

Informing the HR Hiring Decision of IT Personnel: The HR Professional's View of IT Certification, Education, & Experience

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Abstract

This study examined the importance of IT Certification from the HR Professional's perspective, specifically the value of certification in relation to education and experience in a hiring decision. We found that an increase in formal education was subsidized by a decreasing emphasis on experience until a balance was reached. The relative weight of certification, however, was generally stable. A repeated measure analysis showed a statistically significant main effect and interaction effect. An exploratory factor analysis yielded five underlying dimensions which may be possible value drivers of IT certification on HR Professional's hiring decisions: internal organizational benefits, external organizational benefits, same-job employee benefits, different-job employee benefits, and certification credibility. A mixed-design analysis also yielded five statistically significant interactions which shed further light on possible moderators of the value drivers of certification value: years of management experience and certification perception.

Key Words: IT Certification, HR Manager, Value of Certification

Introduction

The information technology (IT) environment is one of rapid dynamic change, driven by new and evolving technologies. Consequently, IT professionals face an incessant need to keep their skill portfolios marketable. Certification is a useful tool for enhancing and validating IT professionals' skill portfolios and can play an important key role in the hiring process. Although the certification

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perspectives of IT professionals and managers have been studied in the past (Computing Technology Industry Association [CompTIA], 2001), the perspective of Human Resource (HR) professionals has been neglected. Because they are organizational gatekeepers, the certification viewpoint of HR professionals is extremely important and worthy of study. This study represents an initial step in that direc-

tion. This is exemplified by a recent Computerworld interview with IT Analyst Jonathan Eunice:

While employers want to hire only qualified workers, certification isn't typically a prerequisite because it doesn't always guarantee that the applicant has the necessary skills. "It's a nice proxy" though, he said "It does give people an additional feeling of confidence" when hiring. (Weiss, 2004)

IT Certification Literature Review

Certification is often viewed as the practice whereby an individual demonstrates a minimal level of competence through successful completion of a sampling-performance measurement tool based on a profession's set of standards (Mulkey & Naughton, 2005). As a practical matter, certification is pervasive in the IT field with over 1.65 million individuals having earned over 2.5 million IT certifications worldwide (Adelman, 2001). This certification activity suggests that there is a market for the knowledge and skills associated with those certifications (CRN Staff, 2004; Noack, 2001; Ray & McKoy, 2000). Cohen argues that the importance of certification will only increase in the future because of its employee and organizational benefits (D. Cohen, 2001). Indeed, as the economy evolves, new opportunities will arise outside of traditional areas that will promote the need for new certifications to address the complex issues associated with emerging markets (Braun, Mauldin, & Fischer, 2001; N. Cohen, 2000; Freir, 2001; Jiang, 1994).

Some researchers suggest that IT certification is a likely catalyst for facilitating the IT field's transformation into a "profession" with its accompanying generally accepted standards for requisite training, codes of ethics, and sanctions for unprofessional behavior (Linderman & Schiano, 2001; Maier, Greer, & Clark, 2002). They also suggest that certification is of value to certified professionals and those that interact with them. Certified professionals enjoy these commonly cited certification benefits: 1) enhanced profession credibility, knowledge, expertise, and development, and 2) improved compensation, productivity, and career opportunities (Barber & Brackner, 2001; Barry, 2001; N. Cohen, 2000; CompTIA, 2001; Freir, 2001; Hrisak, 2001; Precipe, 2000; Ray & McKoy, 2000; Schroeder & Reichardt, 2001; Williamson, 1997). Business managers believe that certified professionals enhance their organizations': 1) ability to attract and retain highly qualified staff; 2) credibility; 3) competitive advantage; 4) level and consistency of service, and 5) productivity (Ray & McKoy, 2000). They also believe that certification is a reliable measure of applicants' knowledge, skills, attitudes, and commitment to the industry. Thus, certification serves as a useful job-ad criterion and a prescreening heuristic for potential quality, reliability, and productivity (Cappel, 2001-2002; Edwards, 2004; Jiang, 1994; Maier et al., 2002; Pierson, Frolick, & Chen, 2001; Precipe, 2000; Schrage, 2004; Williamson, 1997; Zhao, 2002).

On the other hand, some researchers argue that certification proliferation causes confusion for: 1) consumers who are unfamiliar with a particular certification and its level of prestige, and 2) employers who must sort through an increasing number of certified applicants during economic downturns (Braun et al., 2001; Kraus, 1999; Moore, Yager, Sumner, & Crow, 2001). That confusion is nicely illustrated by a recent local-area-network-certifications study that found that there was not a significant difference in end-users perceptions between the capabilities of certified and non-certified network professionals (Cegielski, 2004). Another interesting dimension of certification confusion is the distinction between *vendor-controlled* (potentially biased, open to market pressure, yet often seen as highly relevant and immediately applicable) and *profession-controlled* or *vendor-neutral* (more objective, less vulnerable to market pressure, often seen as more broad-spectrum long-term expertise) certifications (Pierson et al., 2001; Schrage, 2004). Many educators see vendor product-specific certifications as "narrowly focused on relatively perishable knowledge ... an insufficient foundation upon which to base a long-term adaptable workforce ... ignores the expressed needs of IT managers for a workforce having business knowledge" and broad skills (Minch & Tabor, 2003, p.53). However, some educators view the broader profession-

controlled or vendor-neutral certifications such as the CCP (Certified Computing Professional) and ACP (Associate Computing Professional) or vendor-neutral certifications such as Security+ and CWNA (Certified Wireless Network Administrator) in a more positive light, even using them as exams for college courses (Brandon, Pruett, & Wade, 2002). With the mix of opinions seen above, it is easy to see why some researchers believe that business managers rely too heavily upon certifications to measure an applicant's or employee's knowledge, skills, and/or abilities (Schrage, 2004).

The literature review considered thus far shows the variety of views of certification. There remain questions as to the relevance of certification to end users, certification-based hiring and promoting biases, and whether profession-controlled or vendor-controlled certification provides the greatest certification usefulness. While those moderators require further research, this study focuses instead on a largely overlooked certification issue, the value of certification to HR professionals. HR professionals are normally involved in all phases of the hiring process, including approving position advertisements, screening resumes, and doing initial interviewing (Mondy, Noe, & Premeaux, 1999). One study that did examine the perspective of HR professionals when hiring a network professional noted that HR professionals placed a significantly different value on IT certification than that of IT professionals (Cegielski, 2004). Other studies that addressed the HR view utilized descriptive statistics to glean a basic understanding of HR professionals' opinions and emphasized the impact of certifications on curriculum (Anderson, Barrett, & Schwager, 2002, 2004).

