

THE RELATIONSHIPS BETWEEN WIRELESS NETWORK COMMUNICATION, IT FLEXIBILITY, IT ARCHITECTURE, AND STRATEGIC ALIGNMENT: AN EMPIRICAL STUDY

¹A.HAMEED, ²ALI OUDAH

Faculty of Manufacturing Engineering, Universiti Malaysia Pahang, Malaysia

E-mail: multicore.processor@yahoo.com, mark34@gmail.com

ABSTRACT

Strategic alignment and wireless communication network are two important areas that receive considerable attention in two last decades, for this reason, we try to evaluate the relation between these two important concepts. This study discussed and empirically tested the most important factors that affect strategic alignment and wireless network communication. The objective of this paper is to analysis and provides a model for the effect of wireless network connectivity on strategic alignment in the case of Iraqi firms. For this purpose, we consider the relationship between information technology flexibility and strategic alignment and also we involve three important dimension of flexibility in our research. Connectivity is voice and data Communication infrastructure of networks. We empirically tested our model using data collected from executives of 55 Iraqi firms. The results show that strategic alignment is not positively correlated with wireless network communication; so successful communication in a wireless network indicates good connectivity.

Keywords: *strategic alignment, wireless communication network, connectivity, IT, IT architecture*

1. INTRODUCTION

Successful voice and data communication infrastructure can be used as an indicator for connectivity of network. On the other hand, one of the IT architecture segments is network architecture and communications infrastructure. We have tried to analysis relationship between the network communication and architecture. Information Technology architecture is a strategic asset that defines technology components necessary to support business operations and the infrastructure required for implementing new technologies in response to the changing needs of business. It is a multi-layered architecture that includes IT architecture segments including 1) Application and Data Architectures, 2) Platform Architecture, 3) Network Architecture 4) Internet Architecture, 5) Security Architecture. As we see IT architecture is in the positive relation with network and finally communication and connectivity. Several models have been proposed for solve misalignment between IT architecture and strategic alignment. Researches show most organizations rely on IT applications for performing their business activities [1]. The high speed progress in the area of IT, makes IT as a strategic weapon for competitive advantages in most enterprises [1]. Enterprises should use IT in strategic manner with business activities in order to

protecting themselves in today's dynamic business environment. The object of our research therefore was to investigate whether positive relation exists between strategic alignment and wireless network connectivity or not, on the other hand improvement in communication infrastructure results in maintain strategic alignment. As it is the first time this relationship is going to take place, it should be analysis in different industries and firms to validate it. Information technology architecture is positively in association with wireless communication infrastructure since IT architecture is consist of network architecture and that has positive relationship with network communication .the ultimate goal of this paper is assess if the wireless communication has positive impact on strategic alignment in direct or indirect way, so we used IT flexibility in our model, since it is consist of connectivity, modularity and compatibility. IT flexibility has an influence on strategic alignment [2]. To the best our knowledge to date that has empirically tested the wireless communication network relationship with strategic alignment. We report an empirical study that probed the strategic alignment IT flexibility, IT architecture and wireless network communication relationship within context of Iraqi firms.

2. STRATEGIC ALIGNMENT

Strategy is a management concept that is defined as an elaborated and systematic long term plan of action designed to achieve the basic long-term objectives [3]. For over 20 years, business- IT strategic alignment is ranked as a top management concern where business and IT executives are continually looking for best management practices to help them align their business and IT strategies [4]. IT enables business strategies and allows the firm to adopt a stronger competitive posture [5]. Strategic alignment is the link between an organization's overall goals and the goals of each of the units that contribute to the success of those overall goals [6].

3. INFORMATION TECHNOLOGY FLEXIBILITY

IT flexibility is the potential cornerstone of business transformation, firm effectiveness, and ultimately sustained competitive advantage through increased IT effectiveness and strategic alignment between business and IT [7]. IT flexibility can be illustrated in terms of connectivity, which be defined as the capability of the different technological elements or modules to connect to each other regardless of whether these elements or modules reside inside or outside the organization [8]. These four components are: Connectivity, compatibility, modularity, and IT personnel, these components have positive and significant impact on the organization's effectiveness to develop systems that meet the demands of today's dynamic and competitive environments, which organizations are forced to operate in [9]. Compatibility is the ability to share any information across a variety of technology (hardware and software) platforms both inside and outside the organization [10]. Modularity is the feasible decomposition of a complex program or application into more discreet modules or components; a component is self-contained and can be integrated to form the whole application [11]. IT Personnel Competency, having a knowledgeable and skilled IT workforce is an extremely critical component of IT infrastructure, and can affect the quality of other IT resources [12]. Organizations that seek to be competitive in the 21st century and beyond must be able to establish strategic flexibility which enables them to quickly react to market and customer shifts and trends, such flexibility is largely dependent on IT and its tools one of which is the Internet which has become the most influential of all the IT tools that lend impressive support to organizational flexibility [13]. This study focused on the connectivity dimension of IT flexibility.

