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Joint Influence of Internal & External Operating Environments on Accuracy of Performance Forecasting

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ABSTRACT

This article analyses the influence of the combined effect of the internal (IOE) and external (EOE) operating environments on the accuracy of performance forecasting (APF) in large manufacturing firms (LMFs) in Kenya. The objective of this study was to assess if the combined effect of the operating environments precipitated any change in any of the measures of APF. Against the backdrop of internal management conflicts of interest and exogenous events, poor forecasting in LMFs is commonplace. However, in recent times, LMFs have tended to hire skilled forecasting personnel. This study therefore, assumes that the qualified forecasting staff ensures accuracy in preparing future budgets. Both IOE and EOE are said to influence the performance of manufacturing operations. The study identified IOE and EOE influencers of firm performance and tested these against critical measures of APF. To isolate statistical significance of results, regression analysis was applied using data collected through a structured questionnaire administered among randomly selected LMFs. Results indicated that there was evidence that the combined effect of IOE and EOE had a moderating influence on APF through ROS when objective forecasting was applied, and through EV when combination forecasting was used.

1. Introduction

In evaluating accuracy of forecasts most researchers have tended to use past data only and trends with minimal attention being paid to existing dynamics in the operating environments. Often, there exist factors within internal and external operating environments that affect accuracy in business performance and, ultimately, accuracy of forecasts. While a number of problems in an organization can be discerned from audit and consultants' reports, financial data, the internet, newspaper and magazine articles, general public talk, commenting and suggesting solutions about past internal management weaknesses, staff attitudes, shifts in demographics, competitors and attitudes of customers minimal emphasis is placed on the impact of existing and future operating environments when preparing future budgets. Whereas, in general, the simple act of compiling information from separate sources can give a substantial amount of previously unseen insights into problems a LMF may be facing, assessing future trends without examining current and future environmental conditions poses a challenge for management resulting in budgets being prepared based only on hindsight. In times of fast-paced change, companies look to their leaders for vision, values, and confidence. The beginning of this 21st century has undoubtedly brought radical change to our lives and we are experiencing one of the most thoroughly documented industrial revolutions in mankind's history. To navigate this turbulent time, businesses need leaders with foresight and agility. But what defines good business leadership today? Are they the same qualities that brought names to fame in the past?

While causes of decline in the performance of any business may include external environmental factors such as commodity price shocks, political interventions, technology changes and low-cost foreign competition, the impact of the internal operating environment can also be deleterious. A number of the characteristics of management that cause terminal decline in many firms are virtually indistinguishable from those that are responsible for success in a large number of organizations. Inappropriate management tends to kill companies. However, it can also be argued that what constitutes appropriate management changes significantly during the life cycle of a company or even product, most notably when it comes under competitive threat, including poor control systems, cost slippage and general staff attitudes. EOE of an organization includes factors outside of the company that affect the company's ability to function optimally. Whereas some of these external elements can be manipulated by a company's marketing strategy, other factors call for the organization to make radical adjustments. Organizations are encouraged to monitor the critical components of their organization's external operating environment and keep a close watch at all times. On the other hand, IOE comprises factors within a firm which impact the success or otherwise of the business. Unlike the EOE, firms have control over factors of the IOE. Whereas it is important to recognize potential opportunities and threats outside company operations, identifying and managing the weaknesses and strengths of internal operations is key to business success. Leadership and other management styles impact organizational culture and structure and the strength of employees manifests itself as an essential internal business factor. Processes and relationships among departments help to improve effectiveness and efficiency resulting in better performance and hence APF.

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Depending on the prevailing business climate and internal operating circumstances, the joint effect of the external and internal operating environments can either result in an adverse or favouarble business outcome over a specified forecasting period. This study examines the various factors of both operating environments and identifies their joint influence on APF. APF remains a key fundamental in predicting the future performance of any LMF as managers grapple to understand about the future before it happens. APF can help in developing strategies to promote profitable trends and to avoid unprofitable ones. This study tested the combined influence of the EOE and IOE on APF in LMFs, in Kenya.

2. Literature Review

In general, investments work effectively because of demographics. Populations grow, incomes increase, and more people with more money buy more products. Great companies will do more than their share of selling stuff to people. Great companies will also control costs and boost productivity better than their competitors and will adapt to change faster than their competitors. Great companies not only survive, they thrive; and part of the reason is that they understand their customers. They 'get' demographics. So, investors need to do the same thing. Investors need to keep an eye on demographic trends because these are the customers of the future. Scholars have observed that forecasting accuracy can be affected by both the external and internal operating environments. According to Kibera (1996) business operating environment comprises internal factors, task environment (customers, new entrants, competitors, suppliers and substitutes), remote environment (political, economic, socio-cultural, technological, geo-ethnical factors) and ultra remote environments (earthquakes, natural calamities, and wars). The researcher posits that demographic characteristics in terms of age, size, education levels, structure, diversity and background have an effect on business performance. This assertion implies that an inaccurate assessment of the demographic characteristics of the consumer market results in an inaccurate forecast for a LMF. Kibera, further, proposes that business context consists of various dimensions and that the environment can be classified as stable, changing or turbulent. On his part, Porter (1979) envisioned a five forces framework where the external environment influences bargaining power. In this model, factors of the external operating environment include customers, competitors, buyers' demographic characteristics, suppliers and substitute products.

