

What is architectural management? Towards a pragmatic definition

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Abstract

Purpose – The purpose of this paper is to provide a pragmatic definition of architectural management (AM) derived from systematic research.

Design/methodology/approach – A triangulated approach to data collection was employed, comprising a number of sequential stages. First, a literature review was carried out to analyse the previous attempts to define the term. Then, a preliminary survey was conducted (online questionnaire) to capture the current interpretations of the term. After that, a new definition was formulated based on analysing and synthesising the collected data. The fourth stage was focused on examining the consistency of the new definition through the perspectives of architectural researchers and practitioners. The final stage was refining the definition based on the feedback.

Findings – After following a pragmatic approach for constructing a new definition of AM; and based on the results of the several testing stages, it was found that AM is associated with the strategic management of the architectural office and its individual projects; and it is responsible for value design and delivery for its adopter and for the different types of stakeholders.

Research limitations/implications – Although there was some quantitative testing in addition to the qualitative data the response rate was low in terms of the population of UK architectural practices.

Originality/value – The outcome is the first definition of AM grounded in research. The research is unique in terms of reviewing the scope and limitations of the previous definitions of AM. Based on the research findings, the new definition of AM was found to offer an accepted description of AM that can be used by both researchers, educators and practising architects. The definition provides a common understanding (vocabulary) for those working in the area of AM.

Keywords Architecture, Impact, Architectural management, Architectural practice, CIB W096, Definition

Paper type Research paper

Introduction

In looking at any discipline an essential issue is a “definition” that describes “what is” and “what isn’t” constituted by that discipline. Inadequate definition may lead to confusion and in the worst cases some of the theories constituted by the defined discipline may be ignored (Madge, 1962). Similarly, Merton (1957) argued that in order to carry out successful research, the relevant concepts must be defined with “sufficient clarity”. Accordingly, as the authors were involved in research in the field of architectural management (AM), a critical starting question was: is there an adequate definition of AM?



The first emergence of the term AM was in 1964 (by Brunton *et al.*, 1964) to encourage architects to appreciate and manage the business side of the profession. Since 1964 only eight attempts have been made to explicitly define the term. This is despite arguments that have articulated the importance of architects adopting AM, especially by the CIB Working Group W096 Architectural Management (see Emmitt *et al.*, 2009). Each of these attempts proposed a definition based on certain types of methodology. As a result, different thoughts, scopes and functions were included under the umbrella of AM. Nicholson (1995b) attributed the difference in AM definitions to the fact that each individual considered the term from different perspectives, as a result of their background. Nicholson also argued that defining AM might differ in “interpretation” among different construction professionals. Given that the most recent attempt to define AM was in 1999 (Emmitt, 1999b), it would appear timely to revisit and upgrade the definition in light of the following:

- changes within the construction sector, e.g. changing roles;
- advances in technologies, e.g. building information modelling (BIM), which might reshape the character of the previously defined roles and concepts; and
- the need to consider the different interpretations of the term outside the limits of the CIB W096 Architectural Management Working Group (i.e. architectural researchers and practising architects).

Defining terms aims to improve humans’ use of language as well as eliminate any kind of uncertainty or ambiguity (Brodbeck, 1968; Swartz, 2010). Furthermore, developing a common definition is essential for future constructive debates in the field of AM. The research reported here does not aim to produce a new lexical definition; it aims to articulate a description of AM, with the objective of eliminating unnecessary vagueness in its context and use.

Research method

Any definition is composed of two parts: intension and extension (Swartz, 2010). The former specifies a set of logically necessary and jointly sufficient conditions for the application of a term (the nature/family of AM); while the latter defines terms by sampling and listing their extensions (components/subcomponents of AM). Thus, if the extension is known and agreed upon, then the intension should fit the extension as closely as possible; otherwise, the definition is considered too broad and wide in its scope and description. In this research, the principal guiding strategy for (re)-defining AM was to present clear and flexible intensions and extensions of AM, which describe its nature and what it entails.