4. INFORMATION TECHNOLOGY FLEXIBILITY DIMENSION CONNECTIVITY

The number of platforms that a business entity can hook up to is symbolized as connectivity [14]. As a means of delivering IT on demand (e.g., IT flexibility), [15]. Technological connectivity is the capability of IT systems for communication and coordination among various elements of the organization internally and externally [16]. Computer and communications technologies are dramatically increasing connectivity and providing rich opportunities for organizational creativity [17]. Mobile device supported by wireless connectivity can dramatically change the ways in which people interact with computers [18]. With IT connectivity, organizations that are flawless and transparent are able to be free from the influence of time and space. It is much easier to share IT resources at the platform level with connectivity [19]. Connectivity is data and voice communication technology.

5. INFORMATION TECHNOLOGY ARCHITECTURE

As it mentioned in DOC Enterprise IT Architecture Advisory Group (2004) "an IT Architecture is a blueprint that is developed, implemented, maintained, and used to explain and guide how organization's IT and information management elements work together to efficiently accomplish the mission of the organization." The best reasons for having IT Architecture are the benefits it brings to your organization. Improved ability to share and efficiently process information, The ability to respond faster to changes in technology and business needs and reductions in costs because of economies of scale and resource sharing. The seven step process for doing IT Architecture by in DOC Enterprise IT Architecture Advisory Group (2004), is defined as follow :

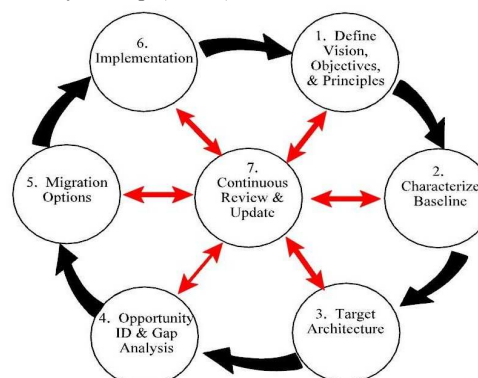


Figure 1: IT Architectures Process

IT flexibility has an influence on strategic alignment [19]. Establishments that lacked IT flexibility, encountered a more demanding time when obtaining business value from strategic alignment [20]. Strong association exists between increasing innovation levels of IT flexibility and strategic alignment [21]. The results from the examination of a formational model (data from 200 U.S. and Canadian companies) offer evidence that connectivity, modularity, and IT personnel have a noteworthy effect on strategic alignment. Additionally, the data confirmed that IT connectivity has a stronger relationship with strategic alignment than do other dimensions [20]. As organizations cope with rapid changes in their business and technological environments, alignment issues have been at or near the top of the list of “critical issues” in IT management every year for the past fifteen years [22]. [23] provided the model in the way of guidance for actually correcting misalignment between business and IT architecture and thus achieving alignment, BITAM (Business IT Alignment Method) which is a process that describes a set of twelve steps for managing, detecting and correcting misalignment, the methodology is an integration of two hitherto distinct analysis areas: business analysis and architecture analysis. The BITAM is illustrated via a case study conducted with a Fortune 100 company. Service-Oriented Architecture (SOA) has been proposed as a mechanism to facilitate alignment of IT with business requirements that are changing at an ever increasing rate because of its ability to engender a higher level of IT infrastructure flexibility [24]. SOA has attracted considerable attention among IT practitioners due to its potential to address alignment of IT with business requirements [25]. Department of IT (2007) defines IT Architecture segments including: Application and Data Architectures, Platform Architecture, Network Architecture, Internet Architecture, Security Architecture. As we see network architecture and IT Architecture can have effect on each other. Communication infrastructure includes voice and data technologies. As mentioned by Department of IT (2007) transmission services and protocols necessary to facilitate the interconnection of server platforms, intra-building and office networks (LANs), and inter-building and campus networks (WANs), also initiatives already in place and those planned have resulted in many significant changes. In this research we provide indicators for measuring wireless network communication in context of IT Architecture.