LMFs, in Kenya, grapple with competitive challenges posed by subsidized imports, counterfeit and sub-standard goods and substitute products. This means locally manufactured goods are more costly than imported products, which negatively impacts their customer base. Further, the average import tariff has been perceived not to be protective enough compared to other countries like India or South Africa. Supplier power resulting from raw material imports and instability in exchange rates, pose a setback as the resulting prices of final products become prohibitive. The model of pure competition implies that risk-adjusted rates of return should be constant across firms and industries. However, numerous economic studies have affirmed that different industries can sustain different levels of profitability; part of this difference being explained by industry structure. For this study therefore, key variables that were tested within the external operating environment that are common among different LMFs included demographic characteristics, competitors, customers, suppliers and substitute products.

According to Khandwalla (1977), organizational performance is enhanced when there is a good 'fit' between management style and various contextual factors which include leadership, strategy, structure and organizational culture. These factors can be measured through market share, customer satisfaction, corporate image, profitability and business growth. Researchers have defined strategy differently, but with the same logic of planning for superior performance. Mintzberg and Quinn (1996) defined strategy as the plan that integrates an organization's major goals, policies, and action sequences into a cohesive whole. Thompson and Strickland (1993) defined strategy as "the pattern of organizational moves and managerial approaches used to achieve organizational objectives and to pursue the organization's mission". Porter (1996), states that "The essence of strategy is choosing to perform activities differently than rivals do". According to Zahra (1993), a strategy offers a framework within which the company defines possible means for achieving goals. Much literature has emphasized the benefits of planning for the company's performance in a competitive environment. In Lohrey's (2017) assessment of factors affecting sales forecasting, the researcher asserts that although accurate sales forecasts are essential to achieve long-term growth and profitability goals, many small-business owners struggle with forecasting tasks. The writer postulates that sales forecasting does involve crunching numbers, and the need to base it on reliable information. It also involves some other factors, including getting all of the responsible employees to buy into the importance of the report. This observation reinforces Khandwalla's view about there being "a good fit between management style and various contextual factors". On his part, Pearson (2006) states that the way a company views and approaches forecasting affects both the quality and accuracy of sales forecast results. The approach includes the expectations, criteria, systems and the people involved in creating forecasts. He concludes that individual team member attitudes, such as whether there is a total buy-in from everyone involved about the importance of accurate forecasting and its connection to long-term business success, affects sales forecasts. In my view, total buy-in is the antecedent to APF and panacea for all corporate ills in performance enhancement.

Hage et al (1971) observe that organizational structure refers to an organization's internal pattern of relationships, authority and communication. Johnson and Scholes (1984) defined corporate culture as being 'the deeper level of basic values, assumptions and beliefs that are shared by members of an organization'. These norms govern the behavior of people within the company and are reflected within an organizational culture and manifested through the rites, rituals and routines that take place within an organization, the language used, the stories, legends and myths that are told and re-told, the symbols, logos and artifacts that are found throughout the company. The key feature is that culture is taught to new members as the correct way to behave, thus perpetuating organizational survival and growth (Maull et al., 2001). While it may be claimed that any deviation from the culture can result in a dysfunctional entity and affect the performance of the company, it is this writer's belief that with current technological advances where some individuals can telecommute/work from home, the impact of certain features of culture on them is vanquished.

According to Vecchio and Appelbaum (1995), leadership is a process through which a person tries to get others in the organization to do what he or she wants. Sleeth et al. (1996) state that actions that link people and tasks to accomplish work are what leadership is. Aosa (1998) asserts that leadership is the ability to influence others to strive towards achieving organizational objectives by mobilizing and showing people the way forward. Allen and Kraft (1987) define successful leadership as the ability to bring about sustained culture change. These scholars posit that a leader has the responsibility for allocating tasks, duties, structuring the organization and distributing materials and financial resources. In light of the above, factors of the IOE tested for this study included: leadership, strategy, structure and culture.

3. Conceptual Framework

In corporate planning in Kenya, APF is perceived as an adjunct to the larger notion of firm performance. Fahy & Smithee (1999) posit that "forecasting models are conceptualized on the premise that the desired outcome of organizations is to achieve a sustainable competitive advantage that allows them to earn above-average returns". This study demonstrates the finding that the combined effect of IOE and EOE has a moderating influence on APF in LMFs, in Kenya. A moderator variable is a third variable that affects the strength of the relationship between a dependent and independent variable in correlation. The conceptual framework, Figure 1, displays the linkages in the variables of interest whose results showed that the combined effect of the environments had a moderating influence on some measures of APF to some extent.

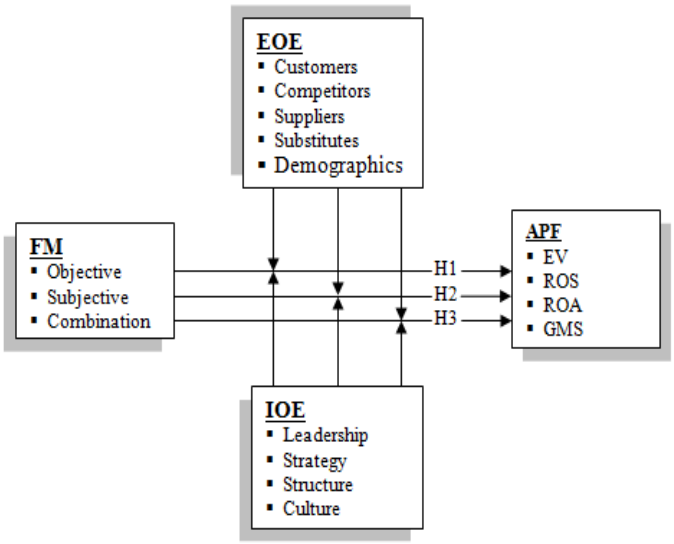

Figure 1. Conceptual Framework

3.1 Indicators of Accuracy of Performance Forecasting

According to Chindia (2017) the following dependent variables of APF can be used in this type of study:

3.1.1 Profit Growth (PG)

Profit growth, often denoted as Expected Value (EV), is a measure of a firm's growth in profit year-on-year computed in real terms to eliminate distortions introduced by fluctuations in currencies. The EV gives an indication of how a firm is managing costs while increasing prices at the same time even in a market with intense rivalry and diminishing purchasing power. If a firm's forecasts are unbiased and accurate the actual EV yield will approximate expected performance.

