Routine production or symbolic analysis? India and the globalisation of architectural services

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Developments in information technology have reduced the need for spatial proximity in the geography of architectural employment: computer-based drafting allows for better standardisation and more efficient production of project information, whilst electronic communication links make the immediate transfer of this information possible across long distances. The ability to compress time and space may be paving the way to the relocation of architectural production facilities from higher-wage to lower-wage regions: numerous examples already exist of firms that have adopted this strategy to reduce their overheads.

Thus far, discussion of the viability and desirability of this emerging trend has been hampered by its close focus on the type of work carried out, and a consequently narrow view of its costs and benefits. Remote drafting is seen as a cheap form of professional north-south exploitation in architecture's intellectual circles that should be ignored if not deplored. By stressing the connection between the task and the culture in which it is developed, this paper seeks to produce a broader, alternative perspective, which identifies the several limitations of current off-shore collaborations but also points out possible future strengths, development strategies, and necessary environmental conditions.

The Indian context provides an opportunity to highlight analogies and differences between the recent growth of the export-oriented IT industry and the construction of a colonial professional practice at the turn of the twentieth century. If properly acknowledged by the domestic profession and considered by policy-makers, the development of a framework for distant architectural collaborations could be used not only to support the local design sector and bring the contested components of its post-colonial tradition in sharper focus and possibly closer together, but also to respond to the many challenges posed by the country's economic policies, growth, and infrastructural conditions.

Architecture: a labour-intensive and traditionally local practice

Architectural services in Australia provide work to approximately 19,000 people. Of these, about 40% are proprietors or directors, 45% are technical staff (either qualified professionals or unqualified feeearners) and 15% fulfil support and administrative functions. Since it is estimated that one-third of the 4,500 registered firms consist of sole practitioners, the remaining 3,000 employ 12,000 people, for an average employer-employee ratio of 1:4.¹ This ratio is relatively small when compared to other

countries: in the United States, for example, the number of employees outweighs the number of offices by almost seven to one.²

Such numbers serve to highlight that, in mature economies, architecture is a salaried sector – a sector, moreover, where value is produced through the intensive application of knowledge, planning and representational skills rather than use and assembly of materials. This explains the relevance of the wage component in the economics of design practice. In Australia, for example, the salaries of technical and support staff (including superannuation and leaves) represent 43% of office billings, out of an industry total of almost A\$580 million in 1993. Rent or lease of office premises, telephone, electricity and maintenance take up another 12% of this amount.³

From an economic geography point of view, architectural practice has always been a local employment industry; an industry, that is, which produces its output (in this case advice and physical information) in close enough proximity to the place where such output is put to use. This is due to the socially complex and thus operatively uncertain nature of the building process. Within it, architects are required to generate, submit, issue and transfer design information at an almost constant pace: decisions must be progressively formalised, discussed and agreed upon with a panoply of project participants coming from different directions, and eventually modified.

Such a distinctive lack of operative autonomy made it traditionally difficult for architectural firms to operate beyond the territorial limits of physical transactions (essentially the space allowing drawings to be exchanged in a reasonable time): information producers and information users had to inhabit, by-and-large, the same social domain (Fig. 1). Limits could be expanded by establishing a satellite office or associating with a 'local' firm in charge of project and site administration.

This need for proximity generated a critical difference in the spatialisation of production in architecture and the spatialisation of production in manufacture. While the industrialising world could organise its processes by deciding which factors to play with - land, capital or labour - thus bringing workers to central cities or moving factories to distant cheaper locations, architectural practice could never follow these patterns. The difficulty of dividing plant (the design office), process (the drawings) and product (the building project), meant that cost minimisation strategies had to be organisational rather than geographic. The best way to keep overheads under control was through low capital investment, capacity sub-contracting and workforce mobility, indeed the traditional balance wheel of professional practice.

Technology, mobility, and the new spatialisation of practice

Over the last fifteen years, the technological context has changed substantially. Telecommunications infrastructure and convergence technologies have become cheaper and more widely available around the world and across different economies, defining an operative environment with relatively low entry barriers in terms of capital investment.⁴

The increases in global connectivity of



Figure 1. Florence, 1430 (Brunelleschi and Cosimo de Medici, during the construction of S. Maria del Fiore).

telecommunication networks, in their capacity to carry data, and in the speed at which data are carried, have also started to affect, perhaps structurally, the way architectural practices work. According to *AlArchitect*, the online publication of the American Institute of Architects, 83% of US architectural firms transferred drawings electronically in 1999, compared to just 35% in 1996.⁵ These data are consistent with the information recently collected by other design professional research agencies such as PSMJ and ZweigWhite, which stress diffusion in use and competitive advan-

tage of digital technologies whilst noting offices' interest in setting up remote links (Fig. 2).⁶

The ability of graphic documents to travel quickly across space, either to provide instruction or to supervise the work carried out under such instruction, gives architectural practice the chance to overcome its historical spatial location constraints, and catch up with the geographic dynamics of manufacturing: rather than remaining fixed in place, architectural capital can now move to where labour is, spatially dispersing its activities according to relative production advantages (Fig. 3).

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Figure 2. Bangalore, 2000 (adapted from *Development Outreach*, Fall 2001, World Bank Institute).



