

## Information Technology–Higher Education Alignment: A Field Study in an Arab Environment

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### Abstract

*The purposes of this paper are, first, to determine the levels of alignment between IT and higher education processes in the Jordanian university environment, as one of the Arab countries; second, to diagnose potential enablers and inhibitors in this context; and third, to develop recommendations to strengthen enablers if needed. Two random samples of Master and Doctoral students at Yarmouk University answered questionnaires to gather field data. The findings of the analyses identify enablers and inhibitors in the natural and social sciences, with insignificant differences. The recommendations of this paper refer to certain enablers and inhibitors that are unique to Jordanian universities, in contrast to some of the previously cited studies.*

**Keywords:** Alignment, enablers, inhibitors

### 1. Introduction

A number of field studies have shown that modern information technology (IT) has served as a driver of progress in both school and university educational systems. Therefore, methods through which to realize progress using IT have consistently been emphasized (Beard & Humphrey, 2014; Cui, Ye, Teo, & Li, 2015): "In recent decades, billions of dollars have been invested in information technology (IT). A key concern...is alignment - applying IT in an appropriate and timely way and in harmony with strategies, goals, and needs" (Luftman, Papp, & Brier, 1999).

The issue of alignment addresses both how IT is aligned with, for example, higher education processes in universities (teaching, doing research, and learning) and how university higher education processes should be aligned with IT (Silvius & de Waal, 2010; Tanuwijaya & Sarno, 2010).

The significance of alignment is well known and has been documented in a number of articles (Martin et al., 2011; Ottenbreit-Leftwich et al., 2012; Tallon & Pinsonneault, 2011). What has not been sufficiently documented and investigated, especially in developing countries, is how harmony between IT and university higher education processes can be achieved and sustained (Alfahad, 2012; Seman & Salim, 2013).

Literature review point out that there are some published research projects about the factors (enablers and inhibitors) which generally influence levels of alignment (Barry et al., 2015; Beard & Humphrey, 2014; Luftman et al., 1999; Talebian, Mohammadi, & Rezvanfar, 2014). Other publications reveal emphasis on either enablers or inhibitors while all are concerned with university undergraduate students as follow:

Farideh et al., (2011) had concluded their field study about university undergraduate students, that the effects of information technology on education depends on how much it is responsive to local environment. Therefore levels of responsiveness to local environment are enablers.

Elisha et al., (2013) had stated in their field study on university undergraduate studies that limited responses of information technology to local needs negatively affect levels of alignment between IT and university education.

Mohammad, (2014) had stated that inhibitors of IT education alignment on university undergraduate level in Iran are: human, facility equipment, technical, cultural, financial, professional ability and payment fringe benefits. This study pointed out that human inhibitors are the most important while fringe benefits are the least important.

Amornkitpinyo, & Piriyasurawong, (2015) had pointed out that inhibitors of IT education alignment at university undergraduate level are: perceived usefulness of IT, perceived ease of use of IT, student attitudes towards IT.

Peeraer, & Van Petegem, (2015) had concluded that enlarging participation of stakeholders in planning for IT alignment with university undergraduate levels education is enabling factor.

The purposes of this paper are as follows:

- 1- determine the levels of alignment between IT and university higher education processes in Jordan as one of

the Arab countries;

2- diagnose possible enablers and inhibitors in this context;

3- and develop possible recommendations to weaken inhibitors and strengthen enablers.

Obviously, reaching higher levels of alignment requires improvements in university higher education processes. This research therefore proposes the following hypotheses.

First, there are no statistically significant differences in levels of alignment resulting from differences between academic specializations (social or natural sciences).

Second, there are no statistically significant positive correlations between levels of alignment and levels of enablers.

Third, there are no statistically significant negative correlations between levels of alignment and levels of inhibitors.

## 2. Methodology

To test these hypotheses, a questionnaire form is taken from (Luftman et al., 1999) and adapted for the collection of field information regarding levels of alignment, inhibitors, and enablers which were emphasized in number of scholarly papers (Talebian, Mohammadi, & Rezvanfar, 2014; Barry et al., 2015; Beard & Humphrey, 2014).