3.1.2 Return on Sales (ROS)

ROS is a ratio that is used to evaluate a company's operational efficiency.

It can also be described as a firm's operating profit margin.It measures a company's performance by analyzing what percentage of total company revenues are actually converted into company profits. Mathematically, ROS is calculated by dividing the operating profit by the net sales for that period.

3.1.3 Return on Assets (ROA)

ROA demonstrates how profitable a company is relative to its total assets. It gives an indication as to how efficient management is at utilizing its assets to generate earnings. It is calculated by dividing a company's annual earnings by its total assets, and is generally displayed as a percentage.

3.1.4 Growth in Market Share (GMS)

Market share is the percentage of an industry or market's total sales that is earned by a particular company over a specified time period. Market share is calculated by taking the company's sales over the period and dividing it by the total sales of the industry over the same period. Growth in market share year-on-year indicates growth in sales of a company relative to the industry total. For example, if a company's sales were S_1 in period one and S_2 in period two while the industry total sales were T_1 and T_2 respectively, then growth in market share, as a ratio, would be computed as $(S_2-S_1)/T_2$.

4. Hypothesis

H1: The combined effect of IOE and EOE has a moderating influence on the relationship between objective forecasting method and APF in LMFs, in Kenya.

H2: The combined effect of IOE and EOE has a moderating influence on the relationship between judgmental forecasting method and APF in LMFs, in Kenya.

H3: The combined effect of IOE and EOE has a moderating influence on the relationship between combined forecasting method and APF in LMFs, in Kenya.

5. Results

H1: The combined effect of IOE and EOE has a moderating influence on the relationship between objective forecasting method and APF in LMFs, in Kenya. This hypothesis was defragmented into four sub-hypotheses in order to address the implications of the combined moderator variable (IOE/EOE) on each dependent variable (performance measures) while applying different independent variables (FMs).

H1a: Both internal and external operating environments have a moderating effect on the relationship between objective forecasting method and expected value. Expected value was the dependent variable. The combined variables of the internal and external operating environments were moderator variables and the objective forecasting method was the independent variable. Table 1 yielded results of analysis of variance that gave coefficients of the variables. An examination of the p-values of the variables revealed that none of them was statistically significant, where the table p-value is less than 0.05. This implied that no relationships existed among these variables. Hypothesis H1a was therefore, rejected and concluded that the combined effect of the IOE and EOE did not have a moderating influence on the relationship between objective forecasting and expected value.

H1b: Both the internal and external operating environments have a moderating effect on the relationship between an objective forecasting method and ROS.

ROS was used as a performance measure which was regressed against the internal and external operating environments and an objective forecasting method. Table 2 provided coefficients of the variables.

Table 1. External and Internal Operating Environments – Coefficients.

Model		Un-standardized Coefficients		Standardized Coefficients	t-Value	p-Value
		Beta	Std. Error	Beta		
1	(Constant)	1.042	0.624		1.669	0.097
	Competitors	0.031	0.114	0.023	0.276	0.783
	Customers	0.011	0.112	0.008	0.095	0.925
	Substitutes	0.060	0.045	0.103	1.325	0.187
	Suppliers	0.004	0.016	0.020	0.257	0.798
	Demographics	0.033	0.061	0.043	0.542	0.589
2	(Constant)	1.299	1.049		1.239	0.217
	Competitors	0.085	0.118	0.062	0.718	0.474
	Customers	0.020	0.114	0.015	0.174	0.862
	Substitutes	0.105	0.052	0.182	2.015	0.046
	Suppliers	0.008	0.017	0.037	0.461	0.646
	Demographics	0.006	0.068	0.007	0.083	0.934
	Leadership	-0.065	0.108	-0.055	-0.607	0.544
	Strategy	0.060	0.058	0.086	1.039	0.300
	Structure	-0.187	0.125	-0.137	-1.496	0.137
	Culture	0.058	0.137	0.035	0.423	0.673
	Objective method	0.019	0.066	0.023	0.280	0.779

Dependent Variable: Expected Value (EV)

Table 2. External and Internal Operating Environments – Coefficients.

Model		Un-standardized Coefficients		Standardized Coefficients	t-Value	P-Value
		Beta	Std. Error	Beta		
1	(Constant)	8.089	3.282		2.465	0.015
	Competitors	0.605	0.599	0.085	1.011	0.314
	Customers	-0.114	0.587	-0.016	-0.194	0.846
	Substitutes	0.058	0.237	0.019	0.243	0.808
	Suppliers	-0.042	0.085	-0.038	-0.488	0.626
	Demographics	-0.106	0.319	-0.026	-0.333	0.740
2	(Constant)	14.857	5.414		2.744	0.007
	Competitors	0.700	0.608	0.098	1.152	0.251
	Customers	-0.305	0.588	-0.044	-0.519	0.604
	Substitutes	0.163	0.270	0.054	0.603	0.547
	Suppliers	-0.085	0.086	-0.078	-0.994	0.322
	Demographics	0.171	0.352	0.042	0.485	0.628
	Leadership	-0.096	0.556	-0.015	-0.173	0.863
	Strategy	-0.120	0.300	-0.033	-0.402	0.689
	Structure	-0.456	0.646	-0.064	-0.707	0.481
	Culture	-0.145	0.708	-0.017	-0.204	0.838
	Objective method	-1.055	0.343	-0.246	-3.077	0.002

Dependent Variable: ROS

On examination of the p-values of these variables, it was found that when the moderator variables were introduced, the objective forecasting method became statistically significant with $p = 0.002$, where the theoretical p-value is less than 0.05. This resulted in the following relationship:

Return on sales=14.857–1.055 Objective forecasting method.
(0.007) (0.002)

This implied that a unit marginal change in the use of the objective forecasting method resulted in decline of 1.055 units in ROS. Hypothesis H1b was therefore, accepted and concluded that the combined effect of the IOE and EOE had a moderating effect on the relationship between the objective forecasting technique and return on sales.

