represents a manufacturing firm's ability to sustain high performance during variations in product development, manufacturing, and logistics. This capability permits firms to deliver high-quality products with dependable delivery. Given that all three dimensions—range, mobility, and uniformity—are evident across the four functional flexibilities, and because these flexibilities are interrelated, a manufacturing firm's overall flexibility plays a crucial role in enhancing its competitive edge (Jin et al., 2010). Therefore, it is hypothesized that:

Hypothesis 2: A firm's flexibility has no significant moderating role on the relationship between human capital and competitive advantage

Resource-based View (RBV) Theory

With the growing emphasis on competencies, researchers and HR professionals have utilized the resource-based view (RBV) theory and discovered that the variations in human capital resources among companies can explain differences in competitive advantages (Barney, 1991; Wright et al., 2001). Organizations that possess superior human capital resources aligned with their overall strategy tend to outperform their rivals and achieve long-term success (Carmeli & Schaubroeck, 2005; Peteraf, 1993). The rationale behind this assertion includes the following: (1) The skills and knowledge of employees enhance the firm's productivity, making human capital an essential resource; (2) These skills and knowledge require time to cultivate and need continual updating, which can be expensive and unfeasible for all organizations, rendering human capital a rare resource; (3) The tacit knowledge gained through social interactions within the firm makes human capital a resource that cannot be easily replicated; and (4) The journey of developing human capital is unique to each individual, incorporating aspects such as personal background and experiences, which means human capital is a non-replaceable resource (Barney, 1991; Lado & Wilson, 1994; Wernerfelt, 1984). Beyond being valuable, rare, imperfectly imitable, and non-substitutable, the human capital within a manufacturing firm enhances its competitive advantages by increasing the firm's flexibility. Superior human resources yield adaptive performance, which in turn boosts the overall flexibility of the organization (Pulakos et al., 2000).

METHODOLOGY

Sample and Sample Size

Due to the increasing uncertainties faced by manufacturing firms, which require a high level of flexibility, the manufacturing industry was selected for this study (Jin et al., 2010). The study involved 274 manufacturing firms that represent various manufacturing sectors. The sample was well-balanced across these sectors, with no single sector accounting for more than 30% of the total respondents. The study did not differentiate between small, medium, and large businesses based on company size or annual sales. The unit of analysis consisted of Kenyan manufacturing firms, with the sample including specific groups based on criteria such as job title and responsibilities (e.g., CEOs, finance managers, production managers, human resources and administrative managers, and senior employees). Manufacturing firms were selected from the sampling frame using the

proportional allocation method, ensuring that the sizes of the samples from different strata were proportional to the sizes of those strata (Kothari, 2004). Table 1 presents the total number of firms chosen for each stratum.

Research Instrument

An email was sent to each of the 274 manufacturing firms with a link to a website where respondents could complete the survey online. Reminder emails were sent two and three weeks after the initial email. Although web-based surveys typically receive fewer responses than mail surveys, primarily due to technical issues, such as security systems that flag many emails as junk without notifying the sender and a significant number of inactive email addresses resulting from firm relocations, the online survey offers several advantages. These benefits include fewer data entry errors, faster data collection, and lower costs. The questionnaire was adapted from the research study by(Jin et al., 2010), with some modifications.

Table 1: Sampling Frame

Sectors (KAM Code)	**Population**	**Sample Size**	**Percentage**
Service & Consultancy	3	1	0.31
Building, Mining & Construction Sector	35	10	3.64
Chemical & Allied Sector	84	24	8.75
Energy, Electrical & Electronics Sector	55	16	5.72
Food & Beverages Sector	217	62	22.60
Leather & Footwear Sector	8	2	0.83
Metal & Allied Sector	88	25	9.16
Motor Vehicle Assemblers & Accessories Sector	55	16	5.72
Paper & Board Sector	79	22	8.22
Pharmaceutical & Medical Equipment Sector	25	7	2.60
Plastic & Rubber	2	1	0.20
Fresh Produce Sector	14	4	1.45
Plastics and Rubber Sector	86	25	8.95
Textiles & Apparels Sector	67	19	6.97
Timber, Wood & Furniture Sector	27	8	2.81
Service and Consultancy Sector	115	32	11.97
	***N* = 960**	***n* = 274**	**100**

