measured as competitive advantage performance. For example, although one form of energy, such as heat, can be transformed into another form, such as kinetic, potential, chemical, or electrical, the total sum of the energy in any system of materials or bodies remains constant. If some amount of heat (Q) is put into the system, then it must either do work (W′) or increase the total energy of the system. If H stands for the enthalpy of heat content, then $\Delta H = Q - W'$. Therefore, we infer that the total sum of energy for an organization derived from its IS can be neither created nor destroyed but only changes form. For example, the energy derived from IS expertise can be transformed into another form, such as IS infrastructure flexibility, trusting IS–business relationships, IS top management support, or IS competitive advantage performance.

The second law of thermodynamics states that systems tend to reach a state of equilibrium. In other words, any organization, group of individuals, or information system, no matter how highly organized it may be at any given instant, tends toward greater disorder or randomization, called entropy (S). Entropy can be related to the random movements of molecules and can be measured by $T\Delta S$, where T is the absolute temperature of the system. When the system is at equilibrium, there is no net reaction and the system has maximum entropy with no capacity to do useful work: $Q = T\Delta S$. Work can be done by systems tending toward equilibrium, and a measure of this work is $W' = -\Delta H + T\Delta S$. Free energy is defined as $\Delta G = \Delta H - T\Delta S$, where $\Delta G = -W'$, such that when the measure of W′ is positive and can do useful work, then the measure of ΔG is negative and vice versa.

A system at equilibrium has three characteristics: There are two opposing tendencies or reactions; both reactions are in full operation at equal speeds, and any change in the conditions, such as concentration, pressure, or temperature, produces a corresponding change in the system. Any change in conditions forces the system to settle down into a new state of equilibrium with new proportions of reactants and products that correspond to these new conditions. In the study of dynamical systems, discrimination of the presence of correlations in time series emerges as one key task. Given a time series, one of the most natural measures of disorder and, thus, the absence of correlation, is Shannon entropy [8], which states that, given a discrete probability distribution, P = {p i:i = 1 to M}. Shannon entropy is defined as follows:

M

S[Ő

For example, if an organization has a trusting IS–business relationship, then it can continue to have trust, or there can be no trust and trust is developed, or there is trust that turns to no trust, or finally, there is no trust that leads to no trust. Uncertainty can be designated as having no trust in the IS–business relationship. Decision-makers are viewing trust, expertise, top management support, and flexibility in the present state. The amount of information lost is known as integrated information. Here, we would look at trust, expertise, top management support, and flexibility in view of performance and competitive advantage. All possible subsets of a system determine the composition and, therefore, we must study the system ceteris paribus, as there are conceivably an infinite number of variables.

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2.1. Background

2.2.1. Trust and Infrastructure Competencies

Despite this understanding of the importance of IS competencies in business performance, little research examined how a firm refines IS competencies over time. This article fills this gap in the literature by examining empirically how a firm refines IS competencies such as top management support in the context of competitive advantage performance. Below, we define the concept of IS competencies in this context. Based on this categorization, we define IS competencies as those attributes of IS that cannot be easily imitated by other IS units in different firms [37].

2.2.2. IS Infrastructure Flexibility

A flexible IS infrastructure allows for the sharing of data and applications through communication networks. It pertains to arrangements of hardware, software, and networks such that

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From the ITQ perspective, data were analyzed using hierarchical regression analysis and structural equation modeling (SEM) to understand the broad objective relationship of top management support with IS competencies and competitive advantage performance. The QCA data were analyzed utilizing both factor analysis eigenvalues and entropy uncertainty coefficients.

Construct Measurement for Top Management Support, IS Competencies Measures, and Competitive Advantage Performance

We used the following items to measure trusting IS–business relationships: “our business managers and IS personnel share responsibility in setting business strategy”; “our business managers and IS personnel jointly set business strategy” business expertise (B = 0.67); Hypothesis 2, competitive advantage performance will have a positive relationship with IS expertise (B = 0.58); Hypothesis 3, IS business expertise will have a positive relationship with a trusting IS–business relationship (B = 0.29); Hypothesis 4, competitive advantage performance will have a positive relationship with IS top management support (B = 0.77); Hypothesis 5, IS top management support will have a positive relationship with a trusting IS–business relationship (B = 0.34); Hypothesis 6, IS top management support will have a positive relationship with IS business expertise (B = 0.63); and Hypothesis 7, IS top management support will have a positive relationship with IS infrastructure flexibility (B = 0.49).

J.=#53+K+ Nomological network of relationships between top management support, IS competencies and competitive advantate structural model results.

6.2. Reliability and Regression Analysis

Table 1 shows an R^2 of 0.415; this means that nearly 42% of the variance in the dependent variable (competitive advantage performance) was explained by the independent variable flexibility of the IS infrastructure, top management support, IS business expertise, and trust. Table 2 demonstrates that the relationship between these variables was significant at $p \leq 0.000$. Table 3 gives the individual contributions. For example, Flexibility 1 and 3 had a significance of $p \leq$-0.01. Expertise 2 and 3 had significances of

8$E-3+0]+Descriptive statistics.

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expertise 1 increased by 1 as well. The same was true for competitive advantage on top management s

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		Y$-#3	, 1: ' ;&0&.2)&$%6$56.I36 B5505	, ; ;50X ' $&3 8	, ; ;50X. ' $&3) .=%.7.2$
Z$ ' E6$	Symmetric	0.562	0.033	[illegible]4.282	0.00[illegible]
	Top manage Dependent	0.585	0.040	[illegible]1.114	0.00[illegible]
	perfo[illegible]k Depen[illegible]t	[illegible].54[illegible]	0.033	[illegible]4.315	0.000

8$E-3 0 Component transformation matrix.

/0 ' ;0%3%&			K	L	N
1	0.839	0.289	0.460	0.038	0.011
2	−0.365	0.927	0.079	0.035	0.007
3	0.404	0.234	−0.884	0.017	−0.025
4	0.025	0.048	0.009	−0.991	−0.122
5	−0.006	−0.001	0.027	0.122	−0.992

Extraction method: principal component analysis. Rotation method: varimax with Kaiser n

VD+ > .12#11.0%+

Our ITQ quale results generally supported the validity of our decision-makers' broad objective contribution to the validity of our research model. We showed,

Staff	5	1
Other	5	1

Question 26: How many years have you worked in your present firm?

	n	%
Less than 10 years	89	34
10–15 years	102	39
16–20 years	11	4
21–25 years	48	18
More than 25 years	7	3
Other	7	3

<37353%231+

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