Research was conducted through a series of sequential stages. First, the previous endeavours to define the term AM were analysed chronologically based on a comprehensive literature review. This stage aimed to identify themes and issues associated with AM. In addition to the scholarly attempts to define AM, this stage also covered the less formal and less academic references that acknowledged and debated AM in their content, thus ensuring a thorough review. Qualitative meta-synthesis was utilised to group the topics with theoretical similarities into themes (Gough and Elbourne, 2002). The second stage comprised a preliminary study in order to capture the current trends and interpretations of the term through the perspectives of the only international research network that nurtures AM (CIB W096 Architectural Management). This was achieved through an online questionnaire survey, used because of the geographical

spread of the members of the network (Oppenheim, 2000). The outcome of the first two stages were analysed and synthesised using the qualitative meta-synthesis leading to the formation of the new definition of AM. The new definition was then tested by seeking the professional judgements of the CIB W096 members, architectural researchers and practising architects. Based on these findings the definition was further refined.

Stage 1: literature review

AM has been explicitly defined in eight sources: Brunton *et al.* (1964), Boissevain and Prins (1993), Bax and Trum (1993), Banks (1993), Freling (1995), Nicholson (1995b), Akin and Eberhard (1996) and Emmitt (1999b). Some of these definitions were analysed by Nicholson (1995a) and the others were analysed by Emmitt (1999a, b). However, it should be noted that none of these definitions were derived by using a clearly stated pragmatic methodology. Each of the eight definitions, however, shed light on the nature (intension) of AM and highlights some aspects to be included under its umbrella (extensions). Table I summarises the key features extracted from each definition.

Within the accessible CIB W096 conference proceedings several articles are categorised under the AM umbrella, but only 29 articles explicitly related to AM directly through quotation of the term within either the title or the contents (i.e. Cairns, 1992; Vinci, 1992; Boissevain and Prins, 1995; Emmitt and Neary, 1995; Prins, 2002; Jensen, 2005; Kendall, 2005; Schmid and Pal-Schmid, 2005; Tibúrcio, 2005; Prins, 2009; Grisham and Srinivasan, 2009; Declercq *et al.*, 2009; Zeiler *et al.*, 2009; Jørgensen, 2009; Emmitt, 2009; Svetoft, 2005, 2009; Daws and Beacock, 2005, 2009; Den Otter, 2009; Den Otter and Emmitt, 2009; Siva and London, 2009a, b; Tzeng *et al.*, 2009; Perng *et al.*, 2009; Finneran *et al.*, 2011; Schijlen *et al.*, 2011; Emmitt *et al.*, 2011; Zerjav *et al.*, 2011). Based on reviewing these sources a list of new intensions and extensions was abstracted, shown in the following list.

Extracts from previous AM descriptions.

Intensions of AM:

- collaborative facilitator;
- value creator;
- enabler;
- strategic facilitator;

Researcher(s)	Year	Major aspects of definition
1 Brunton <i>et al.</i>	1964	Two components: office management and project management
2 Boissevain and Prins	1993	Contexts: two environments (internal (office) and external (projects))
3 Bax and Trum	1993	Domains/levels of architectural management (urban, building and building detail levels)
4 Banks	1993	AM is a philosophical approach
5 Freling	1995	AM consists of a reviewing approach and tools
6i Nicholson	1995a	An academic and professional discipline
6ii Nicholson	1995a	Includes all areas of expertise beyond design
7 Akin and Eberhard	1996	Combined management functions
8 Emmitt	1999b	Competitiveness, office and project environments, culture

Table I.
Extracts from previous scholarly attempts to define AM

- procurement method;
- working process/model;
- practical function/tool;
- set of strategies;
- knowledge domain;
- thinking philosophy; and
- working template.

Extensions of AM:

- value design and management;
- collaboration;
- design management;
- planning;
- creativity;
- knowledge management;
- teamwork;
- project management;
- education;
- IT adoption and applications;
- legal and ethical issues;
- lean philosophy;
- construction management;
- sustainability and renewable energy;
- communication;
- managing growth;
- leadership;
- quality management;
- facilities management;
- benchmarking; and
- risk management.