H1c: Both internal and external operating environments have a moderating effect on the relationship between the objective forecasting method and ROA.

ROA was used as a performance measure against both the internal and external operating environments and the objective forecasting method as the interaction variable. Table 3 provided a summary of the coefficients of the variables whose p-values were statistically not significant at the theoretical p-value of ≤ 0.05. Hypothesis H1c was therefore, rejected and concluded that the combined effect of the internal and external operating environments did not have a moderating effect on the relationship between the objective forecasting method and return on assets.

H1d: Both internal and external operating environments have a moderating effect on the relationship between the objective forecasting method and growth in market share (GMS). GMS was used as a performance measure which was regressed against the internal and external operating environments and the objective forecasting technique. Table 4 yielded coefficients of the variables where none of their p-values was statistically significant where the theoretical p-value is less than 0.05. This signified that no relationships existed among these variables. Hypothesis H1d was therefore, rejected and concluded that internal and external operating environments combined did not have a moderating effect on the relationship between the objective forecasting method and growth in market share.

H2: The combined effect of IOE and EOE has a moderating influence on the relationship between judgmental forecasting and APF in LMFs, in Kenya. The hypothesis was split in four parts in order to address each of the performance measures as follows:

Table 3. External and Internal Operating Environments – Coefficients.

Model		Un-standardized Coefficients		Standardized Coefficients	t-Value	P-Value
		Beta	Std. Error	Beta		
1	(Constant)	1.832	1.773		1.033	0.303
	Competitors	0.190	0.324	0.048	0.586	0.558
	Customers	0.231	0.317	0.060	0.729	0.467
	Substitutes	0.043	0.128	0.026	0.335	0.738
	Suppliers	0.001	0.046	0.002	0.028	0.978
	Demographics	-0.425	0.172	-0.191	-2.469	0.015
2	(Constant)	3.127	3.007		1.040	0.300
	Competitors	0.179	0.338	0.046	0.531	0.596
	Customers	0.181	0.327	0.047	0.552	0.581
	Substitutes	0.080	0.150	0.048	0.530	0.597
	Suppliers	-8.467E-5	0.048	0.000	-0.002	0.999
	Demographics	-0.358	0.196	-0.161	-1.829	0.069
	Leadership	0.213	0.309	0.062	0.689	0.492
	Strategy	-0.086	0.166	-0.043	-0.519	0.604
	Structure	-0.293	0.359	-0.074	-0.816	0.416
	Culture	-0.201	0.393	-0.042	-0.511	0.610
	Objective method	0.028	0.190	0.012	0.149	0.881

Dependent Variable: ROA

Table 4. External and Internal Operating Environments – Coefficients,

Model		Un-standardized Coefficients		Standardized Coefficients	t-Value	P-Value
		Beta	Std. Error	Beta		
1	(Constant)	37.402	13.036		2.869	.005
	Competitors	2.225	2.380	0.079	0.935	0.351
	Customers	-1.957	2.332	-0.071	-0.839	0.403
	Substitutes	-0.516	0.943	-0.043	-0.548	0.585
	Suppliers	-0.089	0.339	-0.021	-0.264	0.792
	Demographics	-0.186	1.266	-0.012	-0.147	0.884
2	(Constant)	68.531	21.844		3.137	0.002
	Competitors	3.568	2.453	0.126	1.455	0.148
	Customers	-2.384	2.374	-0.086	-1.004	0.317
	Substitutes	0.638	1.091	0.053	0.585	0.559
	Suppliers	-0.099	0.346	-0.023	-0.287	0.775
	Demographics	-0.322	1.420	-0.020	-0.226	0.821
	Leadership	-3.206	2.242	-0.129	-1.430	0.155
	Strategy	-0.052	1.209	-0.004	-0.043	0.966
	Structure	-3.072	2.605	-0.108	-1.179	0.240
	Culture	-1.969	2.858	-0.057	-0.689	0.492
	Objective method	-0.480	1.383	-0.028	-0.347	0.729

Dependent Variable: GMS

Table 5. External and Internal Operating Environments – Coefficients.

Model		Un-standardized Coefficients		Standardized Coefficients	t- Value	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.042	0.624		1.669	0.097
	Competitors	0.031	0.114	0.023	0.276	0.783
	Customers	0.011	0.112	0.008	0.095	0.925
	Substitutes	0.060	0.045	0.103	1.325	0.187
	Suppliers	0.004	0.016	0.020	0.257	0.798
	Demographics	0.033	0.061	0.043	0.542	0.589
2	(Constant)	1.416	1.026		1.380	0.170
	Competitors	0.073	0.119	0.054	0.615	0.539
	Customers	0.014	0.114	0.011	0.126	0.900
	Substitutes	0.103	0.052	0.177	1.960	0.052
	Suppliers	0.008	0.016	0.038	0.484	0.629
	Demographics	0.011	0.066	0.014	0.169	0.866
	Leadership	-0.051	0.108	-0.042	-0.469	0.640
	Strategy	0.051	0.060	0.072	0.848	0.397
	Structure	-0.161	0.130	-0.118	-1.244	0.215
	Culture	0.068	0.138	0.041	0.493	0.622
	Judgmental method	-0.048	0.068	-0.063	-0.708	0.480

Dependent Variable: Expected value

H2a: Both internal and external operating environments have a moderating effect on the relationship between the judgmental forecasting method and expected value. Expected value was used as a performance measure against the internal and external operating environments and the judgmental forecasting method. Table 5 yielded regression coefficients of the variables and on examining their p-values, none of them was statistically significant where the theoretical p-value is less than 0.05. This implied that no relationships existed among these variables.