6. RESEARCH MODEL

Maintain strategy alignment in organizations is very important. As mentioned by [5] Strategic alignment is effected by many factors, like: The relationship between IT and business executives, shared domain knowledge, connections between business and IT planning, environmental uncertainty, communication among IT and business executives,, environmental uncertainty, communication among IT and business executives. Past studies have shown that flexibility in IT (i.e., connectivity, compatibility, and modularity) is an influential aspect of sustaining strategic alignment in active and ever changing business settings [6-11]. Connectivity as a dimension of IT flexibility has the most influences on strategic alignment; thus, the researcher will study connectivity with regard to strategic alignment [23]. A review of literature on factors affecting strategic alignment showed that IT flexibility can be in positive relation with strategic alignment IT Architecture and strategic can have impact on each other, since in the both of domains we should have the positive interaction of IT and business executives. as reviewed in literature IT Architecture and network architecture are interdependent. Key issue is the relationship between wireless network data and voice communication and strategic alignment. Prior research have not studied this relationship so we want to examine this relationship. In our assumptions network communication influence strategic alignment. We are going to improve impact of wireless communication network on strategic alignment by IT Architecture, since it is in positive correlation with communication infrastructure. The following model illustrates what we are going to do:

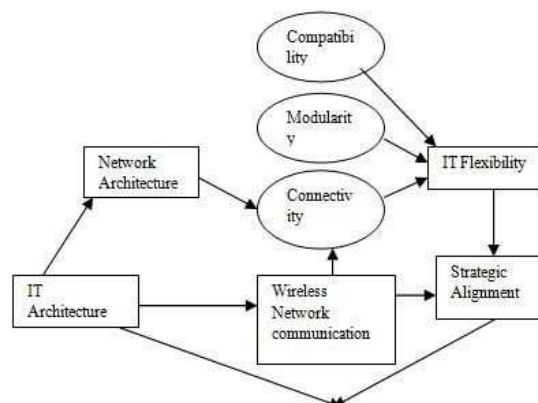


Figure 2: Research Model

7. HYPOTHESES

The relationship between wireless communication network and connectivity. Connectivity is necessary for successful communication [12]. as mentioned by [22] it connectivity is one of the most vital factor that help sustain strategic alignment in today's environments, organizations are looking at it connectivity as the main and fundamental competency that is required in order for organizations to exist and grow in the environments today. Since connectivity is data and voice communication in organization, therefore, this led to the following hypothesis: h1: wireless communication network has positive impact on connectivity.

- The relationship between it architecture and strategic alignment. As stated earlier, in the both domain of it architecture and strategic alignment it and business executives should have interaction with each other in order to fulfill organization missions. [25] Provided model in the way of guidance for actually correcting misalignment between business and it architecture: h2. Its architecture and strategic alignment are in positive relation with each other.

- The relationship between it architecture and wireless network communication. as mentioned earlier by department of it (2007) transmission services and protocols necessary to facilitate the interconnection of server platforms, intra-building and office networks (LANS), and inter-building and campus networks (wans), also initiatives already in place and those planned have resulted in many significant changes, this will provide more challenges for county fiscal and staff resources, as the county strives to keep network standards in line with evolving business requirements so the communications plan strives to take into account growth. h3. It architecture and wireless communication network are in positive relation with each other.
- The relationship between its flexibility and strategic alignment. As stated by [26], establishments that lacked it flexibility, encountered a more demanding time when obtaining business value from strategic alignment. Other researches like [27] emphasis the effect of its flexibility on strategic alignment. It flexibility has positive impact on strategic alignment.
- The relationship between wireless network communication and strategic alignment. as stated by [25] the level or communications all through the organization is greatly improved and this makes it

easier for users all across the borders of the organization to impart information at fast speed. It architecture is common domain between strategic alignment and wireless network communication, since this factor has positive impact on strategic alignment and wireless network communication. Thus, the following hypothesis is proposed: h5. Wireless network communication is positively associated with strategic alignment.