Operationalization of Study Variables

All measurement items were developed using 5-point Likert scales, where 1 represents “strongly disagree” and 5 represents “strongly agree.” A manufacturing firm’s human capital (HCAP) was assessed through two dimensions: managerial capital (HC_MCAP) and worker capital (HC_WCAP), measured by five and four items, respectively. Respondents were asked to “tick (√)” the number that best indicates their level of agreement or disagreement with each statement regarding their company. Although relying on a single respondent has been criticized for potentially providing less valid information about a firm's human capital, in many cases, a single respondent is the most viable option to provide such information. The researcher selected respondents in high-level positions within their organizations, as they are likely to offer reliable insights about the overall human capital in the company, as recommended by Jin et al. (2010). For the assessment of the manufacturing firm’s flexibility (MFF), respondents were instructed to “tick (√)” the number that best indicates their level of agreement or disagreement with each statement in comparison to industry norms. This evaluation included aspects of product development (FF_PDEV), production (FF_PROD), procurement (FF_PROC), and distribution flexibility (FF_DIST). Regarding the manufacturing firm’s competitive advantage (CAD), respondents were also asked to “tick (√)” the number that best indicates their level of agreement or disagreement with each statement as compared to industry norms in terms of delivery speed, delivery reliability, quality, price/cost, and product customization.

RESULTS

Reliability refers to the consistency of results produced by a research tool when tested multiple times (Mugenda & Mugenda, 2003). A construct is considered reliable if the alpha value is .70 or higher (George & Mallery, 2019). Cronbach's alpha, α, was used to evaluate construct reliability, with results summarized in Table 2.

Table 2: Reliability Statistics

Scale	Cronbach's Alpha	N of Items
Human Capital	.885	9
Firm's Flexibility	.837	14
Competitive Advantage	.741	3

The results indicate that the human capital scale, which includes 9 items (α = 0.885), the firm's flexibility scale, consisting of 14 items (α = 0.837), and the firm's competitive advantages scale, comprising 3 items (α = 0.741), are all considered reliable. Additionally, the overall reliability statistic of 0.861 suggests that the combined constructs are reliable.

Hypothesis 1 explored the relationship between a manufacturing firm's human capital (HCAP) and its competitive advantage (CAD). The regression analysis presented in Table 3 indicates a statistically significant and strong positive correlation between HCAP and CAD, with a correlation coefficient (R) of 0.722. This implies that, as HCAP increases, CAD also tends to increase. HCAP accounts for approximately 52.2% of the variance in CAD, as demonstrated by an R-squared value of 0.5216. However, the R-squared value indicates that there are additional factors not included in this model that also affect CAD. The coefficient for HCAP is 0.775, suggesting that a one-unit increase in HCAP is associated with a 0.775 unit increase in CAD. The very low p-values for both the overall model (Significance F) and the HCAP coefficient indicate that these results are highly statistically significant. Specifically, the p-value associated with the F-statistic (Significance F = <.001) is extremely small, nearly approaching zero, which provides strong evidence against the null hypothesis. Therefore, we reject the null hypothesis, that there is no significant relationship between human capital and the firm's competitive advantage. Similarly, the p-value associated with the t-statistic for HCAP (p-value = <.001) is also very small, reinforcing the conclusion that HCAP has a statistically significant effect on CAD.

Table 3: Regression Results on the Relationship between HCAP and CAD

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.722[a]	.521	.520	.36423
a. Predictors: (Constant), HCAP				

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	39.316	1	39.316	296.354	<.001[b]
	Residual	36.085	272	.133		
	Total	75.400	273			
a. Dependent Variable: CAD						
b. Predictors: (Constant), HCAP						

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.972	.172		5.644	<.001
	HCAP	.775	.045	.722	17.215	<.001
a. Dependent Variable: CAD						