Hypothesis H1e was therefore, rejected and concluded that the combined effect of both internal and external operating environments had no moderating influence on the relationship between the judgmental forecasting method and expected value.

H2b: Both internal and external operating environments combined have a moderating effect on the relationship between judgmental forecasting technique and ROS. The ROS was used as a performance measure and regressed against both internal and external operating environments and judgmental forecasting method. Table 6 below displayed coefficients of the variables, and on examining their p-values, none of these variables was statistically significant where the theoretical p-value is less than 0.05. This implied that no relationships existed among these variables. Hypothesis H1f was therefore, rejected and concluded that the combined effect of internal and external operating environments did not have an influence on the relationship between judgmental forecasting and return on sales.

H2c: The combined effect of internal and external operating environments has a moderating effect on the relationship between judgmental forecasting method and ROA. ROA was used as a performance measure and regressed against internal and external operating environments and judgmental forecasting method. Table 7 summarized the coefficients of the variables, after the introduction of the moderator variables, which indicated that none of the variables was statistically significant at the table p-value of less than 0.05. Therefore, there were no relationships among these variables, signifying that the combined effect of internal and external operating environments had no moderating influence on the relationship between judgmental forecasting method and ROA. Hypothesis H1g was therefore, rejected.

H2d: Both internal and external operating environments have a moderating effect on the relationship between judgmental forecasting and growth in market share. GMS was used as a performance measure and regressed against internal and external operating environments and judgmental forecasting technique. Table 8 yielded coefficients of the variables which indicated that none of the variables was statistically significant where the theoretical p-value is less than 0.05, signifying that relationships existed among these variables. Hypothesis H1h was therefore, rejected and concluded that the combined effect of the internal and external operating environments had no moderating influence on the relationship between judgmental forecasting and growth in market share.

Table 6.External and Internal Operating Environments – Coefficients.

Model		Un-standardized Coefficients		Standardized Coefficients	t-Value	P-Value
		Beta	Std. Error	Beta		
1	(Constant)	8.089	3.282		2.465	0.015
	Competitors	0.605	0.599	0.085	1.011	0.314
	Customers	-0.114	0.587	-0.016	-0.194	0.846
	Substitutes	0.058	0.237	0.019	0.243	0.808
	Suppliers	-0.042	0.085	-0.038	-0.488	0.626
	Demographics	-0.106	0.319	-0.026	-0.333	0.740
2	(Constant)	10.842	5.436		1.995	0.048
	Competitors	0.806	0.629	0.113	1.281	0.202
	Customers	-0.165	0.603	-0.024	-0.274	0.784
	Substitutes	0.198	0.278	0.065	0.713	0.477
	Suppliers	-0.049	0.087	-0.045	-0.566	0.572
	Demographics	-0.118	0.348	-0.029	-0.338	0.736
	Leadership	-0.349	0.574	-0.056	-0.607	0.544
	Strategy	-0.079	0.317	-0.022	-0.251	0.802
	Structure	-0.710	0.687	-0.099	-1.033	0.303
	Culture	-0.111	0.730	-0.013	-0.151	0.880
	Judgmental method	0.416	0.360	0.103	1.154	0.250

Dependent Variable: ROS

Table 7. External and Internal Operating Environments – Coefficients.

Model		Un-standardized Coefficients		Standardized Coefficients	t-Value	P-Value
		Beta	Std. Error	Beta		
1	(Constant)	1.832	1.773		1.033	0.303
	Competitors	0.190	0.324	0.048	0.586	0.558
	Customers	0.231	0.317	0.060	0.729	0.467
	Substitutes	0.043	0.128	0.026	0.335	0.738
	Suppliers	0.001	0.046	0.002	0.028	0.978
	Demographics	-0.425	0.172	-0.191	-2.469	0.015
2	(Constant)	3.426	2.938		1.166	0.245
	Competitors	0.136	0.340	0.035	0.399	0.691
	Customers	0.164	0.326	0.043	0.502	0.616
	Substitutes	0.070	0.150	0.042	0.464	0.643
	Suppliers	0.003	0.047	0.005	0.062	0.951
	Demographics	-0.349	0.188	-0.157	-1.854	0.066
	Leadership	0.262	0.310	0.076	0.845	0.400
	Strategy	-0.125	0.171	-0.062	-0.732	0.466
	Structure	-0.196	0.372	-0.050	-0.528	0.598
	Culture	-0.157	0.395	-0.033	-0.399	0.691
	Judgmental method	-0.184	0.195	-0.083	-0.943	0.347

Dependent Variable: ROA

Table 8. External and Internal Operating Environments – Coefficients.