During the course of this study, it was noticed that most of the early defining attempts (and most of the AM literature) were too broad; they admitted too many members to the extension of AM. Furthermore, the intension is not agreed upon, as shown in Tables I and list above.

Other “less scholarly” definitions of AM were found on some internet web sites and architects’ personal blogs. Although these sources are not considered as consistently valid or authoritative sources for obtaining academic research data, it was decided to consider them for the sake of covering every attempt to define and understand AM. The definitions obtained from these sources did not contribute new ideas beyond the

previously mentioned definitions in Tables I and list above; indeed, they all “borrowed” from the body of sources reviewed above. The internet search also revealed a small number of architectural firms claiming to offer AM services. Only five of these (located in Canada, China, India, South Africa and the USA) listed the nature and types of the services on offer, but these bore little relationship to any definitions found within the AM literature; hence they were discounted from this research.

A view from education

Despite criticism of the failure of architectural education to include AM in programmes (e.g. Emmitt, 1999a) a few successful attempts have been reported in the UK (Daws and Beacock, 2005, 2009) and The Netherlands (Emmitt and Den Otter, 2010). In addition to these studies a small number of educational programmes claim to offer academic degrees or modules (units) entitled “Architectural Management”. These include.

International Excellence University (IE) – MA Architectural Management and Design (Spain); University of Kansas – MA Architectural Management (USA); California Polytechnic State University – MBA Architectural Management Track (USA); Lawrence Tech University – Postgraduate Certificate in AM (USA); University of Newcastle – Architectural Management Module (Australia); University of Edinburgh – Architectural Management, Practice and Law Module (UK) and Texas A&M University – Emerging Strategies in Architectural Management Module (USA).

None of these programmes attempted to define AM; rather they emphasise the importance of architects adopting managerial skills and competences in their professional practices. The following list provides a summary of the modules under these programmes. Understanding these modules helped in understanding AM by understanding its extensions.

Meaning of AM in some architecture educational programmes.

Extensions of AM:

- business analysis and management;
- management theory and principles;
- soft skills development;
- communication and teamwork;
- financial and economic fundamentals;
- marketing strategies;
- organisation principles and management;
- facilities management;
- accounting for managers;
- quantitative analysis;
- organisation behaviour;
- managerial economics;
- production and operations in management;
- construction management;
- law and ethics for architects;

- practice management;
- client and user analysis;
- market and precedent analysis;
- project management;
- architectural management and professionalism;
- health and safety;
- planning for architects;
- building contracts and procurement;
- architectural briefing;
- changing practice;
- law and ethics;
- organisational culture;
- strategic planning;
- negotiation;
- design teams and leadership; and
- human resource management.

Stage 2 – preliminary study

A preliminary study was conducted through an online questionnaire survey comprising a list of eight open-ended questions. An invitation was sent to all members and affiliates of CIB W096 Architectural Management as held on the current database of e-mail addresses. Totally, 50 people were contacted, with 14 people completing the survey, giving a response rate of 28 per cent. In this paper, only the first two questions of the survey are included since they are directly related to this research:

Q1. What does the term AM mean to you?

Generally, the findings can be described as varied in their views of AM, conflicting at some specific points, and proving the need for further research into the basic meaning and nature of AM.

Some respondents (5/14) narrowed the scope of AM to the activities associated with design; others (2/14) thought of AM as engaging and managing the construction process; while the third category of the respondents (7/14) combined these two functions (design and construction) and extended the domain of AM to cover other aspects of the profession. Some of the different views of the survey participants regarding the meaning of AM include:

- “The management and organisation of aspects associated with architectural design”.
- “The term is mainly applied in construction engineering denominating a field of different strategies and tools for a more systematic approach in construction phases”.
- “A process of arranging complicated architecture components in design and construction”.