Hypothesis 2 aimed to establish the moderating role of firm flexibility on the relationship between human capital and competitive advantage. The findings in Table 4 reveal a strong positive correlation between the predictors, including the interaction term, and competitive advantage (Multiple R = 0.728). The model explains approximately 53% of the variance in competitive advantage (R Square = 0.530), indicating a significant relationship between the variables (human capital, firm flexibility, their interaction, and competitive advantage). The ANOVA test shows that the overall model is highly statistically significant (F = 153.077, p-value = <.001), suggesting that at least one of the predictors, or their interaction, significantly influences competitive advantage. According to the coefficients, a one-unit increase in human capital corresponds to a 0.344 unit increase in competitive advantage, with this effect being statistically non-significant (t = 1.162, p-value = .246), after including MFF and the interaction term. Conversely, a one-unit increase in firm flexibility is associated with a decrease of 0.693 units in competitive advantage, which is statistically significant (t = -2.506, p-value = 0.013). The interaction term (HCAP_MFF) between HCAP and MFF is statistically significant at the 0.05 level (Beta = .961, Sig. = .050). This value indicates the effect of HCAP on CAD depends on the level of MFF, hence, the moderating role of firm flexibility on the relationship between human capital and competitive advantage. Based on the regression results and interpretation, we reject the null hypothesis "A firm's flexibility has no significant moderating effect on the relationship between human capital and competitive advantage." That is, since the statistical tests indicate that firm flexibility *does* have a significant moderating effect, we reject the claim that it has *no* significant effect. However, the moderating effect explains only a small additional amount of variance in CAD.

Table 4: Regression Results on the Moderating Role of MFF on the HCAP-CAD Relationship

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
2	.728[a]	.530	.527	.36144	.530	153.077	2	271	<.001
3	.733[b]	.537	.532	.35955	.007	3.867	1	270	.050

a. Predictors: (Constant), MFF, HCAP

b. Predictors: (Constant), MFF, HCAP, HCAP_MFF

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
2	Regression	39.996	2	19.998	153.077	<.001[b]
	Residual	35.404	271	.131		
	Total	75.400	273			
3	Regression	40.496	3	13.499	104.420	<.001[c]
	Residual	34.904	270	.129		
	Total	75.400	273			

a. Dependent Variable: CAD

b. Predictors: (Constant), MFF, HCAP

c. Predictors: (Constant), MFF, HCAP, HCAP_MFF

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
2	(Constant)	1.117	.182		6.126	<.001
	HCAP	.909	.074	.846	12.355	<.001
	MFF	-.169	.074	-.156	-2.283	.023
3	(Constant)	3.191	1.070		2.982	.003
	HCAP	.344	.296	.321	1.162	.246
	MFF	-.693	.277	-.642	-2.506	.013
	HCAP_MFF	.141	.072	.961	1.966	.050

a. Dependent Variable: CAD

DISCUSSION AND CONCLUSION

Our study emphasizes the significance of human capital and identifies two key relationships between a firm's human capital, flexibility, and competitive advantage. First, there exists a positive correlation between the human capital of a manufacturing firm and its competitive advantage. The regression analysis indicated a statistically significant and strong positive relationship between these two factors. Secondly, the findings show a strong positive correlation between the predictors, including the interaction term, and competitive advantage. The analysis demonstrated a significant positive relationship between a manufacturing company's human capital and its ability to be flexible. Nevertheless, achieving and maintaining flexibility necessitates focused human resource strategies and practices (Jin et al., 2010). The implementation of a strategic human resource management system with targeted practices has been shown to improve overall firm performance and bolster the firm's competitive edge by making it hard for rivals to replicate (Liu et al., 2007).

Based on Jin et al. (2010), the human capital of a manufacturing company impacts its flexibility and performance in two distinct ways: there is a direct positive correlation between human capital and flexibility, and human capital resources are indirectly linked to competitive advantages by way of the firm's flexibility. Furthermore, both the internal strategic human capital and the flexibility of external suppliers are crucial for a manufacturing company to sustain the flexibility that enhances its competitive edge. Lastly, even though the moderating influence of firm flexibility on the link between human capital and competitive advantage was only slightly significant, flexibility continues to be an essential element that clarifies this connection, particularly in the current volatile environment. Furthermore, while technology can enhance flexibility, the expertise of the employees utilizing that technology holds even greater importance. For example, the effective execution of Six Sigma relies not on the specific software acquired but rather on the skills of the employees managing the software (Jin et al., 2010). In conclusion, Jin et al. (2010) suggest that focused practices in human resource management, such as hiring, training and development, and incentives, can greatly improve the overall flexibility of a manufacturing company. The initial step towards achieving flexibility within a business is to choose individuals who have skills associated with flexibility. Efficient selection techniques ensure the hiring of employees who have the essential skills to enhance the firm's adaptability.