Questions concerning inhibitors and enablers are specially modified to fit meanings derived from the same field of research. The employed questionnaire has been pretested and shows high internal consistency (93% Alpha Coefficient), ensuring that it is applicable to the local Jordanian environment. Yarmouk University is selected randomly out of the seven Jordanian state universities for the purpose of this investigation. Master and doctoral students are considered in the statistical population of this research because they have more experience with IT and its applications than undergraduates.

Random samples of 42% of the examined university's natural and social sciences students are selected, representing 75 out of 175 natural sciences students and 189 out of 1447 social sciences students.

The statistical techniques presented below are used to analyse the collected data in order to test the research hypotheses.

## 3. Analysis and Findings

In order to test the first hypothesis, which states that there are no statistically significant differences in levels of alignment resulting from differences in academic specializations, the responses of natural and social sciences students regarding levels of alignment are calculated in Table 1.

**Table 1:** Levels of Alignment

Weight	Social Sciences		Natural Sciences	
	Frequency	Percentage	Frequency	Percentage
Very low	5	2.6	3	4.0
Low	18	9.5	9	12.0
Medium	106	56.1	36	48.0
High	48	25.4	23	30.7
Very high	12	6.3	4	5.3
Total	189	100.0	75	100.0

Table 1 shows that the highest percentages of responses for both the social and natural sciences students were at the medium level, followed by the high, low, very high, and very low levels. This means that there is a great degree of similarity between the two distinct academic specializations with regard to the distributions of the responses. For an overall comparison between the responses of these two groups of students in terms of the levels of alignment, the arithmetic means and standard deviations of the responses are calculated in Table 2.

**Table 2:** Levels of alignment between IT & university higher education processes

Academic specialization	Mean	Std. Dev.
Social sciences	3.23	0.81
Natural sciences	3.21	0.87
Both	3.21	0.87

Table 2 shows a minor difference in the level of alignment between the social and natural sciences. Meanwhile, the standard deviations of the responses of both groups show a low level of differentiation. A T-test is conducted to determine whether this difference in alignment levels is statistically significant.

**Table 3:** Comparing social sciences with natural sciences with regard to levels of alignment

Academic specialization	Mean	Std. Dev.	T-Value	2-Tail Prob.
Social sciences	3.232	0.811	0.17	0.868
Natural sciences	3.213	0.874		

The T-test in Table 3 shows that there is a difference between the alignment levels of the two groups of academic specializations but it is not statistically significant. This supports the first research hypothesis. This difference could be attributed to the fact that both groups of students have equal access to IT at the university have relatively brief amounts of experience with IT, not exceeding a few years. In addition, this result implies that students with different academic specializations have similar tendencies towards IT. The arithmetic means of the responses of the two groups presented in Table 3 exhibit medium levels of alignment, as shown in Tables 4 and 5.

**Table 4:** Levels of alignment enablers

Enabler Item Number	Social sciences		Natural sciences		Both	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
1	3.28	0.89	3.21	0.99	3.21	0.99
2	3.57	1.01	3.27	1.09	3.27	1.09
3	3.29	0.99	3.21	1.02	3.21	1.02
4	3.17	0.97	3.03	1.13	3.03	1.13
5	3.38	1.09	3.23	1.09	3.23	1.09
6	2.99	1.02	2.96	0.95	2.96	0.95
7	2.94	0.99	2.71	1.14	2.71	1.14
8	3.03	0.98	2.76	1.05	2.76	1.05
9	3.04	1.06	2.84	0.97	2.84	0.97
10	2.95	1.06	2.81	0.97	2.81	0.97
11	2.97	1.08	2.76	1.02	2.76	1.02
12	2.97	1.11	2.85	0.98	2.85	0.98
13	2.96	1.10	2.75	1.05	2.75	1.05
14	3.24	1.13	3.01	1.02	3.01	1.02

Table 4 shows that the arithmetic means of the responses of social sciences students regarding levels of enablers range from 3.57 to 2.94, while they range from 3.23 to 2.71 among natural sciences students, and from 3.27 to 2.71 for both groups. However, the levels of enablers are relatively higher in the social sciences than the natural sciences, which could be an additional reason for their higher level of alignment in Table 3. Both of these findings indicate a medium level of enablers. The standard deviations of all arithmetic means range from 1.14 to 0.89, which means responses levels of differentiation are either low or medium. Inhibitors, on the other hand, are illustrated in Table 5.