The current study builds on the previous anecdotal and descriptive studies discussed above by extending our understanding of the relative value of certification in the hiring mix of education-certification-experience in the mind of the HR manager through an analytical perspective, explicitly using formal statistical analyses to evaluate the value of IT certification and determine the value drivers of IT certification on HR Professionals' hiring decisions.

Problem and Purpose

While the perspectives of IT professionals and IT managers have been studied in the past, there has been little research on the perspective of HR professionals toward IT certification. The purpose of this study is to explore the perspective of the HR professional toward IT certification. These objectives were motivated from the literature review and formulated to accomplish the purpose of this study:

1. Determine the value of IT certification to HR professionals relative to formal education and experience in the hiring decision for IT professionals.
2. Determine some of the value drivers of IT certification from the perspective of HR professionals focusing on: organizational benefits; employee benefits; relative credibility (e.g., CPA versus IT certification); organization size, and industry.

Methodology

The perceptions of HR professionals were solicited utilizing a survey methodology. A short survey was administered to members of local chapters of the Society for Human Resource Management (SHRM) in North Carolina, USA. Data for Objective 1 was obtained with a set of three scenario questions and then analyzed using a repeated measure design. Respondents were asked to indicate the relative percentage weights (summing to 100 percent) that they would assign to education, certification, and experience when making a hiring decision in each of these scenario contexts:

Scenario 1: “Candidate has no degree but several years of experience;”

Scenario 2: “Candidate has an Associates Degree from a Community College/Vo-Tech,”

Scenario 3: “Candidate has a Bachelors Degree from a University.”

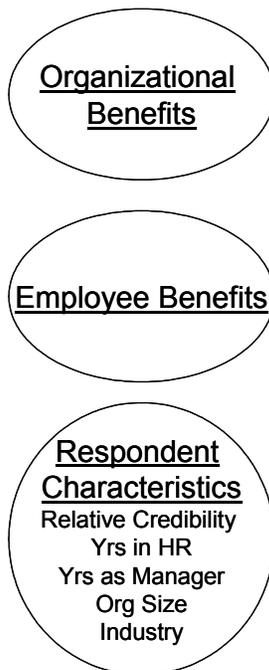
After the repeated measures design used to evaluate Objective 1 established that HR professionals perceive value in IT certification, Objective 2 was examined in order to obtain insights into where exactly that value comes from, i.e., the value drivers. The data for evaluating Objective 2 came from HR professionals’ responses to questions dealing with their perceptions of: 1) organizational benefits of certification; 2) benefits of certification for employees 3) credibility of IT certification as compared to other professional certifications; 4) experience in HR; 5) experience in management; 6) organization size, and 7) industry.

Research Design

As noted above, a repeated measure design was used to determine whether HR professionals associated value with IT certification relative to Education and Experience (i.e., Objective 1). Repeated measure designs are used when the same subjects participate in all conditions of a study; in this study all participants rated their relative values of qualifications in all three scenarios. Repeated measure designs have many advantages including: 1) reducing unsystematic variability by controlling individual differences by testing the same people in all conditions, and 2) providing more power to detect effects, thus requiring fewer subjects (Field, 2000 p.323). An exploratory factor analysis was then used to see if any underlying dimensions could be identified as possible value drivers of HR professionals’ perceived IT certification value. A mixed design was then used to evaluate interaction effects of the value drivers identified in the factor analysis. A conceptual model is presented in Figure 1.

Factor Analysis and Mixed Design

To identify and Evaluate Value Drivers
If IT Certification has Perceived Value



Repeated Measure Design

To determine if IT Certification
has Perceived Value

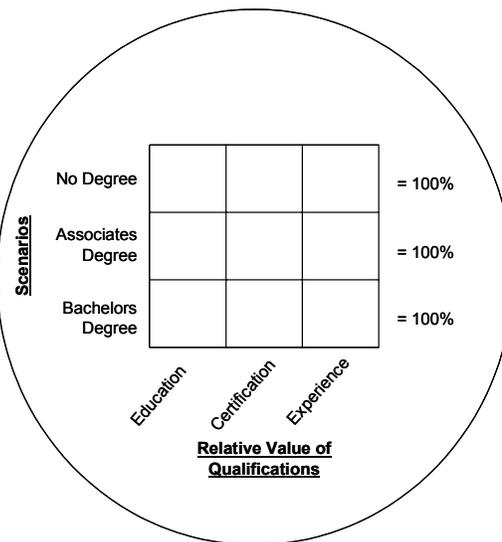


Figure 1: Conceptual Model

Six SHRM chapters were contacted and asked to participate in this study. These chapters reflect the diversity of the state by representing rural and urban communities as well as various industries. The surveys were distributed to SHRM members at a regularly scheduled monthly meeting by the chapter presidents. Feedback from the presidents, who distributed the surveys, indicated that approximately 300 surveys were circulated. Overall, one-hundred-and-one responses were obtained, yielding a response rate of approximately 30%. In addressing individual questions, only responses with complete information were used. The descriptive statistics for respondents' demographic data appears below and is then followed by the repeated measure results.

Descriptive statistics and demographics

To determine organizational and respondent characteristics, respondents were asked to disclose the number of years served as an HR professional and as an HR manager, the number of full-time employees in their organization, and their organizational affiliations. Table 1 shows that the average HR professional has served as an HR professional for about 12 years and as an HR manager for about 9 years and currently works in a medium sized organization. Approximately 73 percent of the HR professionals participating in this study were in HR managerial positions and thus intimately involved in the hiring of new personnel (for ease of reference, all respondents are now referred to as HR professionals). This finding strengthens the meaningfulness of the HR perceptions that underpin subsequent analyses.

Table 1: Descriptive statistics for demographic data

Demographics	Statistic				
	N	Mean	SD	Min.	Max.
Number of full-time employees currently in organization	93	4178.89	15249.92	4	85000
Years served as a HR professional	95	12.13	8.35	0	33
Years served in a HR management position	94	8.64	8.10	0	32

Descriptive statistics for organizational, employee, and credibility variables

The organizational benefits of a certified IT staff from the perspective of the HR professional were measured by a set of nine benefit factors drawn from the survey used in CompTIA's 2001 Training and Certification Study. A tenth factor, ethical conduct, was added on an experimental basis to see to what extent HR professionals perceive that certification enhances ethical behavior. Table 2 discloses those factors along with statistics for HR professionals' corresponding perceptions. In general, HR professionals felt that certification provides their organizations with at least "some benefit" for each of the factors.

The employee benefits of IT certification from the perspective of the HR professional were measured by a set of nine benefit factors drawn from CompTIA's 2001 Training and Certification Study. Table 3 discloses those factors along with statistics for HR professionals' corresponding perceptions. In general, HR professionals felt that certification would provide their employees with at least "some benefit" for each of the factors.