Model		Un-standardized Coefficients		Standardized Coefficients	t-Value	P-Value
		Beta	Std. Error	Beta		
1	(Constant)	37.402	13.036		2.869	0.005
	Competitors	2.225	2.380	0.079	0.935	0.351
	Customers	-1.957	2.332	-0.071	-0.839	0.403
	Substitutes	-0.516	0.943	-0.043	-0.548	0.585
	Suppliers	-0.089	0.339	-0.021	-0.264	0.792
	Demographics	-0.186	1.266	-0.012	-0.147	0.884
2	(Constant)	66.212	21.394		3.095	0.002
	Competitors	3.721	2.475	0.131	1.503	0.135
	Customers	-2.287	2.372	-0.083	-0.964	0.336
	Substitutes	0.677	1.093	0.056	0.620	0.536
	Suppliers	-0.093	0.342	-0.022	-0.272	0.786
	Demographics	-0.456	1.370	-0.028	-0.333	0.740
	Leadership	-3.430	2.260	-0.138	-1.517	0.131
	Strategy	0.063	1.246	0.004	0.051	0.960
	Structure	-3.417	2.706	-0.120	-1.263	0.208
	Culture	-2.068	2.875	-0.060	-0.719	0.473
	Judgmental method	0.632	1.417	0.039	0.446	0.656

Dependent Variable: GMS

Table 9. External and Internal Operating Environments – Coefficients.

Model		Un-standardized Coefficients		Standardized Coefficients	t-Value	P-Value
		Beta	Std. Error	Beta		
1	(Constant)	1.042	0.624		1.669	0.097
	Competitors	0.031	0.114	0.023	0.276	0.783
	Customers	0.011	0.112	0.008	0.095	0.925
	Substitutes	0.060	0.045	0.103	1.325	0.187
	Suppliers	0.004	0.016	0.020	0.257	0.798
	demographics	0.033	0.061	0.043	0.542	0.589
2	(Constant)	1.436	1.040		1.381	0.169
	Competitors	0.083	0.118	0.061	0.705	0.482
	Customers	0.015	0.114	0.011	0.128	0.898
	Substitutes	0.104	0.052	0.179	1.977	0.050
	Suppliers	0.007	0.016	0.034	0.434	0.665
	demographics	0.010	0.066	0.013	0.152	0.880
	Leadership	-0.063	0.107	-0.052	-0.583	0.561
	Strategy	0.059	0.058	0.083	1.006	0.316
	Structure	-0.181	0.126	-0.133	-1.440	0.152
	Culture	0.066	0.139	0.040	0.476	0.634
	Combined method	-0.030	0.072	-0.033	-0.410	0.683

Dependent Variable: EV

H3: The combined effect of IOE and EOE has a moderating influence on the relationship between combined forecasting method and APF in LMFs, in Kenya. This hypothesis was split into four sub-components in order to address each performance measure.

H3a: Both internal and external operating environments have a moderating effect on the relationship between combined forecasting technique and expected value. Expected value was used as a performance measure and regressed against components of the internal and external operating environments and combined forecasting method. Table 9 gave coefficients of the variables where substitute products were found to be statistically significant with a p-value = 0.050 where the theoretical p-value is $p<0.05$. The resulting relationship was therefore, represented as follows:

Expected Value = 0.104 Substitute products

(0.05)

This implied that a unit marginal change in substitute products resulted in an additional 0.104 units change in expected value. It was therefore, postulated that the combined effect of the internal and external operating environments had a moderating influence on the relationship between combined forecasting and expected value. Hypothesis H1i was hence, accepted.

H3b: The combined effect of internal and external operating environments has a moderating influence on the relationship between combined forecasting and ROS. The ROS was used as a performance measure which was regressed against internal and external operating environ ments and combined forecasting technique. Table 10 yielded coefficients of the various variables which indicated that none of these variables was statistically significant where the theoretical p-value is less than 0.05. The lack of relationships among these variables signified that the combined effect of internal and external operating environ ments had no moderating influence on the relationship between combined forecasting and ROS. Hypothesis H1j was therefore, rejected.

H3c: Both internal and external operating environments have a moderating effect on the relationship between combined forecasting method and ROA. The ROA was used as a performance measure which was regressed against internal and external operating environments and combined forecasting technique. Table 11 summarized statistics for coefficients of the variables which indicated that none of the variables was statistically significant where the theoretical p-value is less than 0.05. The absence of any relationships among these variables signified that the combined effect of internal and external operating environments had no moderating influence on the relationship between combined forecasting and ROA. Hypothesis H1k was therefore, rejected.

Table 10. External and Internal Operating Environments – Coefficients.

Model		Un-standardized Coefficients		Standardized Coefficients	t-Value	P-Value
		Beta	Std. Error	Beta		
1	(Constant)	8.089	3.282		2.465	0.015
	Competitors	0.605	0.599	0.085	1.011	0.314
	Customers	-0.114	0.587	-0.016	-0.194	0.846
	Substitutes	0.058	0.237	0.019	0.243	0.808
	Suppliers	-0.042	0.085	-0.038	-0.488	0.626
	Demographics	-0.106	0.319	-0.026	-0.333	0.740
2	(Constant)	10.744	5.522		1.946	0.053
	Competitors	0.718	0.625	0.101	1.148	0.253
	Customers	-0.171	0.605	-0.025	-0.283	0.778
	Substitutes	0.188	0.279	0.062	0.674	0.501
	Suppliers	-0.042	0.087	-0.038	-0.479	0.632
	Demographics	-0.109	0.349	-0.027	-0.312	0.755
	Leadership	-0.248	0.569	-0.040	-0.435	0.664
	Strategy	-0.151	0.310	-0.041	-0.487	0.627
	Structure	-0.535	0.667	-0.075	-0.802	0.424
	Culture	-0.085	0.740	-0.010	-0.115	0.909
	Combined method	0.223	0.384	0.047	0.582	0.562

Dependent Variable: ROS

Table 11. External and Internal Operating Environments – Coefficients.