- “I take it to have two meanings, depending on the context. First, the management by architects of construction projects. Second, the management of architectural practice”:
- Q2. What has been the impact of AM from the establishment of the CIB W096 Working Group in 1993 until today?

Regarding the AM impacts, the replies varied from the role of AM in increasing value through design, to the positive impact on the construction process. Generally, the respondents agreed that the successful impact was the building of an international research group which served as a discussion platform for those interested in the AM field. But less impact (“if any”) was seen on the practical level. Some criticism was focused on the lack of clear practical guidance for practitioners to adopt AM (although the work of Emmitt, 1999, 2007 was cited as a useful source). Similarly, some respondents expressed concern that AM was still not recognised by professional bodies and educational institutions. The different views regarding the impacts of AM can be summarised by quoting the answer of one of the participants: “It is difficult to see how Architectural Management has evolved. There are still no clear philosophies, no clear guidance, and no clear message from CIB W096. CIB W096 is a good meeting place and encompasses a broad range of ideas and views, which is good to participate in, but the weakness is that to those outside the group there is no clear strategy - perhaps there should be”.

Stage 3 – AM – a new definition

Based on the outcome of the previous stages, it can be argued that all of the previous intensions and extensions of AM, summarised in Table I and lists: extracts from previous AM descriptions and meaning of AM in some architecture educational programmes, are applicable to AM, but it was noticed that each attempt to define AM aimed to include whatever new aspect or innovation appeared in the industry or within managerial science. For example, the issues of sustainability; value design and delivery; competitiveness; and utilising BIM, did not appear in the early attempts at definition, but once surfaced or debated, researchers included them in their definitions/descriptions of AM. Accordingly, as mentioned earlier, our principal strategy for updating the AM definition was to present clear and flexible intensions and extensions of the term, which describe its nature, what it entails, and what might be included in the future.

It is important to distinguish AM from the alternative method of management (AMM), to avoid any confusion. The aim of this attempt at definition does not advocate reinventing the AMM “which is based on eliminating the role of the main contractor in favour of architects” (Emmitt, 1999a), but it aims to understand and define AM based on five attributes: its nature (intension), its components (extension), whom it affects/concerns (stakeholders), its benefits (outcomes), and its responses to industry changes (e.g. its response to the recommendations of the Latham, 1994 and Egan, 1998 reports).

Starting with those affected by AM, the findings of the literature review and preliminary study confirm that almost everyone included within the construction industry is affected either directly or indirectly by AM, see the following list).

Parties affected by architectural management (stakeholders).

AM stakeholders:

- architectural professionals;
- architecture as a profession;
- architectural professional bodies;

- projects clients;
- project end-users;
- construction professionals (consultants – contractors – subcontractors);
- construction supply chains;
- society (social and physical environments);
- organisations (the business side as well as the firm’s structure);
- projects (how they managed and produced); and
- education (as a generator of future professionals and as a feedback receiver).

As claimed by both Latham (1994) and Egan (1998), there is a need for a quantum leap in the construction industry. Egan (1998) emphasised the importance of five aspects of improvement: committed leadership; focus on the customer; integrated processes and teams; quality-driven agenda; and commitment to people. Comparing these aspects against the benefits of AM identified in the literature, such as its role in: organisational management; managing value design and delivery; managing sustainability; increasing professional competitiveness; serving the society; practicing ethically and professionally; – helps to show AM as an effective response to Egan and Latham’s recommendations.

Regarding AM’s intension and extension, which are the main components of any definition (as claimed by Swartz, 2010), and based on the research findings, the following guidelines were considered to compose the new definition:

- AM is the management of architectural practices (intension). So, the “management” term does not narrow the scope of AM as “tool, philosophy, framework, etc.”; hence, the “management” always seeks continuous improvement and the utilisation of any new advances and innovations. Besides that, such a role is only managed by a “strategic” position (intension).
- AM assures the integration of managing the business sides of the office “the internal environment” with managing its individual projects “external environment” (extension).
- AM (unlike the AMM) is not utilised to underestimate or eliminate the role of the other key players within the industry; rather, AM is about assuring the value achievement for all those involved in the industry (extension).