8. RESEARCH METHOD

Due to the nature of this study, we relied on quantitative method. Quantitative research method tries to seek relationships between variables which impact the phenomenon of interest [17]. Data for our study collected using questionnaire survey filled up by 55 it managers of organizations in Iraq. After the questionnaire was completed, it was tested by professional it manager and it experts. Then we select some item based on their suggestions with their sources were listed in table 1. a seven-point likert-type scale of ordinal values was used, in which 1 indicates strongly disagree and 7 indicates strongly agree. To ensure data validity, first of all, the questionnaire was tested and piloted, and any feedback for improvement was considered in the revision of the questionnaire. Thus, the content validity of the questionnaire was incorporated into survey questionnaire. In addition, cronbach alpha was computed for whole constructs, and the results were show 0.88 reliability. The greater or equal reliability score of 0.7 for cronbach's alpha is acceptable [28].

9. DATA ANALYSIS

This section contains the data collection and analysis results on Strategic Alignment, IT flexibility, Wireless Network Communication, IT Architecture and Connectivity and their relationships as previously described. Statistics about each of these questions, are presented in some Tables. Table 2. shows the percentage and, Type of Business Table 3. Includes Number of Employee, Table 4. Shows years of experience with this organization.

A survey population of 200 IT and business executives in Iraq organizations. The total number of respondents was 76 or 19%. Participants were assured that only the researcher would have access to any data that the survey provides and such data would not be shared, distributed or sold to anyone. Firstly, we performed pre-tests using SPSS, including: Outliers, Multi-collinearity, Chi-Square

and Independent T-Test, to see if any of items is a line with others. First of all we have to detect missing data but in this research don't have any missing data, after that outliers detection test has been taken for detect and removed anomalous samples from data, we have to remove them as they can change the last model, we removed organizations 3 and 32 as they are out of the range. After that we calculated descriptive statistics including; mean, Standard Deviation, Variance, Minimum and Maximum, for data as described in Table 5. If correlation among the independent variables is strong we would face multicollinearity that will increase the standard errors of the coefficients. We supposed strategic alignment as dependent variables and other variables as independent. multicollinearity can be detect by VIF factor , If VIF for one of the variables is around or greater than 5, there is collinearity associated with that variable, as we see results in Table 6. We don't see any multicollinearity between variables. We used two ways of online and post for filling questionnaires by IT executives, for testing the relationship between numbers of employee and way of filling questionnaires , years of experience with organization and filling questionnaires, we performed chi-square test for examine these relationships (F.Q.No.E) and (F.Q.Y.Org), as we see results in Table 7 and Table 8. Significant level for both relationships is more than p-value (0.05) then we can accept the null hypotheses, it means that there is no significant relationship between numbers of employee and way of filling questionnaires, years of experience with organization and filling questionnaires. The last test we performed in SPSS was PCA (principal component analysis), to see if items can reveal their corresponding factor. Each item is in relation with main variable, the result was shown in Table 9. At least, we tested the model by [28] stated that PLS is used because it is not restricted by sample size or distribution assumptions. First of all we performed PLS algorithm and we reached first model that show us coefficients for each path and by performing boot strapping algorithm we see sig. level for each confidence path shows the model. Last results shown in Table10.indicated that three of five hypotheses were supported.

- Wireless Communication Network has positive impact on connectivity.
- IT Architecture and Strategic Alignment are in positive relation with each other.
- IT Architecture and Wireless Communication Network are in positive relation with each other.

10. CONCLUSIONS

Literature shows IT architecture is in positive relation with strategic alignment. Moreover, reviewing the literature showed that connectivity is one of the most important dimensions of IT flexibility. We found that wireless network communication infrastructure has positive impact on connectivity (one of IT flexibility components). And also IT architecture can be seen as a important domain that can provide blueprint in order to improve network architecture, since wireless network communication is the at the top of last decade subjects. Although it was proven for many times, that IT flexibility has positive impact on strategic alignment, but in the case of Iraqi firms we found this relationship is not effective. Also the main question of this research has been rejected, that wireless network communication is in positive relation with strategic alignment. As a result, we tried to develop a model of the relationship among, strategic alignment, wireless network communication, IT flexibility, IT Architecture and connectivity. In proposed model IT architecture has good impact on strategic alignment and also wireless network communication infrastructure could be improved by IT architecture. On the other hand wireless network communication infrastructure is in positive relation with connectivity. The target population proposed model was not effective due to the many reasons: No effective interaction was existing between IT and business executives, poor wireless communication infrastructure through organizations. Future studies can decrease number of items for communication infrastructure, this may provide acceptable level of significant between this variable and strategic alignment or may by changing the items of strategic alignment this relationship become meaningful. In this society this model doesn't work, it can be examined through different societies.