Model		Un-standardized Coefficients		Standardized Coefficients	t-Value	P-Value
		Beta	Std. Error	Beta		
1	(Constant)	1.832	1.773		1.033	0.303
	Competitors	0.190	0.324	0.048	0.586	0.558
	Customers	0.231	0.317	0.060	0.729	0.467
	Substitutes	0.043	0.128	0.026	0.335	0.738
	Suppliers	0.001	0.046	0.002	0.028	0.978
	Demographics	-0.425	0.172	-0.191	-2.469	0.015
2	(Constant)	2.817	2.978		0.946	0.346
	Competitors	0.187	0.337	0.048	0.555	0.579
	Customers	0.196	0.326	0.051	0.600	0.549
	Substitutes	0.088	0.150	0.052	0.583	0.561
	Suppliers	-0.003	0.047	-0.005	-0.059	0.953
	Demographics	-0.346	0.188	-0.156	-1.837	0.068
	Leadership	0.216	0.307	0.063	0.703	0.483
	Strategy	-0.071	0.167	-0.035	-0.425	0.671
	Structure	-0.321	0.360	-0.082	-0.893	0.373
	Culture	-0.264	0.399	-0.055	-0.662	0.509
	Combined method	0.162	0.207	0.062	0.781	0.436

Dependent Variable: ROA

Table 12. External and Internal Operating Environments – Coefficients.

Model		Un-standardized Coefficients		Standardized Coefficients	t-Value	P-Value
		Beta	Std. Error	Beta		
1	(Constant)	37.402	13.036		2.869	0.005
	Competitors	2.225	2.380	0.079	0.935	0.351
	Customers	-1.957	2.332	-0.071	-0.839	0.403
	Substitutes	-0.516	0.943	-0.043	-0.548	0.585
	Suppliers	-0.089	0.339	-0.021	-0.264	0.792
	Demographics	-0.186	1.266	-0.012	-0.147	0.884
2	(Constant)	63.377	21.622		2.931	0.004
	Competitors	3.641	2.448	0.129	1.487	0.139
	Customers	-2.174	2.370	-0.078	-0.917	0.360
	Substitutes	0.717	1.091	0.059	0.657	0.512
	Suppliers	-0.091	0.340	-0.021	-0.268	0.789
	Demographics	-0.416	1.367	-0.026	-0.304	0.761
	Leadership	-3.284	2.228	-0.132	-1.474	0.143
	Strategy	0.048	1.212	0.003	0.040	0.968
	Structure	-3.349	2.613	-0.118	-1.282	0.202
	Culture	-2.421	2.898	-0.070	-0.835	0.405
	Combined method	1.410	1.502	0.075	0.939	0.349

Dependent Variable: GMS

H3d: Both the internal and external operating environments have a moderating effect on the relationship between combined forecasting method and growth in market share. GMS was used as a performance measure and regressed against parameters of internal and external operating environments and the combined forecasting technique.

Table 12 Table 12 displayed coefficients of the variables which indicated that none of the variables was statistically significant where the table p-value is less than 0.05.

The absence of any relationships among the variables implied that the combined effect of internal and external operating environments had no moderating effect on the relationship between combined forecasting and growth in market share. Hypothesis H1l was therefore, rejected.

6. Discussion and Conclusion

APF ensures the establishment and delivery of expected revenue and profitability goals of a firm. It is an integrated exercise in which all organizational operations at all levels should be involved and share information to help in increasing demand visibility as well as improving the performance of forecasts. Firms that apply forecasting appropriately and successfully have developed not only cross-functional trust, but also cross-organizational trust with suppliers of raw materials and distributors of finished products. This helps to ensure that the adverse effects of current and future operating environments are mitigated to a large extent. In this study test results for hypotheses H1a to H1l demonstrated that the combined effect of the EOE and IOE had some moderating effect on the relationship between any of the three forecasting methods and hence APF. In using regression analysis to determine the statistical significance of the combined influence of the operating environments on the relationship between a FT and APF, hypothesis H1 was partially accepted. In the case of Kenya, many LMFs still have a disconnect between the different functional areas involved in forecasting, which creates disruption in the supply chain process, ultimately and adversely impacting the firms' ability to deliver products to its customers on time, in the right quantity and of the right quality. Forecasting in most LMFs is still handled without accurate supporting data or automation and failure to assess operating environments skillfully. In addition, most of the LMFs do not monitor their own forecasting accuracy at the beginning, during and at the end of a forecast period. Further, a number of the LFMs fail to grasp how gross margin – an important aspect of firm performance - is affected by poor forecasting.

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8. Appendices

8.1 Cronbach Reliability Tests

The inter-correlation among items was tested using Cronbach's alpha, where

$$\alpha = \frac{N \cdot \hat{c}}{[\tilde{V} + (N - 1) \cdot \hat{c}]}$$

Case Processing Summary

		Number	Percent
Cases	Valid	854	99.8
	Excluded*	2	0.2
	Total	856	100.0

- Listwise deletion based on all variables in the procedure

Reliability Statistics for Spectral Analysis

Cronbach's Alpha	Number of Items
0.976	8

Internal Operating Environment

Leadership

Cronbach's Alpha	Number of Items
0.683	9

Strategy

Cronbach's Alpha	Number of Items
0.629	9

Structure

Cronbach's Alpha	Number of Items
0.921	7

Culture

Cronbach's Alpha	Number of Items
0.772	7

8.2 Linearity, Colinearity and Multicolinearity

The undesired situation, colinearity (or multicollinearity), where the correlations among the independent variables are strong was tested. Multicolinearity increases the standard errors of the coefficients which, in turn means that coefficients for some independent variables may be found not to be significantly different from 0, whereas without multicolinearity and with lower standard errors, these same coefficients might have been found to be significant and the researcher may not have come to null findings in the first place. Multicolinearity is a problem in multiple regressions that develops when one or more of the independent variables are highly correlated with one or more of the other independent variables. If one independent variable is a perfect linear combination of the other independent variables; that is, if it is regressed on the other independent variables and the resulting R^2 = 1.0, then the matrix of inter-correlations among the independent variables is singular and there exists no unique solution for the regression coefficients.