Table 2: Descriptive Statistics for Organizational Benefits of IT Certification

	N	Min.	Max.	Mean	Std. Deviation
Credibility	99	2	7	5.61	.998
Competitive advantage	100	3	7	5.24	.996
Higher level of service	100	1	7	5.23	1.230
Consistency	99	1	7	5.22	1.234
Helps attract/retain staff	99	1	7	5.10	1.351
Ability to sell a bigger/broader solution	99	1	7	5.03	1.328
Increased productivity	99	1	7	4.92	1.291
Access to vendor info/support	100	1	7	4.91	1.264
Ethical conduct	98	1	7	4.69	1.677
Lower costs	96	1	7	4.39	1.605
Valid N (listwise)	96				

Table 3: Descriptive Statistics for Employee Benefits of IT Certification

	N	Min.	Max.	Mean	Std. Deviation
Increase credibility	98	3	7	5.65	1.026
Prepare for a new position	96	1	7	5.51	1.036
Increase Compensation	98	2	7	5.36	1.038
Switch jobs	98	1	7	5.23	1.129
Prepare for certification test	96	1	7	5.18	1.281
Job requirement	95	1	7	5.00	1.263
Increase Productivity	98	1	7	4.99	1.366
Job security	98	1	7	4.85	1.395
Access priority support	93	1	7	4.82	1.398
Valid N (listwise)	89				

The relative credibility of IT certification as compared to other certifications in business and industry from the perspective of the HR professional was examined with three questions that compared the credibility of IT certification to Accounting, Human Resource, and other industry certifications (e.g., CFP, Series 7, APICS, etc.). Table 4 reveals that HR professionals view IT certification as having slightly more credibility than other industries' certifications and their own HR certifications and roughly equal credibility with the Accounting profession's CPA certification.

Table 4: Descriptive Statistics for Credibility of IT Certifications relative to other Certifications

	N	Min.	Max.	Mean	Std. Deviation
Other Industry Certifications (CFP, Series 7, APICS)	98	2	7	4.30	1.229
Human Resource Certification (PHR/SPHR)	98	1	7	4.29	1.332
Accounting Certification (CPA)	99	1	7	3.96	1.696
Valid N (listwise)	97				

Presentation of Results

Objective 1: Perceived IT Certification Value: Repeated Measure Design

A repeated measure design was used to statistically analyze the data elicited by the three Scenarios noted above. In this section we show that there was a significant main effect on the variable qualifications (Experience, Certification, and Education) and a significant interaction effect.

Of the 101 HR professionals taking the survey, 88 completed the Scenario section. These 88 responses were used in the repeated measure design. The descriptive statistics for those scenarios are shown in Table 5.

Table 5: Descriptive Statistics of Scenarios

	Mean	Std. Deviation	N
No Degree - Education	15.58	14.160	88
No Degree - Certification	28.08	14.785	88
No Degree - Experience	56.09	18.135	88
Associates Degree - Education	30.2537	13.55382	88
Associates Degree - Certification	24.3447	13.40080	88
Associates Degree - Experience	45.390	17.0899	88
Bachelors Degree - Education	38.65	15.723	88
Bachelors Degree - Certification	21.89	11.312	88
Bachelors Degree - Experience	39.79	17.275	88

The spread between means is largest in the No-Degree scenario and converges in the Associates and Bachelors-Degree scenarios. Experience had the greatest variability in each scenario, followed overall by education, and then certification. Figure 2 illustrates the decreasing value of Experience, the increasing value of Education, and the relative stability of Certification.

Table 6 shows significant results in Mauchly's sphericity test for each of the model effects, consequently, corrected Greenhouse-Geisser values appear along with the traditional F values in the following tables (Field, 2000 pp.324-326).

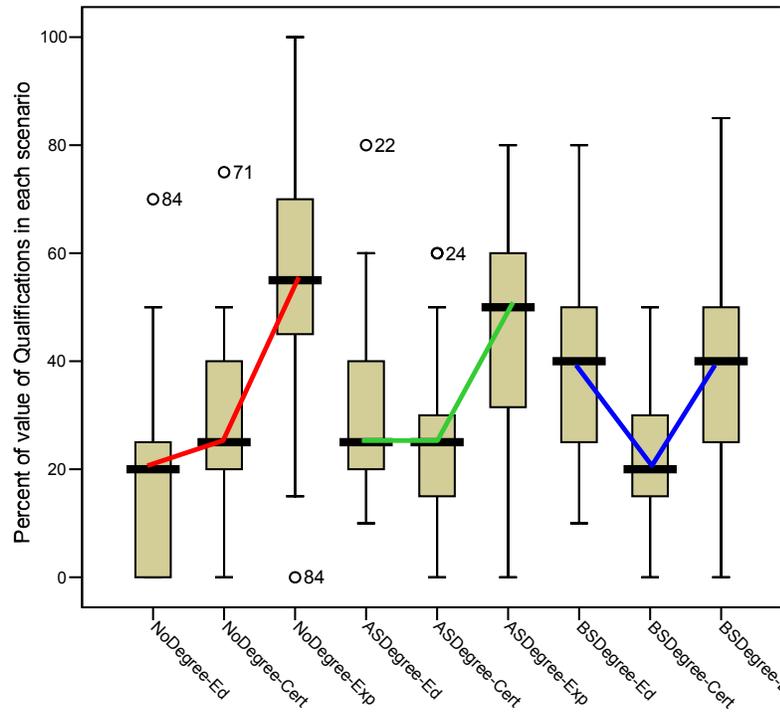


Figure 2: Boxplot of Descriptive Statistics in Table 5

Table 6: Mauchly's Test of Sphericity

Within Subjects Effect	Mauchly's W ^a	Approximate Chi-Square	Df	Sig.	Epsilon ^b		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
qualifications	.834	15.620	2	.000	.858	.873	.500
degree * qualifications	.511	57.345	9	.000	.731	.759	.250

^a Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

^b May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table (see Table 7).

^c Design: Intercept Within Subjects Design: qualifications and degree*qualifications

The main analysis

The statistics for the within-subjects repeated measure ANOVA are shown in Table 7.

Table 7: Tests of Within-Subjects Effects for Main ANOVA

Source	Sphericity Status	Type III Sum of Squares	df	Mean Square	F	Sig.
Qualifications	Sphericity Assumed	76371.269	2	38185.634	56.555	.000
	Greenhouse-Geisser	76371.269	1.715	44528.010	56.555	.000
degree * qualifications	Sphericity Assumed	37780.387	4	9445.097	52.521	.000
	Greenhouse-Geisser	37780.387	2.924	12918.920	52.521	.000

The Effect of Qualifications (Education-Certification-Experience) There was a significant effect of qualifications ($F = 56.555$, $p < 0.001$). This tells us that if we ignore the type of degree (No Degree, Associates Degree, and Bachelors Degree) in the scenarios, subjects still rated the types of qualifications (Experience, Certification, Education) significantly differently.

