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An Empirical Investigation into the Advantages and Disadvantages of Combining Information Systems and Operations Management into One Department

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Abstract

This paper reports on the results of research on the advantages and disadvantages of merging the Information Systems (IS) discipline and the Operations Management (OM) discipline into one department within the school of business. The research included performing a literature review of previous research on the topic, a review of the top 35 public business programs in the USA as to their approach to the topic, and the collection of opinions from academics external to the researchers' institution, gathered through a survey instrument. The results of the research show that there are advantages and disadvantages to merging the two disciplines and that opinion on the topic is mixed.

Keywords: Information Systems Curriculum, Operations Management, Information Systems and Operations Management Integration

1. INTRODUCTION

The purpose of this research is to investigate the advantages and disadvantages of merging the Information Systems (IS) discipline and the Operations Management (OM) discipline into one department. This project was undertaken by the researchers, not just out of curiosity, but also out of necessity. Recently, at the researchers' institution, members from the Management department approached the IS department and proposed the idea of moving the quantitative (OM) portion of their program into the IS group.

Although it has yet to be clearly defined as to what exactly this reorganization would entail, it is known that several OM faculty would move from the Management department to the IS department and the OM course offerings would become part of the IS catalog. Many questions still remain as to the depth of the integration of the two disciplines. For example, will there be a combined degree or separate degrees? Will

there be crossover in core and elective courses offered? Will there be crossover as to the courses faculty teach?

Due to this uncertainty, the terms "combining", "merging", "moving", and "integrating" are used interchangeably in this research and all refer to some unknown degree of synthesis between the two disciplines. That degree of synthesis could range anywhere from the two disciplines simply being housed in the same department up to a fully integrated and shared degree.

2. RESEARCH METHODOLOGY

This research was conducted using a "grounded theory" approach. Grounded theory was developed by the sociologists Barney Glaser and Anselm Strauss in the 1960's. In the grounded theory approach, conclusions are drawn and theories are produced by analyzing a body of data. In essence, the theories that are produced are "grounded" in the data (Glaser & Strauss, 1967).

For this study, the research question was, "What are the advantages and disadvantages of combining information systems and operations management into one department?" In order to answer the research question, the researchers undertook a methodical data gathering approach. That approach included performing a literature review of previous research on the topic, a review of the top 35 public business programs in the USA as to their approach to the topic, and the collection of opinions from academics external to the researchers' institution, gathered through a survey instrument.

3. LITERATURE REVIEW

The IS and OM disciplines are not usually combined (Silva & McFadden, 2005) although they may be housed in the same department (Ho, 2009). Therefore, unsurprisingly, a Google Scholar™ and ProQuest® search reveals a dearth of literature describing a joint major. In fact, it is more common to see IS combined with Computer Science (CS) as the two disciplines clearly share a computing focus. This nexus is so pervasive that in order to prevent confusion, IS researchers have had to articulate the difference between the two (Hirschheim & Klein, 2012).

Nevertheless, for philosophical reasons, some rationale for the combination of IS and OM exists if we take a further step back in time to the intellectual foundation of these disciplines; both disciplines have their origins in mathematics because they are quantitative and/or involve logical reasoning. And for this very reason, they may attract and benefit the very same sort of student. Furthermore, when IS began in the 1960s, it formed from the nexus of operations research, computer science, management and organization theory, and accounting, indicating a historic shared origin (Davis and Olson cited in Hirschheim and Klein, 2012).

Another similarity IS and OM share is their relative newness to the business school curriculum and their somewhat rocky path to acceptance. OM first became part of the business school curriculum in the 1950s as a result of the Carnegie and Ford Reports which called for more analytical training and rigor (Grossman, 2003). The basic OM required course, which developed in response, was unpopular with students due to its extensive mathematical content and perceived lack of relevancy to the typical managerial environment. Other constituencies, including business school deans, recruiters, the business community, and alumni, were also unsupportive of OM viewing it as more theoretical than directly applicable (Grossman, 2003). In sum, "[t]he cost of learning the simplex method in terms of time and burnt brain cells did not justify the payoff, which was next to nil for someone destined for a managerial role" (Horner, 2003).

Perhaps reflecting this assessment, the Association to Advance Collegiate Schools of Business (AACSB) changed its guidelines in 1991 to eliminate an OM requirement and top business schools reduced or eliminated their OM courses (Grossman, 2003). However, in 2003, AACSB did another flip-flop of sorts and changed its standards to state that "learning experiences" in OM are "typically" part of the business school curriculum. Nevertheless, the Standards did not require a separate course in OM. Currently, Standard 9 of the 2016 Standards states that General Business and Management Areas include: "Systems and processes in organizations, including planning and design, production/operations, supply chains, marketing, and distribution" (AACSB, 2016).
This indicates that OM has regained a more secure place in the curriculum, at least for now.