Furthermore, this method can enhance the alignment of employees with the organization's values and culture, which is vital for maintaining valuable human capital (Liu et al., 2007). Job knowledge assessments, recognized for their high reliability, are effective for evaluating technical skills, as highlighted by (Schmitt et al., 1997), and involve relatively low administrative expenses and minimal adverse effects (Ryan & Tippins, 2004). Identifying individuals with the necessary technical, interpersonal, conceptual, and technological skills for promoting flexibility is a crucial first step, but equally important is the support of these skills through training and development, particularly in fast-changing industries. Training not only enhances these skills but also allows employees to apply them effectively in their jobs (Noe, 2010). Besides choosing individuals with the appropriate skills and offering training and development, it is essential to encourage employees to make use of their skills by implementing suitable reward systems. Providing adequate compensation that reflects industry standards, market value, and employees' knowledge, skills, and abilities is crucial for promoting motivation. Competitive pay also aids companies in attracting and retaining talented individuals with exceptional skills and training (Liu et al., 2007).

Organizations must ensure that their human resource management strategies are cohesive with one another, considering both the industry context and the overarching strategy (Liu et al., 2007). For example, a business functioning in a rapidly evolving technological sector, characterized by short product life cycles and a demand for swift customer responsiveness, should focus on hiring individuals with robust technical and conceptual abilities that facilitate non-routine problem-solving and innovative thinking (Anell & Wilson, 2000). Given that this company will have made considerable investments in acquiring these skills, further training may be redundant, counterproductive, or distracting (Liu et al., 2007). Ultimately, understanding the relationships between a firm's human capital, its adaptability, and its competitive edge can assist practitioners in crafting innovative human resource management strategies that enhance efficiency, effectiveness, and overall profitability (Jin et al., 2010).

In conclusion, the regression analysis revealed a strong, positive, and statistically significant relationship between HCAP and CAD. Higher HCAP scores correspond to increased CAD scores, and HCAP accounts for a substantial portion of the variability in CAD within the model. Although HCAP serves as a strong predictor, other influencing factors warrant exploration in future research to develop a more comprehensive model. The significant interaction term (HCAP_MFF) indicates that the relationship between HCAP and CAD is affected by MFF. The strength and direction of HCAP's effect on CAD vary depending on the level of MFF. Notably, the fact that the direct effect of HCAP becomes non-significant in Model 3 suggests that the effect of HCAP on CAD is conditional upon MFF. The positive coefficient for the interaction term implies that the positive effect of HCAP on CAD may be stronger at higher levels of MFF. Conversely, MFF exerts a direct negative influence on CAD, indicating that higher MFF levels are associated with lower CAD levels, irrespective of HCAP. Ultimately, the regression analysis showed that MFF significantly moderates the relationship between HCAP and CAD, while also possessing a direct negative effect on CAD. However, this moderating effect accounts for only a small additional variance in CAD. Further exploration of this interaction is recommended for a more nuanced understanding.