ACKNOWLEDGEMENT

The authors would like to thank Universiti Malaysia Pahang (UMP) for the help and support. In particular, grant (UMP) Vot. RDU 130387.

REFERENCES:

- [1] Andolsen And Alan A (2007) Does Your RIM Program Need a Strategic Alignment? The Information Management Journal 41,35 BANI J (2011) Assessing the relationships among information technology flexibility, it-business strategic alignment, and information technology effectiveness: an investigation of business intelligence implementation. ProQuest LLC
- [2] Brown Cv And Sambamurth V (1999) Re-Positioning the IT Organization to Facilitate Business Transformations. Pinnaflex Press.
- [3] Brynjolfsson, Erik And Lorin M Hitt (1998) Beyond the productivity paradox. Association for Computing Machinery. Communications of the ACM, 41(8), 49-56.
- [4] Byrd Ta, Pitts J, Adrian A, and DAVIDSON NW (2008) Examination of a path model relating information technology infrastructure with firm performance. Journal of Business Logistics, 29(2), 161-187.
- [5] Chan Ye, Huff Sl, Barclay Dw And Copeland Dg (1997) Business strategy orientation, information systems orientation and strategic alignment. Information Systems Research, 8(2), 125-150.
- [6] Chanopas A, Krairit D And Khang Bd (2006) Antecedents and outcomes of Strategic IS Alignment: An empirical investigation. IEEE Transactions on Engineering Management, 51(3), 27-47.
- [7] CHUNG SH, RAINER R.K JR And LEWIS BR. (2003) the impact of information technology infrastructure flexibility on strategic alignment and applications implementation. Communications of AIS. 11, 191-206.
- [8] Duncan Nb (1995) CapturiOng flexibility of information technology infrastructure: A study of resource characteristics and their measure. Journal of Management of Information Systems, 12(2), 37-57.
- [9] Gorlenko L And Merrick R. (2003) No wires attached: Usability challenges in the connected mobile world. IBM Systems Journal, 42(4), 639-651.
- [10] Hirschheim R, Welke R And Schwarz A (2010) Service-oriented architecture: myths, realities, and a maturity model. MIS Quarterly Executive, 9(1), 37.
- [11] Hong-Mei Chen, Rick Kazaman And Aditya Garg (2005) BITAM: An engineering-principled method for managing misalignments between business and IT architectures.. Science of Computer Programming, 57, 5-26.
- [12] Huang Cd And Hu Q (2006) Using the balanced scorecard to achieve sustained IT-business alignment: A case study. Communications of the Association for Information Systems, 17(1), 181-204.
- [13] Information Technology Architecture. (2004). DOC Enterprise IT Architecture Advisory Group.
- [14] Information Technology Architecture. (2007). Department of Information Technology Quality and Innovative Information Technology Solutions.
- [15] Jae Choi And K Ram (2011) Service-Oriented Architecture and IT-Business Alignment. International Conference on Industrial Engineering and Operations Management, 22-24.
- [16] Jorfi S (May 2011). Assessing the Impact of IT Connectivity and IT Capability on IT-Business Strategic Alignment: An Empirical Study. Computer and Information Science.
- [17] Luftman Ja, Papp. And Brier.T (1999) Enablers and inhibitors of business-IT alignment. Communications of the Association for Information Systems, 1(11).
- [18] LUFTMAN JN And MCLEAN (2004) key issues for IT executives. EMIS Quarterly Executive, 3(2), 89-104.
- [19] Miles R. and Snow CC (1978) Organizational Strategy, Structure, and Process. New York: McGraw-Hill.
- [20] Ness LR (2005) assessing the relationships among IT flexibility, strategic alignment, and IT effectiveness: study overview and findings. Journal of Information Technology Management, 16 (2).
- [21] Norusis Mj (2008) SPSS 16.0 statistical procedures companion. Upper Saddle River, NJ: Prentice Hall.
- [22] Pierce Ac (2002) The effect of business and information technology strategic alignment on informartion technology investment returns and corporate performance (Doctoral Dissertation from Nova Southeastern University Retrieved July 10,2003 from UMI proQuest Digital Dissertation Database.