Table 8 of the Estimated Marginal Means of Qualifications clearly shows that Experience was rated almost two times higher than Education and Certification, and that Education was rated somewhat higher than Certification.

Table 8: Estimated Marginal Means of Qualifications

Qualification	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Education	28.162	1.180	25.817	30.507
Certification	24.771	1.154	22.478	27.064
Experience	47.090	1.550	44.009	50.170

Table 9 helps to clarify the nature of these effects by showing the pairwise comparison for the main effect of qualification corrected using a Bonferroni adjustment. This table indicates that the significant main effect reflects a significant difference ($p < 0.001$) between levels 1 and 3 (Education and Experience) and 2 and 3 (Certification and Experience). The difference between Education and Certification is not significant.

Table 9: Pairwise Comparisons for Qualifications

(I) qualifications	(J) qualifications	Mean Difference (I-J)	Std. Error	Sig. (a)	95% Confidence Interval for Difference ^a	
					Lower Bound	Upper Bound
1 Education	2 Certification	3.390	1.742	.165	-.863	7.643
	3 Experience	-18.928(*)	2.507	.000	-25.047	-12.809
2 Certification	1 Education	-3.390	1.742	.165	-7.643	.863
	3 Experience	-22.318(*)	2.455	.000	-28.311	-16.325
3 Experience	1 Education	18.928(*)	2.507	.000	12.809	25.047
	2 Certification	22.318(*)	2.455	.000	16.325	28.311

Based on estimated marginal means

*The mean difference is significant at the $P < 0.001$ level.

^aAdjustment for multiple comparisons: Bonferroni.

The interaction effect (Degree x Qualifications)

The real value of this study is found in the interaction effect. Table 7 (above) showed that there was a significant interaction between the type of degree and the qualifications associated with it (F-value of 52.521, $p < 0.001$). This effect tells us that the certification, education, and experience qualifications had a different effect depending on which type of degree each qualification was presented with. A plot of the estimated marginal means appearing in Table 10 helps clarify the nature of these interactions.

Table 10: Estimated Marginal Means of Degree x Qualifications

Degree	Qualifications	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
1 No Degree	1 Education	15.580	1.509	12.579	18.580
	2 Certification	28.080	1.576	24.947	31.212
	3 Experience	56.091	1.933	52.248	59.933
2 Associates	1 Education	30.254	1.445	27.382	33.126
	2 Certification	24.345	1.429	21.505	27.184
	3 Experience	45.390	1.822	41.769	49.011
3 Bachelors	1 Education	38.652	1.676	35.320	41.983
	2 Certification	21.890	1.206	19.493	24.287
	3 Experience	39.788	1.842	36.128	43.448

The resulting interaction graph in Figure 3 shows that the pattern of responding across Degree types was similar when rating both Experience and Certification. That is, ratings for Experience and Certification were highest for the No Degree Scenario, lower for the Associates Degree Scenario, and lower still for the Bachelors Degree Scenario. The effect for Education was reverse: ratings for Education were lowest in the No-Degree Scenario, higher for the Associates Degree Scenario, and higher still for the Bachelors Degree Scenario.

As shown in Figure 3, HR professionals, on average, place about 16 percent of the relative weight of their hiring decisions for no-degree candidates on education, about 28 percent of the relative weight on certification and 56 percent on experience. In the case of Associates-Degree candidates, HR professionals nearly doubled the relative weight associated with education to about 30 percent. Certification in the Associates degree scenario is valued at about 24 percent. In the case of a Bachelors-Degree candidate, HR professionals strike an interesting balance between education and experience, drawing nearly equally upon education and experience to strike that balance with education weighted at 39 percent and experience weighted at about 40 percent. Certification in the Bachelors-Degree scenario was weighted at about 22 percent. Interestingly, Figure 3 also shows that the certification curve is the flattest of the three depicted curves. Although the weight given to certification does diminish as education level increases, it is slight when compared to the decreased weight given to experience.

Contrasts for Repeated Measure Variables. The graphical interpretation of the interaction effect seen in Figure-3 can be verified through a series of contrasts for the repeated measures variables. Table 11 shows the summary results for these contrasts.

Estimated Marginal Means of Degree * Qualifications

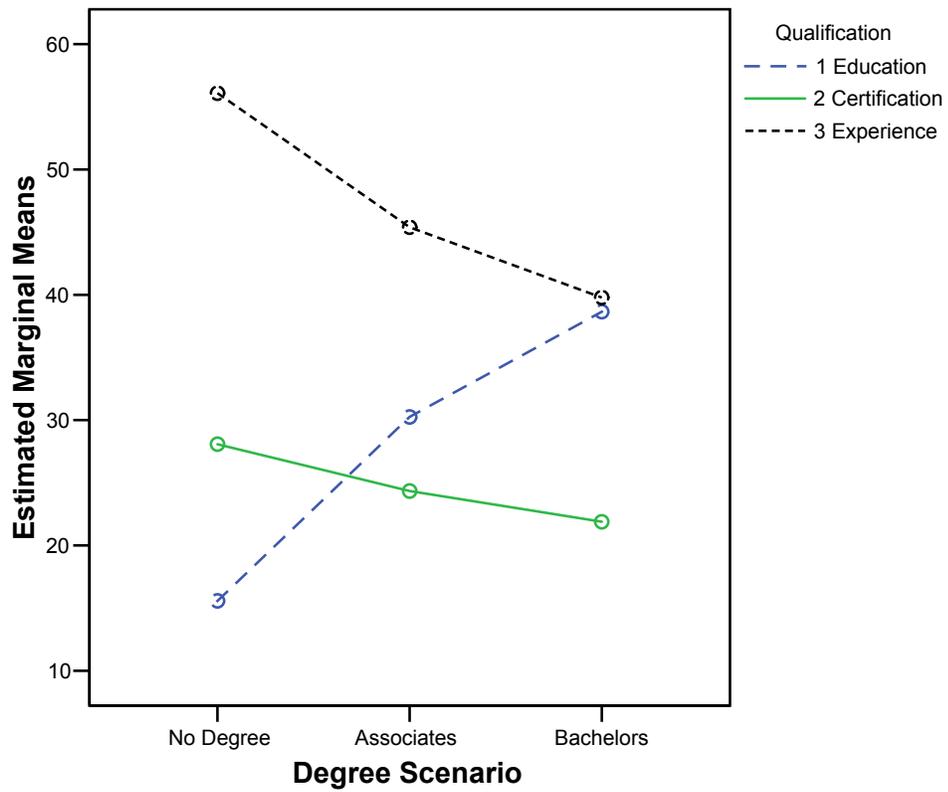


Figure 3: Interaction of Degree * Qualifications

Table 11: Tests of Within-Subjects Contrasts of Degree x Qualifications

Source	degree	qualifications	Type III Sum of Squares	df	Mean Square	F	Sig.
degree * qualifications	NoDeg vs. Bachelor	Educ vs. Exp	136434.375	1	136434.375	110.581	.000
		Cert vs. Exp	9001.136	1	9001.136	13.262	.000
	Assoc vs. Bachelor	Educ vs. Exp	17247.160	1	17247.160	40.053	.000
		Cert vs. Exp	871.732	1	871.732	1.912	.170