Variance Inflation Factors (VIF) measure how much the variance of the estimated coefficients is increased over the case of no correlation among the X variables. If no two X variables are correlated, then all the VIFs will be 1. The Variance Inflation Factor (VIF) measures the impact of colinearity among the variables in a regression model. The VIF is 1/Tolerance, it is always greater than or equal to 1. It must be noted that there is no formal VIF value for determining presence of multicolinearity. Values of VIF that exceed 10 are often regarded as indicating multicolinearity, but in weaker models values above 2.5 may be a cause for concern. When R^2 and VIF values are high for any of the variables in a model, multicolinearity is probably an issue. For this study, the following were the tests of collinearity.

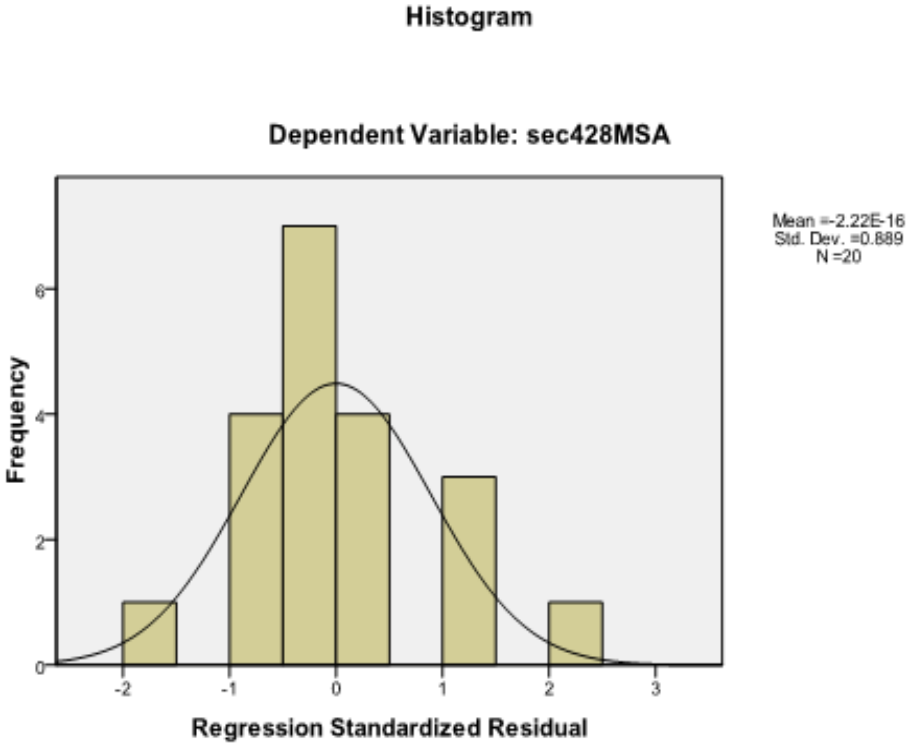
Internal Operating Environment (IOE)

Model		Collinearity Statistics	
		Tolerance	VIF
	Leadership	0.826	1.211
	Strategy	0.810	1.234
	Structure	0.613	1.630
	Culture	0.746	1.340

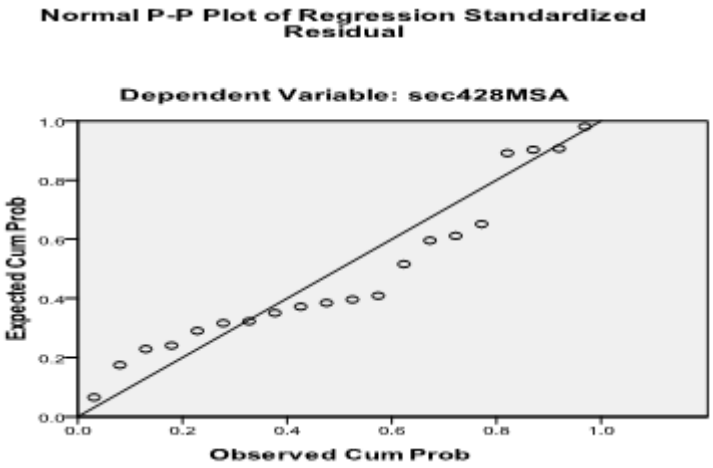
Dependent Variable: Market Share

Values of the VIF and Tolerance demonstrated lack of collinearity among the variables.

The histogram below tested for homoscedasticity displaying data being linearly distributed.



The P-P plot tested for linearity and the graph shows data followed a linear form.



External Operating Environment (EOE)

Model		Collinearity Statistics	
		Tolerance	VIF
	Competitors	0.984	1.017
	Customers	0.961	1.041
	Substitute products	0.956	1.046
	Suppliers	0.934	1.071
	Demographic characteristics	0.917	1.090

Dependent Variable: Expected Value

The VIF and Tolerance are close to a value of 1 indicating there was no co linearity among the variables.

The histogram, below, testing for homoscedasticity displayed data linearly distributed.

And the P-P plot indicated data following a linear form.