Based on these guidelines, combined with the study findings, the following definition was proposed:

Definition 1. AM is the strategic management of architectural practices that assures the effective integration between managing the business aspects of the office with its individual projects in order to design and deliver the best value to all those involved in society.

Stage 4 – testing the new definition

This definition of AM was then tested for clarity and usefulness through the professional opinions of two groups: researchers and architects. This was achieved through three sequential testing sessions:

- (1) First testing session (AM-1): targeted at the academic AM community represented by the members of the CIB W096 Working Group. This was met by a

collaborative discussion workshop conducted during an AM International Conference in Vienna, Austria. The workshop was facilitated by one of the authors and video recorded. Detailed notes were made by another of the authors, which were analysed after the event along with the video recording.

- (2) Second testing session (AM-2): targeted at architectural researchers outside the CIB W096 community. This was achieved by conducting eight semi-structured interviews with senior architectural researchers from countries that were not covered by previous CIB W096 conferences (i.e. Middle East and North Africa).
- (3) Third testing session (AM-3): targeted at senior architects. This was achieved through an online questionnaire survey sent to principals of RIBA registered architectural practices in the UK, the “original” home of AM.

Testing session 1

Totally, 29 members of the CIB W096 Architectural Management participated in the workshop, collectively providing a well-informed group. The workshop started with a brief background as to why and how the definition had been developed. After presenting the new definition attendees were asked to discuss and comment. This allowed the attendees to state their opinions and led to discussion between the attendees as to what AM was. During the discussion there was no attempt to direct the discussion, the facilitator only talked briefly on a couple of occasions to answer a specific question relating to the definition and on one occasion to redirect the discussion back to the definition. Five attendees claimed that it was essential to update and upgrade the definition of AM to provide “a basis for further organised research work in the field of AM”. On the other hand, three experts claimed that this definition and the previous ones (reported in the CIB W096 literature) provide a high degree of risk: “to pull out some of the existing members and prevent potential ones joining the group as long as its scope is narrowed in a specific direction”. However, there was a general acceptance of the need to generate a new pragmatic definition of AM. During the workshop discussion, some attendees claimed that the use of the word “architectural *practice*” in the definition was confusing; rather, it should be replaced with a more concise term such as “architectural *firm, office, company, etc.*”. This suggestion was approved by all of the workshop attendees.

Testing session 2

During the second testing session, with senior architectural researchers outside the CIB W096, semi-structured interviews were conducted to enable detailed discussion and elaboration. The number of the interviews was determined by reaching a theoretical saturation (Miles and Huberman, 1994; Patton, 2002). This was achieved after conducting eight semi-structured interviews with senior architectural researchers interested in the management field from different countries. There was a general acceptance of the new definition by the participants although there was some confusion over the meaning of the term “value”. Therefore the interviewer explained to the interviewees that “value” is about achieving a competitive edge for the AM adopter (architects), which covers both the cost and differentiation aspects of the provided service(s). Value is also about creating better environments, i.e. social, economic and physical environments, thus it is a value for current and future owners and users of the projects. Value is achieved by enhancing the architects’ realisation and adoption of the different managerial tools and functions; thus, it is not about attempting to

eliminate the roles of the other construction professionals like the AMM, for instance. In other words, it aims to avoid leading to negative competition among the different construction parties. After clarifying these points the issue of “value” was accepted by the interviewees.

Four of the interviewees were not aware of the existence of the CIB W096, although two of them were aware of one of their publications, Emmitt *et al.* (2009). On the other hand, two interviewees claimed that they were aware of this Working Group and some of the AM conferences, but they criticised its weak impact on some geographical areas, i.e. the Middle East. Two interviewees, similar to what was found during the preliminary study, claimed that the main impact of CIB W096 was the creation of an AM research platform.

After these two qualitative testing sessions, the definition of AM was refined to:

Definition 2. AM is the strategic management of the architectural firm that assures the effective integration between managing the business aspects of the office with its individual projects in order to design and deliver the best value to all those involved in society.