REFERENCES

1. Anell, B. I., & Wilson, T. L. (2000). The flexible firm and the flexible coworker. Journal of Workplace Learning, 12(4), 165–170. https://doi.org/10.1108/13665620010332831
2. Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. Journal of Management, 17(1), 99–0.
3. Beatty, C. (1993). Implementing advanced manufacturing technologies: Rules of the road Sloan Management Review. Long Range Planning, 33(4), 49–60.
4. Benson, P. G., Saraph, J. V, & Schroeder, R. G. (1991). The Effects of Organizational Context on Quality Management: An Empirical Investigation. Management Science, 37(9), 1107–1124. https://doi.org/10.1287/mnsc.37.9.1107
5. Bhattacharya, M., Gibson, D., & Doty, D. (2005). The Effects of Flexibility in Employee Skills, Employee Behaviors, and Human Resource Practices on Firm Performance. Journal of Management - J MANAGE, 31, 622–640. https://doi.org/10.1177/0149206304272347
6. Carmeli, A., & Schaubroeck, J. (2005). How leveraging human resource capital with its competitive distinctiveness enhances the performance of commercial and public organizations. In Human Resource Management (Vol. 44, Issue 4, pp. 391–412). https://doi.org/10.1002/hrm.20081
7. George, D., & Mallery, P. (2019). Reliability Analysis (pp. 235–246). https://doi.org/10.4324/9780429056765-19
8. Gerwin, D. (1993). Manufacturing Flexibility: A Strategic Perspective. Management Science, 39(4), 395–410. https://doi.org/10.1287/mnsc.39.4.395
9. Henderson, K., & Evans, J. (2000). Successful implementation of Six Sigma: Benchmarking General Electric Company. Benchmarking: An International Journal, 7, 260–282. https://doi.org/10.1108/14635770010378909
10. Hitt, M. A., Bierman, L., Shimizu, K., & Kochhar, R. (2001). Direct and Moderating Effects of Human Capital on Strategy and Performance in Professional Service Firms: A Resource-Based Perspective. Academy of Management Journal, 44(1), 13–28. https://doi.org/10.5465/3069334
11. Jin, Y., Hopkins, M. M., & Wittmer, J. L. S. (2010). Linking human capital to competitive advantages: Flexibility in a manufacturing firm's supply chain. Human Resource Management, 49(5), 939–963. https://doi.org/10.1002/hrm.20385
12. Johnson, T., & Manoochehri, G. H. (1990). Adopting JIT: Implications for Worker Roles and Human Resource Management. Industrial Management, 32(3), 2–6.
13. KAM. (2018). Manufacturing Priority Agenda 2018.
14. KAM. (2024). Manufacturing Priority Agenda (MPA) 2024: Steering economic growth through the manufacturing sector for common good.
15. Kathuria, R., & Partovi, F. Y. (1999). Work force management practices for manufacturing flexibility. Journal of Operations Management, 18(1), 21–39. https://doi.org/https://doi.org/10.1016/S0272-6963(99)00011-X
16. Katz, R. L. (1974). Skills of an Effective Administrator. Harvard Business Review, 52(5), 90–102.

17. Koste, L. L., & Malhotra, M. K. (1999). A theoretical framework for analyzing the dimensions of manufacturing flexibility. Journal of Operations Management, 18(1), 75–93. https://doi.org/https://doi.org/10.1016/S0272-6963(99)00010-8
18. Kothari, C. R. . (2004). Research methodology: methods & techniques. New Age International (P) Ltd.
19. Kraatz, M. S., & Zajac, E. J. (2001). How organizational resources affect strategic change and performance in turbulent environments: Theory and evidence. Organization Science, 12(5), 632–657. https://doi.org/10.1287/orsc.12.5.632.10088
20. Lado, A. A., & Wilson, M. C. (1994). Human resource systems and sustained competitive advantage: A competency-based perspective. The Academy of Management Review, 19(4), 699–727. https://doi.org/10.2307/258742
21. Liu, Y., Combs, J., Jr, D., & Ireland, R. (2007). The Value of human resource management for organisational performance. Business Horizons, 50, 503–511. https://doi.org/10.1016/j.bushor.2007.07.002
22. Mugenda, O. M., & Mugenda, A. G. (2003). Research Methods: Quantitative and Qualitative Approaches (3rd ed.). ACTS Press.
23. Munjuri, M. G., K'Obonyo, P., & Ogutu, M. (2015). Human Capital and Performance of Commercial Banks and Insurance Firms in Kenya. 157–170.
24. Narasimhan, R., Talluri, S., & Das, A. (2004). Exploring Flexibility and Execution Competencies of Manufacturing Firms. Journal of Operations Management, 22, 91–106. https://doi.org/10.1016/j.jom.2003.12.003
25. Noe, R. A. (2010). Human Resource Management: Gaining a Competitive Advantage. McGraw-Hill Irwin. https://books.google.co.ke/books?id=ADWCRAAACAAJ
26. Norman, B., Tharmmaphornphilas, W., Needy, K., Bidanda, B., & Warner, R. (2002). Worker assignment in cellular manufacturing considering technical and human skills. International Journal of Production Research - INT J PROD RES, 40, 1479–1492. https://doi.org/10.1080/00207540110118082
27. Nzuve, S. N. M., & Bundi, E. G. (2010). Human Capital Management Practices and Firm Performance: A Survey of Commercial Banks in Kenya. http://ssrn.com/abstract=2144691http://ssrn.com/abstract=2144691
28. Pasban, M., & Nojedeh, S. H. (2016). A Review of the Role of Human Capital in the Organization. Procedia - Social and Behavioral Sciences, 230, 249–253. https://doi.org/10.1016/j.sbspro.2016.09.032
29. Peteraf, M. A. (1993). The Cornerstones of Competitive Advantage: A Resource-Based View. Strategic Management Journal, 14(3), 179–191. http://www.jstor.org/stable/2486921
30. Pfeffer, J. (1998). The Human Equation: Building Profits by Putting People First. Harvard Business School Press.
31. Porter, M. E. (1980). Competitive Strategy: Techniques for Analyzing Industries and Competitors. Free Press.
32. Porter, M. E. (1985). The Competitive Advantage: Creating and Sustaining Superior Performance. Free Press.
33. Prater, E., Biehl, M., & Smith, M. (2001). International Supply Chain Agility—Tradeoffs between Flexibility and Uncertainty. International Journal of Operations & Production Management, 21. https://doi.org/10.1108/01443570110390507
34. Pulakos, E., Arad, S., Donovan, M., & Plamondon, K. (2000). Running Head: ADAPTIVE PERFORMANCE Adaptability in the Workplace: Development of a Taxonomy of Adaptive Performance. The Journal of Applied Psychology, 85, 612–624. https://doi.org/10.1037/0021-9010.85.4.612
35. Dixon, R. J. (1992). Measuring manufacturing flexibility: An empirical investigation. European Journal of Operational Research, 60(2), 131–143. https://doi.org/https://doi.org/10.1016/0377-2217(92)90088-Q
36. Ryan, A. M., & Tippins, N. T. (2004). Attracting and selecting: What psychological research tells us. Human Resource Management, 43(4), 305–318. https://doi.org/10.1002/hrm.20026