The interaction contrasts are interesting. The contrasts are labeled in Figure 4. The first interaction term (distance 1a vs 1b), No Degree compared to Bachelors Degree when Education is compared to Experience is significant ($F = 110.581, p < 0.001$). This result suggests that the differences in the values placed on Education and Experience is affected by whether the job candidate has No Degree or a Bachelors Degree.

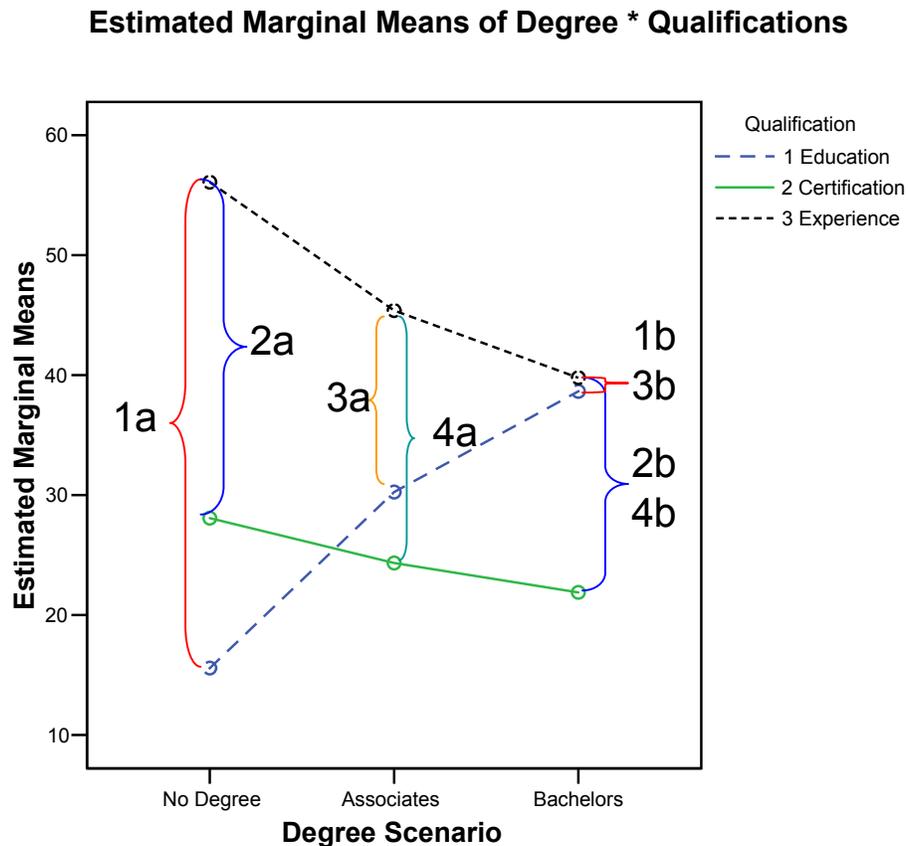


Figure 4: Interaction of Degree * Qualifications with Contrasts Labeled

The second interaction term (distance 2a vs 2b), No Degree compared to Bachelors Degree when Certification is compared to Experience, is significant ($F = 13.262, p < 0.001$). This result tells us that the differences in the values placed on Certification and Experience is affected by whether the job candidate has No Degree or a Bachelors Degree. The third interaction term (distance 3a vs 3b), Associates Degree compared to Bachelors Degree when Education is compared to Experience, is significant ($F = 40.053, p < 0.001$). This result tells us that the differences in the values placed on Education and Experience is affected by whether the job candidate has an Associates Degree or a Bachelors Degree. The fourth interaction term (distance 4a vs 4b), Associates Degree compared to Bachelors Degree when Certification is compared to Experience, is not significant. This result tells us that the differences in the value placed on Certification and Experience is not affected by whether a job candidate has an Associates Degree or a Bachelors Degree.

These interaction contrasts suggest that the decreasing value of Experience and the increasing value of Education are influenced by whether the job candidate has No Degree, an Associates Degree, or a Bachelors Degree. They also suggest that the value of Certification is influenced by

whether the job candidate has No Degree compared to a Bachelors Degree, but is not influenced by whether a job candidate has an Associates Degree compared to a Bachelors Degree.

Objective 2: Value Drivers of Perceived IT Certification Value

The repeated measure design analysis above shows that there is significant value associated with IT certification. In this section we identify some of the underlying factors that HR professionals build into their value formation for IT certification. An exploratory factor analysis is used on the organizational, employee, and credibility variables described earlier (see Tables 2, 3, and 4) to see if any underlying dimensions exist. The resulting drivers are then statistically evaluated with a mixed design analysis.

Exploratory factor analysis

The factor analysis of the organizational benefits of certification yielded a two-factor solution seen in Table 12. Component 1 is composed of Internal Organizational Benefits of certification (i.e., increased productivity, lower costs, helps attract/retain staff, higher level of service, and ethical conduct) while component 2 is composed of External Organizational Benefits (i.e., credibility, ability to sell a bigger/broader solution, competitive advantage, access to vendor info/support, and consistency).

Table 12: Rotated Component Matrix^a for Organizational Benefits

	Component	
	1	2
Increased productivity	.825	
Lower costs	.825	
Helps attract/retain staff	.686	.430
Higher level of service	.685	.521
Ethical conduct	.623	
Credibility		.895
Ability to sell a bigger/broader solution	.400	.712
Competitive advantage		.693
Access to vendor info/support		.627
Consistency	.509	.619
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.		
^a Rotation converged in 3 iterations.		

Table 13: Rotated Component Matrix^a for Employee Benefits

	Component	
	1	2
Increase Productivity	.874	
Job security	.753	
Job requirement	.701	
Access priority support	.644	
Prepare for certification test	.621	
Increase Compensation	.570	.522
Switch jobs		.889
Prepare for a new position		.724
Increase credibility		.621
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.		
^a Rotation converged in 3 iterations.		