By comparison, IS emerged as a discipline with a more practical focus, the application of computers to organizations (Hirschheim & Klein, 2012). So one might assume that IS would have quickly established a strategic foothold in both the business environment and academia. However, this was not the case and IS continues to struggle to establish itself and to define its boundaries. No single accrediting or professional organization has emerged to manage this task definitively (Hirschheim & Klein, 2012). And so, one prevailing thought is that IS should be taught as a service course by other fields as it naturally occurs within the context of problems faced by other functions such as Marketing and Management. Like OM it is a tool for decision making.

IS has experienced an additional challenge, a wildly fluctuating enrollment. Enrollment peaked in 2000 and then fell 70% after the dot-com bust (Walstrom, 2008). Some business schools eliminated their IS major in response (Lynch, 2010). Since 2010, enrollments have begun to slowly recover, rising about 2% per year (Annabi & McGann, 2015). Given this track record, the future of IS enrollment and the role of the IS major remain uncertain.

Possibly, combining OM and IS might bolster their shared precarious existence by guaranteeing sufficient students and and/or an AACSB endorsement. But more importantly, from the viewpoint of benefiting students, there is a clear need for OM majors to have the computer knowledge they would gain in IS courses (Geoffrion, 1992). For example, in identifying the top ten skills and techniques to be taught in introductory OM classes, Horner (2003) lists spreadsheet engineering and modeling in Excel as the most important. And, to further define the metes and bounds of the OM curriculum, Horner identifies what should not be taught. This includes any model that cannot be built and used in Excel® or integrated well with Excel®. So, by moving away from theoretical problem solving and complex mathematical techniques such as the Simplex Method, and toward the more practical and accessible, OM is moving closer to IS in terms of course content.

Also, from the IS perspective, IS students could benefit from the analytical approach of OM and from exposure to techniques for turning data into knowledge (Geoffrion, 1992). Although less specialized, they would be more valuable employees who would be better able to contribute to the overall bottom line. Ho (2009) points out that continual improvement in business operations is the essence of the synergy between information systems and operations management. Long-term improvement is the result of steps taken in both areas. Rethinking how work gets done, combined with new technology, enables a leap forward. So, for example, a hotel guest recognition system that uses guest feedback to anticipate the needs of repeat guests is an idea that turns data into information and is now practical to implement with Web based technologies.

Of course OM and IS are not the only disciplines seeking a possible combination within the business school setting. So, an analogous combination, the merger of marketing with other disciplines, provides some insights when considering a potential OM/IS merger. Neese and Batory (2005) surveyed faculty satisfaction in marketing departments that had merged, with faculty satisfaction in unmerged departments. In developing a hypothesis, they identified the factors that promote merger from the administrative standpoint. These include: cost effectiveness and productivity, enhanced collaboration, maximization of student learning, application of knowledge to solve problems, and use of technology to deliver student services. From the faculty standpoint, however, collegiality, autonomy, academic freedom, specialization and expertise in a functional area are the major concerns rather than a possible synergy of effort. Faculty do not believe that their students will be well understood by another discipline's faculty or receive the same career opportunities. Also, faculty do not believe that merger is cost effective and they fear a loss of resources for their discipline. Neese and Batory's study revealed that faculty members in autonomous marketing departments are far more satisfied with their organizational structure.

Silva and McFadden (2005) surveyed alumni of an undergraduate OM/IS joint degree program which required students to select either OM or IS as their area of emphasis and to take courses in both disciplines. The survey questions asked respondents to rate the relative importance of business and technical skills to their careers and the extent to which the degree program provided these skills. Technical skills included programming, web design, operation systems, and databases. General business skills included written and oral communication, team building, and leadership.

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The survey revealed that respondents felt general business skills were highly important for their jobs while technical skills were of low to medium importance. Respondents felt well prepared in the general skills area and adequately prepared in the technical skills area. So it seems that a broader degree program of this type might "inoculate" graduates against a potential down-turn in IS jobs that are technically focused as well as address the growing emphasis on e-supply chain management. Notably, while most jobs are cross-functional in nature, some recent graduates of the program feared that they were less competitive in pursuing a first job when compared with students in majors that focused solely on computer-related technical skills. And, there may be some truth to this as many businesses seek immediate productivity in new hires rather than long-term potential (Turner & Lowry, 1999).