- [23] Preston R (2003) A bridge too far? Network Computing, 14(22), 12.
- [24] Rouse W (1999) Connectivity, creativity, and chaos. Information Knowledge Systems Management, 1(2), 117-132.
- [25] Seaman And Richard. (1995) How Self-Directed Work Teams Support Strategic Alignment. Compensation and Benefits Review, 27(4).
- [26] Song S, Goecke DI And Towsley D (2006) Collaboration Improves the Connectivity of Wireless Networks.
- [27] The discovery of a paradox. University of California, Irvine. Retrieved March 12, 2004, [Online] Available: <http://www.crito.uci.edu/publications/pdf/AlignmentParadox.pdf>.
- [28] Weil P, Subramani M and BROADBENTM. (2002) Building IT infrastructure for strategic agility. MIT Sloan Management Review, 44(1), 57-65.

APPENDIX

Table 1: Measurement Indicators

Factor	Item	Scale		Source
(SA)	SA1	7-point Likert	Our firm's business plans provide clear directions for IT planning.	Pierce,2002
	SA2	7-point Likert	Our IT and business planners interact closely in the Formulation of the IT strategic plan.	Pierce,2002
	SA3	7-point Likert	Our IT executives participate in the organization's business strategic planning.	Ness, 2005
	SA4	7-point Likert	Our IT executives have a good understanding of the organization's business goals and objectives, strategies, and	Ness, 2005

Table 2: Type Of Business

Type of Business	percentage	numbers
Advertising	2.70	2
Banking	31.08	23
Consulting	—	—
Education	1.35	1
Engineering	4.05	3
Healthcare	1.35	1
Insurance	10.81	7
Manufacturing	40.54	30
Marketing	1.35	1
Retail	—	—
Telecommunications	4.05	3
Transportation	4.05	3

Table 3: Number Of Employees In Organization

Number of employees in organization	percentage	number
Over 5000	5.40	4
1000-5000	44.59	30
500-999	21.62	17
200-499	21.62	16
100-199	5.40	4
Less than 100	4.05	3
	100	74

Table 4: Years Of Experience

Years of experience with organization	percentage	number
Less then 5 years	49.64	36
5-10 years	31.08	25
More than 10 years	18.91	13
	100	74

Table 5: Descriptive Statistics

	Mean	Std.Deviation	Variance	Minimum	Maximum
SAV ¹	4.7167	1.30721	1.696	1.50	7.00
FConAv ²	5.0101	1.11681	1.271	2.25	7.00
FComAv ³	4.4170	1.17725	1.386	1.50	7.00
FMoAv ⁴	4.5609	1.19109	1.419	2.00	6.50
FVAv ⁵	4.5491	.96137	.924	1.83	6.50

¹ Strategic Average
² Flexibility e-commerce Average
³ Flexibility compatibility
⁴ Flexibility modularity
⁵ Flexibility average

Table 6: Multicollinearity Detecting Coefficients^a

Model		Collinearity Statistics	
		Tolerance	VIF
1	FConAv	.410	2.441
	FComAv	.464	2.155
	FMoAv	.507	1.972
	Fave	.270	3.704
	WCAAV	.724	1.381
	FCon4	.653	1.530

a. Dependent Variable: SAV

Table 7: Chi-Square Test (No.E*F.Q)

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.406 ^a	5	.638
Likelihood Ratio	3.454	5	.630
Linear-by-Linear Association	.086	1	.770
N of Valid Cases	74		

a. 6 cells (50.0%) have expected count less than 5. The minimum expected count is 1.30.

Table 8: Chi-Square Test (No.E*F.Q)

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	16.333 ^a	16	.430
Likelihood Ratio	20.455	16	.200
Linear-by-Linear Association	.185	1	.667
N of Valid Cases	74		

Table 9: Principal Factor Analysis

	SAv	FConAv	FComAv	FMoAv	ArchAv	WCAAV
SA1	.760	.209	.240	.103	.349	.075
SA2	.760	.095	.246	-.087	.422	-.010
SA3	.827	.259	.298	.045	.428	-.010
SA4	.652	.331	.359	.243	.356	.175
FCon1	.277	.651	.384	.258	.301	.415
FCon2	.301	.635	.438	.380	.424	.311
FCon3	.366	.624	.337	.262	.322	.224
FCon4	-.075	.553	.193	.268	.223	.377
FCom1	.152	.303	.587	.180	.308	.331
FCom2	.356	.399	.645	.414	.307	.250
FCom3	.156	.215	.538	.325	.420	.127
FCom4	.276	.285	.658	.274	.325	.286
FMo1	.238	.337	.457	.726	.349	.297
FMo2	.095	.267	.309	.636	.342	.217
FMo3	-.163	.190	.149	.478	.115	.299