As seen in Table 13, the factor analysis of the employee benefits of certification also yielded a two-factor solution. Component 1 is composed of same-job employee-benefits of certification (i.e., increased productivity, job security, job requirement, prepare for certification test, and increase compensation). Component 2 seems to be composed of Different Job Employee Benefits (switch jobs, prepare for a new position, increase credibility). The factor analysis of the Certification Credibility questions, comparing perceived credibility of IT certifications to other professional certifications, yielded a single factor solution. For the purposes of the mixed design

ANOVA that follows, the responses for each question making up a given factor are combined together and treated as responses for that given factor. Thus, for example, the responses to increased productivity, lower costs, helps attract/retain staff, higher level of service, and ethical conduct are all combined and treated as responses of the internal-organizational-benefits-of-certification factor. Combined responses thus created for each of these factors: 1) internal organizational benefits; 2) external organizational benefits; 3) same-job employee benefits; 4) different-job employee benefits, and 5) certification credibility.

The mixed design analysis

The factor variables noted above were converted into between group variables by making two categories out of each variable: internal organizational benefits (High vs Low); external organizational benefits (High vs Low), same-job employee benefits (High vs Low), different-job employee benefits (High vs Low), certification credibility (High vs Low), years in HR (High vs Low), years in management (High vs Low), size (SME vs Large Business), industry (Manufacturing vs Service).

The Main Effects. There were no statistically significant main effects for all of the between group variables in the mixed design.

The Interaction Effects. Tables 14 and 16, illustrate the five statistically significant interactions between Qualifications and the between group variables, specifically: Internal Organizational Benefits (High vs Low), External Organizational Benefits (High vs Low), Same Job Employee Benefits (High vs Low), Different Job Employee Benefits (High vs Low), Years in Management (High vs Low). As in the case of the interaction effects associated with the repeated measures model, estimated marginal means, an interaction graph, and related contrasts help to determine the nature of those interactions. Rather than belabor that methodological protocol for each significant High-Low interaction, an extensive analysis is entertained for the Qualifications*Internal-Organizational-Benefits-Factor-Group while only summary commentary is given for the other significant High-Low interactions.

Table 14: Tests of Within-Subjects Effects (High versus Low)

Source	Sphericity Status	Type III Sum of Squares	df	Mean Square	F	Sig.
qualify * IntOrgBenFGrp	Sphericity Assumed	5802.681	2	2901.340	4.325	.015
	Greenhouse-Geisser	5802.681	1.745	3325.323	4.325	.019
qualify * ExtOrgBenFGrp	Sphericity Assumed	7930.164	2	3965.082	6.125	.003
	Greenhouse-Geisser	7930.164	1.723	4602.101	6.125	.004
qualify * SameJobEmpFGrp	Sphericity Assumed	6729.945	2	3364.972	5.160	.007
	Greenhouse-Geisser	6729.945	1.780	3779.985	5.160	.009
qualify * DiffJobEmpBenFGrp	Sphericity Assumed	8616.654	2	4308.327	6.682	.002
	Greenhouse-Geisser	8616.654	1.751	4921.599	6.682	.003

Table 15 presents the contrasts associated with each of the significant High-Low interactions identified in Table 14. Of the contrasts associated with the Qualifications*Internal-Organizational-Benefits-Factor-Group interaction, only the Education versus Experience contrast is significant at the $P \leq 0.01$ level. Figure 5 graphically depicts the estimated marginal means associated with those contrasts and provides a useful visual aid in understanding what happens in the tests of within-subjects contrasts.

Table 15: Tests of Within-Subjects Contrasts (High-Low)

Source	Qualification Contrasts	Type III Sum of Squares	df	Mean Square	F	Sig.
qualify * IntOrgBenFGrp	Education versus Experience	1922.285	1	1922.285	3.490	.065
	Certification versus Experience	3615.255	1	3615.255	7.045	.010
qualify * ExtOrgBenFGrp	Education versus Experience	1579.542	1	1579.542	2.883	.093
	Certification versus Experience	5270.973	1	5270.973	10.88	.001
qualify * SameJobEmpFGrp	Education versus Experience	3244.016	1	3244.016	6.127	.016
	Certification versus Experience	3481.727	1	3481.727	7.091	.009
qualify * DiffJobEmpBenFGrp	Education versus Experience	4081.475	1	4081.475	7.707	.007
	Certification versus Experience	4523.804	1	4523.804	9.217	.003

Estimated Marginal Means of Internal Organizational Benefits x Qualifications

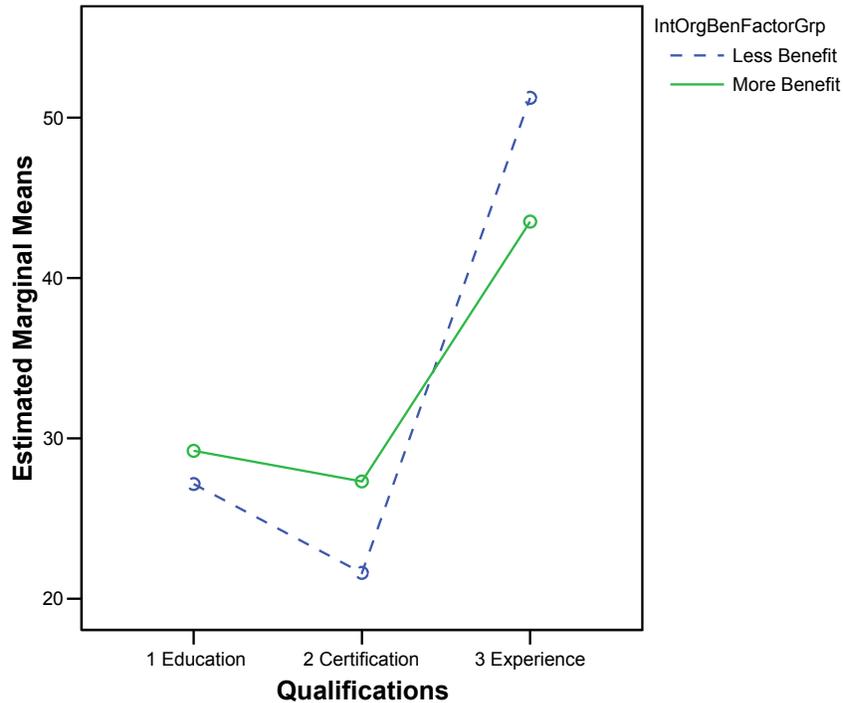


Figure 5: The Qualifications*Internal-Organizational-Benefits-Factor-Group Interaction Contrasts

The Education versus Experience contrast compares the vertical difference between the Low (Less)-Benefit HR professionals’ Education point and the High (More)-Benefit HR professionals’ Education point to the vertical distance between the corresponding Experience points. The corresponding F test suggests that those distances are not significantly different at $P < 0.065$. Similarly, the Certification versus Experience contrast compares the relative vertical distance of certification to that of Experience. The corresponding F test suggests that those distances are significantly different at $P < 0.01$.