Although joint IS/OM programs are uncommon, a sample of other schools offering a dual major includes the University of North Carolina at Wilmington, George Mason University, Northern Illinois University and the University of Connecticut. These programs refer to themselves as "ISOM," "OPIM," and "OMIS." Also, an interest in combining OM and IS is not confined to the United States. Singapore Management University (SMU) offers a double major in IS and OM (SMU, 2016). On its website, the university lists reasons why the combination major, or OM as a second major is desirable, specifically noting the OM graduates' role in recommending system software solutions incorporating Oracle® or SAP® to streamline processes. In addition, these degrees qualify graduates for consulting jobs in logistics, supply chain management, and business change/risk management.

4. TOP 35 PUBLIC BUSINESS PROGRAMS

Table One shows a list of the top 35 public undergraduate business programs. The list comes from the US News and World Report list of top US business programs (Byrne, 2014). The researchers chose to look at only the public institutions as their institution is public.

Undergraduate Public Business Schools	Combined (C)-Separate (S)-Other (O)
Arizona State	S
Georgia Tech	S
Georgia State	S
Indiana U	C
Miami U-Oxford	S
Michigan State	O
Ohio State U	O
Penn State	C
Purdue	S
Texas A&M	C
U Arizona	O
U Arkansas	S
U California Berkeley	C
U Colorado-Boulder	O
U Conn	C
U Florida	C
U Georgia	O
U Illinois—Urbana-Champaign	O
U Iowa	C
U Maryland	C
U Michigan – Ann Arbor	C
U Minnesota	O
U North Carolina—Chapel Hill	O
U Oklahoma	O
U Oregon	C
U Pitt	S
U South Carolina	C
U Tennessee	O
U Texas—Austin	C
U Utah	C
U Virginia (Darden)	S
U Washington	C
U Wisconsin	O
Virginia Tech	O
William & Mary	C

Table One – Top 35 Public Business Programs

The first column contains the name of the institution in which the business program is

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housed. The second column has a value of "C", "S", or "O". A value of "C" indicates that the IS and OM disciplines are housed in the same department. A value of "S" indicates that the two disciplines are housed in separate and distinct departments. A value of "O" indicates that the institution uses some other configuration, (E.g., IS with Accounting, etc.)

Out of the 35 programs listed, 15 (43%) of the programs combined IT/IS and OM/SCM (to the exclusion of all other disciplines) into one department. Eight (23%) of the programs had two distinct separate departments between IT/IS and OM/SCM (to the exclusion of all other disciplines). The remaining 12 (34%) had other groupings.

5. RESULTS FROM SURVEY

The third information gathering technique employed by the researchers was the development and deployment of a survey instrument. The survey asked the respondents several questions eliciting their opinion of merging IS and OM into one department. The survey was sent to 4000 prospective respondents from a list obtained through the Association of Information Systems (AIS). Only those AIS members who had indicated that they were faculty or some other type of academic were sent the survey. Out of the 4000, 203 people responded.

Out of the 203 respondents to the survey, 61 (30%) currently have an integrated IS/OM department at their institution and 57% of the respondents either currently or previously worked in an integrated department. Knowing which respondents currently have an integrated department allowed the researchers to analyze the survey results both at an overall summary level and by department type (currently integrated or not).

The following tables show the results of the survey questions.

Tables Two and Three summarize the overall opinions of the respondents as to whether they feel that integrating OM and IS is a good idea or a bad idea. Respondents were asked to use a five point Likert type scale to rank how strongly they feel that integrating is a good idea and how strongly they feel that integrating is a bad idea. Table Two shows that, using this five point scale, on average respondents said that integrating was a 2.9 out of 5 as a good idea. Table Three shows that respondents also averaged 2.9 out 5 in ranking integration as a bad idea. These results would suggest that, overall, respondents neither feel strongly positive or strongly negative about integrating the two disciplines.

On a scale of 1-5 how strongly do you feel that integrating OM and IS is a GOOD idea? (5 = very strongly 1=not strongly)

Response	Count
1	40
2	36
3	54
4	53
5	20
Average	2.9

Table Two – Likert Scale of Positive Opinion of Integration

On a scale of 1-5 how strongly do you feel that integrating OM and IS is a BAD idea? (5 = very strongly 1=not strongly)

Response	Count
1	43
2	37
3	48
4	43
5	32
Average	2.9

Table Three – Likert Scale of Negative Opinion of Integration

Do you feel that integrating OM and IS is better for students?

Response	Count	%
Yes	61	30%
No	83	41%
No Opinion	59	29%

Table Four – Positive Opinion of Integration Effect on Students

Table Four shows the results of the survey question that asked respondents if they feel that integrating OM and IS is better for students. The table shows that the majority of respondents

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(41% vs 30%) feel that integrating is not better for students.