Testing session 3

The new version of the definition was then tested through the opinions of practising architects. This stage aimed to: first, determine the architects’ degree of familiarity with the concept of AM; second, determine the architects’ degree of familiarity with the scope of work of the CIB W096 Working Group; and third, test the architects’ degree of agreement with the proposed definition of AM. Since this testing session was associated with rating judgements a questionnaire survey was the most appropriate data collection instrument (Oppenheim, 2000). Based on the findings of the earlier two testing stages, there was some concern that newly qualified architects and architects with moderate years of experience might not recognise the concept of AM. Accordingly, it was decided to target principals of UK architectural firms in this testing session. The RIBA Directory web site was consulted for this purpose. Although the Directory listed 3,223 chartered architectural firms in 14 regional areas some firms appeared more than once in the Directory and some did not have any contact details associated with their listing. After removing these irregularities a total of 2,881 firms remained as the population for the survey.

Totally, 211 practice principals participated in the survey. Analysis of the data was mainly descriptive due to the response rate (around 7 per cent), which rendered deep statistical analysis potentially misleading. The majority of the survey respondents’ organisations (80 firms – 52 per cent) were found to belong to the small size organisation category (one to ten employees). There was a balance between the numbers of respondents from the other two categories: 39 (26 per cent) large organisations “31 employees or more” and 34 (22 per cent) medium organisations “11-30 employees”. This ratio is consistent with the general ratio identified by the RIBA.

As shown in Figure 1, the majority of respondents were found to be familiar with the concept of AM: almost 53 per cent of the respondents were familiar to a high extent with the concept of AM; 28 per cent had moderate knowledge; and 19 per cent had little or no knowledge of this concept. However, it was found that the majority of respondents (87.6 per cent) were not familiar with the CIB W096 Architectural Management Working Group, the only known international research network which advocates the adoption, spread and research of AM (see Figure 2).

After determining the respondents’ degree of familiarity with AM and the CIB W096, the respondents were asked to indicate their degree of agreement with the

revised definition of AM. Totally, 45 respondents (29.4 per cent) stated their strong agreement with the new definition; 76 respondents (49.7 per cent) indicated their agreement; 31 respondents (20.3 per cent) were neutral; and only 1 respondent disagreed strongly with the new definition (see Figure 3).

The respondents were also asked to add any personal views they might have regarding AM. The comments they provided can be classified as either: new attempts