Both the graphical depiction and the statistical results clearly communicate the interesting idea that Low (Less)-Benefit HR professionals value experience significantly more than they value certification and education. As noted in Table 15, this theme persists throughout all of the significant High-Low interactions.

Table 16 indicates that there is a statistically significant interaction between respondents that had either high or low Years of Management Experience and Qualifications ($F = 4.694, p \leq 0.014$).

Table 16: Tests of Within-Subjects Effects (Years of Management)

Source	Sphericity Status	Type III Sum of Squares	df	Mean Square	F	Sig.
qualify * YRSMGTHL	Sphericity Assumed	6152.543	2	3076.272	4.694	.010
	Greenhouse-Geisser	6152.543	1.731	3554.248	4.694	.014

The same protocol used to determine the nature of the High-Low interactions can also provide useful insights into the nature of the Qualifications*Years-of-Management-Experience-Factor-Group interaction. Table 17 presents the contrasts associated with this interaction. Both the Education versus Experience and Certification versus Experience interactions are statistically significant at $P \leq 0.022$.

Table 17: Tests of Within-Subjects Contrasts

Source	Degree	Qualifications	Type III Sum of Squares	df	Mean Square	F	Sig.
qualify * YRSMGTHL		Education vs Experience	2815.937	1	2815.937	5.421	.022
		Certification vs Experi-	3316.169	1	3316.169	6.299	.014
degree * qualify * YRSMGTHL	NoDeg vs. Assoc	Education vs Experience	1295.612	1	1295.612	1.041	.311
		Certification vs Experi-	108.472	1	108.472	.152	.698
	Assoc vs. Bache-	Education vs Experience	1894.324	1	1894.324	4.581	.035
		Certification vs Experi-	844.494	1	844.494	1.827	.180

Interestingly, relative to experience, HR professionals with more years of management (ten or more years) value Education and Certification statistically significantly more than HR professionals with fewer years of management. The Degree*Qualifications* Years-of-Management-Experience-Factor-Group interaction suggests that the more-years-of-management HR professionals perceive the largest educational value for candidates with a bachelors degree (at $P \leq 0.035$). Figure 6 graphically depicts the estimated marginal means associated with the Qualifications*Years-of-Management-Experience-Factor-Group interaction, thus providing visual confirmation for the previously discussed findings for that interaction.

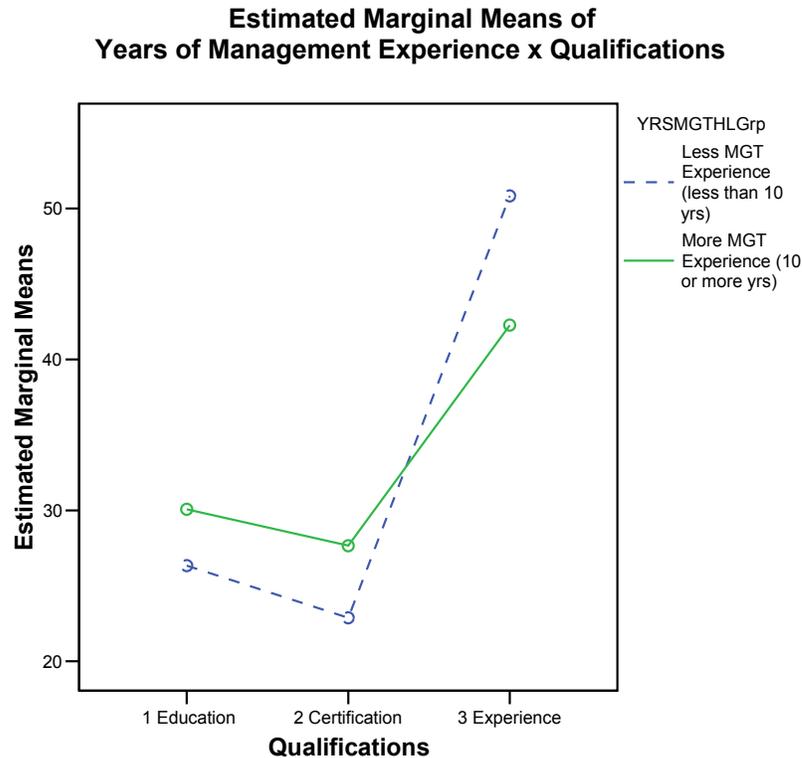


Figure 6: The Qualifications*Internal-Organizational-Benefits-Factor-Group Interaction Contrasts

Discussion

In this study we utilized a repeated measure design to analyze the three scenarios that addressed the dimensions of education, certification, and experience at various levels. This design allowed us to evaluate the value of certification relative to the other dimensions. We followed the repeated measures with a factor analysis that provides insights into possible value drivers. Finally we tested the value drivers to identify possible moderators to certification value.

In a relative sense, the variability of the means results seen in Table 5 and Figure 2 suggest that HR professionals had the greatest consensus on certification value, then education, and finally experience. As a practical matter, the most volatile variable, experience, is the variable that largely subsidizes value gains in education. While the changes in each variable's means across increasing levels of degree reflect diminishing returns, certification appears the most robust to those decrements. In addition, the systematic trend for each type of mean suggests the obvious desirability of the balanced candidate.

It appears that HR professionals expect some level of education, even if the candidate has not completed a degree. This is evident in the no-degree scenario where the HR professional still identified education as a necessary evaluation criterion. In the case of Associates-Degree candidates, HR professionals nearly doubled the relative weight associated with education to about 30 percent. Having some sort of degree seems to establish an important milestone in the minds of HR professionals faced with a hiring decision. Note that the increase in the relative weight of education is subsidized largely by a decreasing emphasis on work experience as seen by the decrease in the relative weight of experience from to about 56 percent to 45 percent. Note however, it appears that relevant experience is still highly valued and that it takes relatively less experience

to place an Associates-Degree candidate on par with a no-degree candidate. In the case of a Bachelors-Degree candidate, HR professionals strike an interesting balance between education and experience, drawing nearly equally upon education and experience to strike that balance with education weighted at 39 percent and experience weighted at about 40 percent.