**Table 5:** Levels of Alignment inhibitors

Inhibitor Item Number	Social sciences		Natural sciences		Both	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
1	3.29	0.98	3.55	0.93	3.55	0.93
2	3.11	1.02	3.29	0.93	3.29	0.93
3	3.05	1.01	3.43	0.81	3.43	0.81
4	2.94	1.04	3.31	1.04	3.31	1.04
5	2.98	1.12	3.32	0.99	3.32	0.99
6	3.02	1.12	2.95	1.04	2.95	1.04
7	2.81	1.16	2.92	0.91	2.92	0.91
8	3.45	1.19	3.56	1.00	3.56	1.00
9	3.15	1.09	3.17	1.12	3.17	1.12
10	3.13	1.18	3.13	0.95	3.13	0.95
11	3.10	1.10	3.40	0.92	3.40	0.92
12	2.45	1.12	2.56	0.87	2.56	0.87
13	3.07	1.10	3.07	1.02	3.17	1.02

Table 5 shows that the arithmetic means of the responses of social sciences students regarding levels of inhibitors range from 3.45 to 2.45, while they range from 3.56 to 2.56 for natural sciences students, and from 3.43 to 2.56 for both groups.

However, the level of inhibitors in the natural sciences is relatively higher than that in the social sciences, which serves as an additional explanation for their lower level of alignment in Table 3. Both of these findings indicate medium levels of inhibitors. The standard deviations of all arithmetic means range from 0.89 to 1.14 which means that the differences between the responses of both groups are either low or medium. In order to test the second hypothesis (which states that there are no statistically significant correlations between levels of alignment and levels of enablers) and to determine whether the levels of enablers shown in Table 4 and the levels of inhibitors shown in Table 5 were the actual determinants of the medium levels of alignment shown in Table 1, correlations between both sets of responses are calculated as shown in Tables 6 and 7.

**Table 6:** Correlations Between Levels of Alignment and Levels of Enablers

Enabler Item Number	Correlation		
	Social sciences	Natural sciences	Both
1	0.1369	0.3056(*)	0.1911(**)
2	0.1164	0.3351(*)	0.1852(*)
3	0.1827(*)	0.5254(**)	0.2868(**)
4	0.3217(**)	0.2410	0.2949(**)
5	0.1837(*)	0.0765	0.1521(*)
6	0.2075(*)	0.2705(*)	0.2250(**)
7	0.1381	0.2270	0.1674(*)
8	0.0840	0.3065(*)	0.1536(*)
9	0.0577	0.2153	0.1021
10	0.1627	0.3668(**)	0.2194(**)
11	0.1608	0.3596(**)	0.2177(**)
12	0.1075	0.4460(**)	0.1995(**)
13	0.1404	0.4260(**)	0.2225(**)
14	0.1291	0.2998(*)	0.1760(*)

0.001 ≥ α(\*\*) 0.01 ≥ α(\*)

Table 6 shows statistically significant positive correlations between levels of enablers (items 3, 4, 5, and 6) and levels of alignment in the responses of social sciences students. This clearly contradicts the second research hypothesis. Table 6 also shows statistically significant positive correlations between levels of enablers (items 1, 2, 3, 6, 8, 10, 11, 12, 13, and 14) and levels of alignment in the responses of natural sciences students. This also contradicts the second research hypothesis.

Additionally, Table 6 presents statistically significant positive correlations between levels of enablers (items 1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, and 14) and levels of alignment in the responses of both social and natural sciences students. This too contradicts the second research hypothesis.

In order to test the third research hypothesis (which states that there are no statistically significant correlations between levels of alignment and levels of inhibitors), the correlations between the relevant responses are calculated in Table 7.