Why or why not do you feel that integrating OM and IS is better for students?

Better?	Reason	Pct
Yes	There is synergy between IT/IS and OM	58%
Yes	Positive effect on future employment prospects for students	40%
Yes	It Depends	2%
No	IT/IS and OM focus on distinctly different areas of research, and use different tools and methods; lack of focus in a combined program could have a negative effect on skills and employment prospects for students	57%
No	IT/IS does not apply narrowly to OM only, but also (broadly) to other fields such as accounting, finance, marketing, and management	29%
No	Administrative issue or concern comment	8%
No	It Depends	6%

Table Five – Why or Why Not Respondents Have a Positive Opinion of Integration Effect on Students

Table Five below shows the result of a follow up question to the Table Four results whereby respondents were asked to identify why or why not they feel that integrating is better for students. The majority of respondents who feel that it is better for students give as a reason the synergy between the two disciplines. The majority of respondents who feel that integrating is not better for students say that the differences between the disciplines were too great.

Tables Six and Seven show the results of the converse question which asked if respondents feel that integrating was worse for students. The majority of respondents (41% vs 28%) feel that integrating is not worse for students. The mixed results shown in tables four through seven suggest that, overall, respondents do not feel strongly that integrating IS and OM is better or worse for students.

Do you feel that integrating OM and IS is worse for students?

Response	Count	%
Yes	56	28%
No	83	41%
No Opinion	64	31%

Table Six – Negative Opinion of Integration Effect on Students

Why or why not do you feel that integrating OM and IS is worse for students?

Worse?	Reason	Pct
Yes	Same reason as previous question	53%
Yes	Weakens IT/IS area	17%
Yes	Loss of focus for the department	16%
Yes	No added value	6%
Yes	Too much math	4%
Yes	Negative effect on employment prospects for students	4%
No	Same reason as previous question	88%
No	Better skill set	8%
No	There is synergy between IT/IS and OM	4%

Table Seven – Why or Why Not Respondents Have a Negative Opinion of Integration Effect on Students

Do you feel that integrating OM and IS is better for faculty?

Response	Count	%
Yes	56	28%
No	76	37%
No Opinion	71	35%

Table Eight – Positive Opinion of Integration Effect on Faculty

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Why or why not do you feel that integrating OM and IS is better for faculty?

Better?	Reason	Pct
Yes	Facilitates research collaboration between IT/IS and OM faculty	56%
Yes	A bigger department is more powerful	16%
Yes	There is synergy between IT/IS and OM	12%
Yes	Enables career or teaching flexibility for faculty	12%
Yes	Combined department helps OM faculty	4%
No	IT/IS and OM faculty have different areas of focus in research	44%
No	There is conflict of resource allocation between IT/IS and OM faculty within an integrated department	24%
No	There is no particular benefit to faculty	13%
No	There is no synergy between IT/IS and OM	9%
No	It depends	8%
No	No, except in need of adequate student enrollment to make a department viable in a business school	2%

Table Nine – Why or Why Not Respondents Have a Positive Opinion of Integration Effect on Faculty

Tables Eight and Nine show a summary of the responses when respondents were asked if they feel that integrating IS and OM is better for faculty. The majority (37% vs 28%) feel that integrating is not better for faculty. The number one reason for those who feel integration is not better for faculty is that the two disciplines have different areas of focus in research. The number one reason for those who feel it is better for faculty is that integrating the two disciplines facilitates research collaboration.

Do you feel that integrating OM and IS is worse for faculty?

Response	Count	%
Yes	56	28%
No	70	34%
No Opinion	77	38%

Table Ten – Negative Opinion of Integration Effect on Faculty

Why or why not do you feel that integrating OM and IS is worse for faculty?

Worse?	Reason	Pct
Yes	Same reason as previous question	60%
Yes	Conflict in resource allocation	27%
Yes	IT/IS and OM have different areas of focus	13%
No	Same reason as previous question	96%
No	Synergy between IT/IS and OM	3%
No	Opportunity for faculty research collaboration	1%

Table Eleven – Why or Why Not Respondents Have a Negative Opinion of Integration Effect on Faculty

Tables Ten and Eleven show the results of the converse question which asked if respondents feel that integrating was worse for faculty. A slight majority of respondents (34% vs 28%) feel that integrating is not worse for faculty. The mixed results shown in tables eight through eleven suggest that, overall, respondents do not feel strongly that integrating IS and OM is better or worse for faculty.