Interestingly, Figure 3 shows that the certification curve is the flattest of the three depicted curves. Although the weight given to certification does diminish as education level increases, it is slight when compared to the decreased weight given to experience. Education and experience may be substitutes for each other to a point. The flat certification curve and small change in mean suggests that certification is a unique part of the hiring mix less substitutable by education or experience. The flat certification curve further suggests that certification is the least vulnerable to diminishing marginal returns and thus the best investment alternative, given a bachelors degree and adequate relevant experience, for becoming a more desirable, balanced job candidate.

The continued strong presence of each of these components suggests that they are imperfect substitutes for each other; each component exerts its own positive influence on the perception formation of HR professionals. Each tradeoff component experiences diminishing marginal returns in moving from the No-Degree scenario to the Bachelors-Degree scenario, suggesting the obvious outcome of the desirability of the balanced candidate which seems to lie at the relative weights of 40 percent education, 20 percent certification, and 40 percent experience for a candidate with a Bachelors Degree.

The dimensions coming out of the factor analysis make sense and are a useful decomposition of the usual organizational benefits into internal and external organizational benefits and employee benefits into same-job and different-job benefits. These dimensions allow greater focus for both organizational and employee certification management.

The most interesting interaction effect was the finding that HR professionals with more years of management (ten or more years) value Education and Certification statistically significantly greater than HR professionals with fewer years of management experience. Is this a case of valuing more what you don't have, thus a less experienced HR manager values experience more and education and certification less while the more experienced HR manager values education and certification more and experience less. Alternatively, is this difference due to the "long-term" perspective of experienced managers, which over the long-run formal educational activities are more important than experience? Experience only goes so far because technologies are constantly changing so the ability to learn has greater value. More research needs to be done to shed light on this issue.

Conclusion

This exploratory study yields a number of interesting insights into HR professionals' perceptions of information technology certification. Based on the findings of this study we can infer that certification, education, and experience are imperfect substitutes for each other. Thus, each component exerts its own unique influence on HR professionals' perception formation. As formal education increases, the increase in the relative weight of education is subsidized largely by a decreasing emphasis on work experience until a balance between education and experience is reached at the Bachelors Degree level of education. The relative weights of the three dimensions in HR Professional's hiring decision for a job candidate with a Bachelor's degree seems to be approximately 40% education, 20% certification, and 40% experience, with education and experience receiving approximately equal weights and certification receiving half of the weight of education or experience. The convergence of the scenarios suggests diminishing marginal returns when moving from the no-degree scenario to the Bachelors-Degree scenario, suggesting the desirability of the balanced candidate.

The repeated measure analysis shows a significant main effect of qualifications, that subjects rated the types of qualifications (Experience, Certification, Education) significantly differently. The significant main effect reflects a significant difference between the Education and Experience levels and the Certification and Experience levels. From the Interaction Effect of Degree x Qualifications we could conclude that the decreasing value of Experience and the increasing value of Education are influenced by whether the job candidate has No Degree, an Associates Degree, or a Bachelors Degree. We could also conclude that the value of Certification is influenced by whether the job candidate has No Degree compared to a Bachelors Degree, but is not influenced by whether a job candidate has an Associates Degree compared to a Bachelors Degree.

The exploratory factor analysis yielded five underlying dimensions that may be possible value drivers of IT certification on HR Professional's hiring decisions:

1. Internal Organizational Benefits of Certification (increased productivity, lower costs, helps attract/retain staff, higher level of service, and ethical conduct);
2. External Organizational Benefits of Certification (credibility, ability to sell a bigger/broader solution, competitive advantage, access to vendor info/support, and consistency);
3. Same Job Employee Benefits of Certification (increased productivity, job security, job requirement, access priority support, prepare for certification test, and increase compensation);
4. Different Job Employee Benefits (switch jobs, prepare for a new position, increase credibility); and
5. Certification Credibility.

The mixed design of the interactions between Qualifications and the Between Groups Variables also yielded five statistically significant interactions which shed further light on other factors that may be possible value drivers of IT certification on HR Professional's hiring decisions. Those respondents perceiving more benefit (Internal Organizational, External Organizational, Same Job Employee, and Different Job Employee) of Certification rated Certification statistically significantly higher than the respondents perceiving less benefit, compared to Experience. Those respondents with more management experience (10 or more years) valued Education and Certification statistically significantly higher than the respondents with less management experience (less than 10 years), compared with Experience.

Management Implications

In addressing the needs of employers and potential employees it is useful to understand that HR professionals appear to favor a balanced candidate. That is to say there is no ideal mix, but they like to see a mix. A recent ComputerWorld article (Pratt, 2005) offers some anecdotal evidence to support this idea:

“While Dworkin stops short of calling certifications a requirement, he says he uses them to differentiate between candidates.” (p 35)

“Though some managers claim that experience trumps certifications, Harrington says his clients still prefer to see certifications on applicants' resumes.” (p 36)

These thoughts were also evident in the comments the respondents articulated on the open ended survey question. One particular response sums it up nicely:

“The difficulty of certification programs are that they are very specific in nature. However, they are very valuable in terms of staying up to date with technology needed.”

In addition, IT certification appears to be the most stable value (least diminishing returns) so it can be an asset to the degree and experience mix. Certifications could possibly be seen as security for the HR professional, confirming particular IT knowledge or skills.

The dimensions are also of use to employers and employees as they indicate the benefits of certifications to the individual and the organization. Realization of these internal and external benefits creates a situation where both the employee and the organization benefits. Certifying organizations can also benefit from these findings as they can promote the benefits of certifications on an organization and individual level.

Finally, potential employees and employers can benefit by understanding the implications that years of HR experience plays in a HR professional's perspective on certifications. HR professionals with more than 10 years of HR experience appear to value education and certifications more than those with less experience. This enables both potential employees and employers to adjust accordingly.

Limitations

This study, like most research in business, is vulnerable to limitations. A survey of respondent "perceptions" is always problematic, but not unusual. The non-random nature of voluntary survey respondents also increases the likelihood of a non-representative sample and the survey population of North Carolina HR professionals may not be generalizable. However, the SHRM Chapters that participated included both urban and rural participants representing a variety of industries. Additionally, this study did not address how much or what type of "in field" work experience or how many or which type of certifications are valuable.

Future Research

This research is valuable as a preliminary procedure for construct definition and hypothesis development. This study, as an initial exploratory attempt to understand the value creation system and value drivers of IT certification on HR Professional's hiring decisions, has found usefulness as the first step in refining the conceptual framework for future research on the value of IT certifications. A next step is to develop and test hypothesis and add other possible factors to further develop the conceptual model (i.e. graduate level education, vendor or industry certifications, etc.). In addition a survey of a larger sample of HR managers would be more generalizable.

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