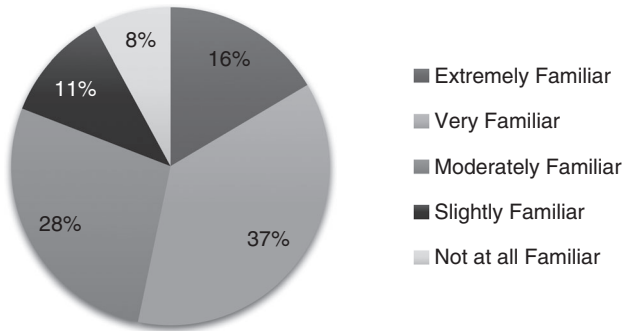


Figure 1. Respondents' degree of familiarity with AM

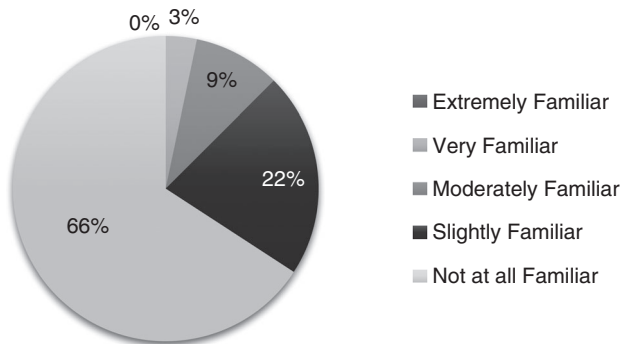


Figure 2. Respondents' degree of familiarity with the CIB W096

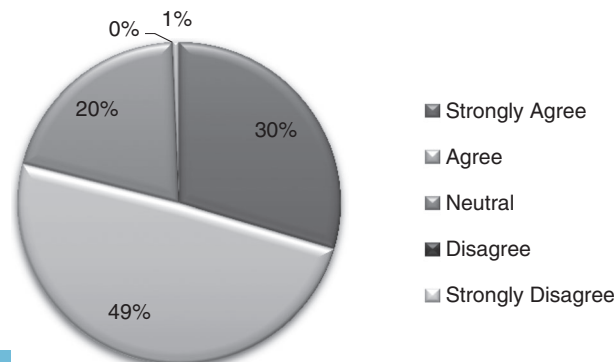


Figure 3. Respondents' agreement with the new AM Definition

to define AM, or alterations to the researchers' definition. Some respondents suggested that AM is:

- “No different from any other management except the business happens to be Architecture”.
- “Mainly concern[ing] design process management”.
- “Often an art, sometimes a science but it's always a business [...] Delivery is everything”.
- “The effective integration of culture, business development, design and production quality to produce profitable and resilient buildings and built environments, enjoyably”.

While other respondents added some suggestions to be included in the proposed definition such as:

- “And take the needs of the users into account”.
- “Run a profitable business”.
- “It must include something about making a profit in order to deliver the other aspirations”.
- “It also requires the appropriate allocation of specialised resources to a project to ensure effective delivery”.

It was found that the term “society” in the proposed AM definition was misleading to some respondents:

- “‘In the society’ should be prefaced by ‘in the project and society’ The Client comes first”.
- “Society?! Users you mean”.
- “The definition ends ‘in the society’ - what society is meant here?”

Despite this confusion, the majority of the survey participants accepted the definition. It was, however, decided to alter some of the terms used in the definition to eliminate ambiguity. Accordingly, it was decided to replace the term “society” with “stakeholders”. Regarding the term “value”, there were some suggestions made by the survey respondents to replace it with a more direct terms such as “profit”, for example. However, it was decided to retain the term “value”, as it covers a wider range of positive outcomes, e.g. social, physical and fiscal benefits for the user of AM as well as the different stakeholders. The final version of the AM definition is:

Definition 3. AM is the strategic management of the architectural firm that assures the effective integration between managing the business aspects of the office with its individual projects in order to design and deliver the best value to all stakeholders.

Conclusion

Over 50 years since the first use of the term AM there is now a definition derived from systematic research. The research aim was to determine a solid and pragmatic definition of AM that is capable of illustrating what exactly it entails. This was achieved by reflecting on AM literature as well as considering the contemporary views of architectural researchers

and practitioners. Given the paucity of work within the field of AM it was necessary to focus research activity on the CIB W096 Architectural Management network. Research also concentrated on UK practitioners because of the history of the development of the field. While this proved to be a strength in terms of soliciting expert and informed views, the relatively narrow scope and relatively small response to the questionnaire survey are research limitations. Despite this, the new definition does offer a common description of AM that can be used for future constructive debates by practitioners, educators and researchers in trying to apply, further understand and develop the field. The definition is not prescriptive, which allows scope for innovation and the space for architectural practices to develop practical and specific strategies to suit their unique context.

In addition to providing a pragmatic definition the research revealed issues that would benefit from further investigation. As noted explicitly by one of the respondents and implicitly by other respondents, there is no clear philosophy of AM, nor is there any clear guidance. So how can AM be transferred successfully from theory to everyday contemporary professional practice? Although there are a few examples in the literature (case studies) it is not an area that has been explored by researchers. Criticism of the impact of the work of CIB W096 was a recurrent theme in this research and there was an appetite from the survey participants for clear guidance from the members of that network. The new definition of AM could be seen as the first step in helping to guide future research into both the philosophical underpinning of AM and the development of practical guidance. Whether or not that research is conducted under the umbrella of the CIB's W096 Architectural Management or by researchers working outside that network remains to be seen.

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