In fact, up to this point the overall results from the survey show a dichotomy of opinion on the subject of integrating IS and OM. There seems to be no strong consensus on whether it is better to integrate or not. The researchers decided to take it one step further to see if significance could be found in the opinions of the 61 respondents who currently worked in an integrated department versus the 142 who did not. Tables twelve through fifteen show those results.

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Is Your Current Department Integrated and Do you feel that integrating OM and IS is better for students?

Integrated?	Better?	Pct
Yes	Yes	44%
Yes	No Opinion	33%
Yes	No	23%
No	Yes	24%
No	No Opinion	27%
No	No	49%

Table Twelve – Positive Opinion of Integration Effect on Students with Integrated Variable

Table Twelve shows that respondents in integrated departments are twice as likely to consider an integrated department better for students than not. Those in non-integrated departments are twice as likely to consider an integrated department NOT better for students.

Is Your Current Department Integrated and Do you feel that integrating OM and IS is worse for students?

Integrated?	Worse?	Pct
Yes	Yes	18%
Yes	No Opinion	25%
Yes	No	57%
No	Yes	32%
No	No Opinion	35%
No	No	33%

Table Thirteen – Negative Opinion of Integration Effect on Students with Integrated Variable

Table Thirteen shows that those in an integrated department strongly disagree that integrated is worse for students. Those in non-integrated departments do not have a predominant opinion – they feel integrated is NOT better but not necessarily worse for students.

Is Your Current Department Integrated and Do you feel that integrating OM and IS is better for faculty?

Integrated?	Better?	Pct
Yes	Yes	43%
Yes	No Opinion	25%
Yes	No	32%
No	Yes	22%
No	No Opinion	39%
No	No	39%

Table Fourteen – Positive Opinion of Integration Effect on Faculty with Integrated Variable

Is Your Current Department Integrated and Do you feel that integrating OP and IS is worse for faculty?

Integrated?	Worse?	Pct
Yes	Yes	20%
Yes	No Opinion	28%
Yes	No	52%
No	Yes	31%
No	No Opinion	42%
No	No	27%

Table Fifteen – Negative Opinion of Integration Effect on Faculty with Integrated Variable

Tables fourteen and fifteen seem to lead to one observation: those in an integrated department strongly disagree that integrated is worse for faculty, while those in non-integrated departments assert that integration is NOT better for faculty.

The following table shows the results of questions that were asked only to those respondents who indicated that they were currently working in an institution where the IS and OM disciplines are merged into one department.

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Questions asked to respondents who indicated that they currently work in an integrated department.

Question	Yes	No
Is there a shared degree?	50%	50%
Is there a shared common core curriculum?	61%	39%
Do OM/IS students share electives?	69%	31%
Do faculty crossover and teach in both OM and IS areas?	43%	57%

Table Sixteen – Responses from Those Who Currently Work in an Integrated Department

Table sixteen shows that for those respondents who currently work in an integrated department, 50% have a shared degree between the two disciplines, while 61% share a common core curriculum and 69% share electives. The majority of respondents in an integrated department (57%) report that faculty do not crossover and teach only in their own discipline.

6. CONCLUSIONS

This paper reports the results of several information gathering efforts undertaken by the researchers in order to make an informed decision as to whether it is advantageous to merge the IS discipline with the OM discipline into one department. Those efforts included performing a literature review of previous research on the topic, a review of the top 35 public business programs in the USA as to their approach to the topic, and the collection of opinions from academics external to the researchers' institution, gathered through a survey instrument.

The literature review showed that it is not common to integrate the two disciplines but that it is fairly common for the two disciplines to be housed in one department. A review of the top 35 public business programs in the USA supports this idea, with 43% of those programs housing IS and OM in the same department.

Unfortunately, the overall results from the survey of academics external to the researchers' institution show a dichotomy of opinion on the subject of integrating IS and OM. Overall, there seems to be no strong consensus on whether it is better to integrate or not.

However, when the results are shown for only those who currently work in an integrated department, some significant conclusions can be drawn. Respondents who currently work in an integrated department overwhelmingly reported that organizing the department that way is better for both students and faculty. The results from those working in an integrated department also showed that 50% of the institutions gave a shared degree between the two disciplines and that the vast majority share a core curriculum and electives. However, in an integrated department it is more likely that faculty will not crossover and will teach only in their own disciplines.

The final conclusion we draw is that those who currently do not work in an integrated department have mixed feelings about integrating while those who do work in an integrated department support it. It appears that there may be several variables that affect an institution's decision whether to integrate IS and OM or not, and that each individual institution must assess its own situation in order to make the best decision. The researchers have yet to make a final decision at their institution.

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