37. Schmitt, N., Rogers, W., Chan, D., Sheppard, L., & Jennings, D. (1997). Adverse impact and predictive efficiency of various predictor combinations. Journal of Applied Psychology, 82(5), 719–730. https://doi.org/10.1037/0021-9010.82.5.719
38. Suarez, F. F., Cusumano, M. A., & Fine, C. H. (1995, October 15). An Empirical Study of Flexibility in Manufacturing. MIT Sloan Management Review, 25–32.
39. Tumwine, S., Nasiima, S., & Kamukama, N. (2014). Human Capital Elements and their Influence on Performance: Evidence from Uganda's Manufacturing Firms. Global Journal of Management and Business Research, 14(2), 18–28.
40. Upton, D. M. (1995). Flexibility as process mobility: The management of plant capabilities for quick response manufacturing. Journal of Operations Management, 12(3), 205–224. https://doi.org/https://doi.org/10.1016/0272-6963(95)00004-C
41. Wernerfelt, B. (1984). A Resource-Based View of the Firm. Strategic Management Journal, 5(2), 171–180. http://www.jstor.org/stable/2486175
42. Wright, P. M., Dunford, B. B., & Snell, S. A. (2001). Human resources and the resource based view of the firm. Journal of Management, 27(2), 701–721.
43. Wright, P. M., & Snell, S. A. (1998). Toward a Unifying Framework for Exploring Fit and Flexibility in Strategic Human Resource Management. The Academy of Management Review, 23(4), 756–772. https://doi.org/10.2307/259061
44. Youndt, M. A., Snell, S. A., Dean, J. W., & Lepak, D. P. (1996). Human Resource Management, Manufacturing Strategy, and Firm Performance. The Academy of Management Journal, 39(4), 836–866. https://doi.org/10.2307/256714
45. Zhang, Q., Vonderembse, M. A., & Lim, J.-S. (2003). Manufacturing flexibility: defining and analyzing relationships among competence, capability, and customer satisfaction. Journal of Operations Management, 21(2), 173–191. https://doi.org/https://doi.org/10.1016/S0272-6963(02)00067-0
46. Zhang, Q., Vonderembse, M., & Lim, J. S. (2005). Logistics flexibility and its impact on customer satisfaction. International Journal of Logistics Management, The, 16, 71–95. https://doi.org/10.1108/09574090510617367