**Table 7:** Correlations Between levels of Alignment and levels of Inhibitors

Inhibitor Item Number	Correlation		
	Social sciences	Natural sciences	Both
1	-0.0506	0.0042	-0.0358
2	-0.0363	0.1552	0.0159
3	-0.1191	-0.0158	-0.0925
4	-0.1142	-0.0581	-0.0980
5	-0.0709	-0.1738	-0.0992
6	-0.1054	-0.0171	-0.0798
7	-0.0659	0.01742	-0.0061
8	-0.0704	0.0468	-0.0397
9	-0.0588	0.1826	0.0145
10	-0.1201	0.1180	-0.0606
11	-0.0190	-0.0743	-0.0343
12	0.0306	-0.0524	0.0093
13	-0.1507	-0.0466	-0.1210

0.001 ≥ α(\*\*) 0.01 ≥ α(\*)

Table 7 shows that there are negative correlations between most of the inhibitors and the levels of alignment in the responses of both the social and natural sciences students, but none of them are statistically significant. This result supports the third research hypothesis.

#### 4. Conclusion and Recommendations

The findings of the analysis show that there are medium levels of alignment between IT and higher education processes in universities. The first research hypothesis was shown to be invalid because the difference between the levels of alignment between social and natural sciences students is not statistically significant. Therefore, different recommendations for the social and natural sciences are not needed to improve these medium levels of alignment.

The findings indicate the presence of enablers and inhibitors in both the natural and social sciences, with insignificant differences. Although inhibitors are identified, they show no significant correlations with the levels of alignment in the social and natural sciences, probably because of the relatively strong formal backing of IT at the university and state levels. This finding clearly supports the validity of the third research hypothesis.

Unlike inhibitors, enabler items exhibit several statistically significant positive correlations with levels of alignment in the social and natural sciences, partially invalidating the second research hypothesis.

These findings indicate that sustaining and energizing the enabler items mentioned above could sustain and improve the levels of alignment between IT and higher education processes in universities, and, consequently, could lead to educational progress in the examined country. Therefore, in contrast to some of the previously cited studies, such as Barry et al. (2015) and Beard and Humphrey (2014), the recommendations of this study are related to certain inhibitors and enablers which are unique to the Jordanian environment in particular and probably also to the Arab environment in general.

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**Appendix: Questionnaire Form**

Dear Graduate Student  
Full Name -----Faculty -----Dept-----

Alignment means leve1 of harmony between information Technology (IT) on one hand and University system on the other hand. It is two ways processes.Factors influencing levels of Alignment are called: Enablers and Inhibitors.

Q1- According to your personal experiences, mark the 1evel of alignment between IT as adopted by your University, on one hand and major academic processes (research doing and experimentation and learning) on the other hand.

Very high ( ) high ( ) medium ( ) low ( ) very low ( )

Q2 - According to your personal experiences, mark the 1eve1s of presence of Enablers at your University.

Enablers Items	Levels of Presence				
	Very High	High	Medium	Low	Very Low
1. Univ. leadership Backing IT.					
2. IT. Involved in University strategy development					
3. IT. Understands University tasks					
4. IT. Non-IT. have close relationship					
5. IT. Shows strong leadership					
6. I.T. efforts are well prioritized					
7. I.T. meets commitments					
8. IT. Plans linked to University plans					
9. IT. achieves its strategic goals					
10. IT. resources shared					
11. IT. Goals / vision are defined					
12. IT. applied for competitive advantage					
13. Good IT. / University communication					
14. Partnerships / alliances between IT. and other university systems					
Others					

Q3: According to your personal experiences, mark the levels of presence of each Inhibitors at your University:

Inhibitors Items	Levels of Presence				
	Very High	High	Medium	Low	Very Low
1- IT. Non IT lack close relationship					
2. IT does not prioritize well					
3. IT. Fails to meet its commitments					
4. IT. Does not understand University tasks					
5. Senior University leaderships do not support IT.					
6. IT. Management lacks leaderships					
7. IT. Fails to achieve strategic goals					
6. IT. Has budget & staffing problems					
9. Antiquated IT infrastructure					
10. Goals and visions of IT. are vague					
11. IT does not communicate well					
12. Resistance from university leaderships regarding IT.					
13. IT. Non IT. Plans are not linked					
Others					