The acquisition of geographic mobility could thus have a substantial effect upon the economics of the design sector. If we consider that multifold differences exist in professional rents around the world, the relocation of certain tasks to lower-wage locales could facilitate major reductions in office budgets as well as project development costs⁷. This would be a difficult opportunity to pass up in all those countries where internal professional competition is high, fee levels are either shrinking or dramatically inadequate, and returns are diminishing: strategic remote outsourcing could enhance competitiveness or profitability by capturing productivity increases through rent discounts.

The geographic relocation of service delivery could yield significant returns also to the host countries: *World Architecture's* survey of architectural firms shows that billing differences between the largest 25 design firms – normally representing around 15% of the industry's total worth – vary enormously by world regions: in 2001 for example, North America (\$4,010m) generated four times more value than Western Europe (\$970m), two-and-half times more value than the Pacific Rim

(\$1,505m), and almost ten times more value than Australasia (\$423m). The difference with the rest of the world is even more staggering. The ability of Central Asia (\$143m) to secure design documentation services for one-tenth of the North American work would more than double its current output (Fig. 4).⁸

The spread of geographic collaborations seems to indicate that architectural practice is willing to put this hypothesis to the test. Evidence is mounting, not only anecdotal, concerning professional or business relationships involving firms from higherwage and lower-wage regions. Offers from lowerwage regions have also become more forthcoming, with whole lists of offices advertising the possibility service sub-contracting on professional for websites. Moreover, the seeming development of a global market coincides with institutional acknowledgement and facilitation at international level. In 1993, the members of the World Trade Organisation (WTO) negotiated an agreement for global service trade (GATS) which includes professional and technical services. Since 2000, sixty-one countries have made commitments towards considering import-export collaborations in architecture, and forty-three in urban planning and landscape architecture (Fig. 5).9

Regardless of its actual current diffusion, the scenario suggested brings several questions to the fore. Are the trans-regional examples encountered so far isolated, albeit numerous, instances of distant collaboration, or should they be considered the harbingers of a new, emerging structure of architectural production? If the latter is the case, what could the consequences of this situation be, especially



Figure 3. Five of the major six centres for outsourcing work as a result of new technology. The sixth, not shown in the map, is Ireland. (Adapted from: *The Macmillan Atlas of the Future*, Ian Pearson ed., New York, 1998, p. 71.)

from a lower-wage locale's point of view? Could the globalisation of design workforce weaken and eventually replace regional professional traditions, or could it assist in the build up, or further strengthening, of local professional capacity? Could its viability simply reflect an up-dated form of professional internationalism – a result of building design increasing its technical homogeneity around the world – or suggest forms of techno-economic colonialism, with richer countries determining the

Figure 4. Billings of the largest 25 design firms by world regions in millions of dollars. Data from *World Architecture*, 'World Survey of the Top 300 Architectural Firms,' Issue 92, January 2001.



profile of the architectural workforce in poorer ones?

Answering these questions requires us to analyse the particular division of labour that underlies the geographic subdivision of practice.

From capital mobility to capital development: routine production and symbolic analysis

In many respects, the organisation of off-shore architectural outsourcing follows Frobel's classic analysis of multinational companies, from which the theory of the New International Division of Labour (NIDL) derives¹⁰. Although it is difficult to categorise this particular market into rigid modes of behaviour, it seems safe to say that the work relocated to

developing economies concerns, by-and-large, design documentation. Trans-regional architectural collaborations present a marked geographic subdivision between conceptual work and production tasks. Outsourcing firms from higher-wage areas tend to use remote offices as drafting bureaux whilst retaining most of the professional component at home.

With its distinction between conception and execution, high-skilled and low-skilled, planning and production, the NIDL paradigm could fit the model of architectural practice, and be adopted as a critical metaphor for it. In principle, architectural offices can be considered 'information manufacturing' plants and examined according to the



Modes: (1) Cross-border, (2) Consumption abroad, (3) Commercial presence, (4) Presence of natural persons.

value-adding steps along the production process. In this case, however, it is more useful to move beyond the functional compartmentalisation of the work, and focus on the degree of intellectual autonomy that such compartmentalisation implies.

From this point of view, the work categories articulated in *The Work of Nations* by Robert Reich, Secretary of Labor during the first Clinton administration, provide a powerful starting framework¹¹. According to Reich, mobile workers in the service sector divide into 'routine producers' and 'symbolic analysts'. Routine producers are those who process data by following instructions; they perform repetitive tasks and respond to explicit procedures, no matter how articulate these are. Symbolic analysts, by contrast, intervene in reality by reducing it to abstract images, manipulating these images, communicating them to other specialists, and coordinating their work. They are involved with independent problem-solving, problem-identifying, and strategic-brokering activities, and make decisions based on critical judgement sharpened by experience. When applied to architectural practice, symbolic analysis suggests an affinity with design, while routine production connotes documentation tasks.¹² If we accept this association, off-shore collaborations represent the geographic

Figure 6. Detail of an information technology advertisement (1992). Photograph : Paolo Tombesi.



separation of symbolic analysis and routine production activities (Fig. 6).

This dual structure lends itself to multiple interpretations. From a micro-economic point of view, the geographic separation of information conception and information production responsibilities (or data definition and data formatting) makes good theoretical sense. As Oliver Williamson has explained, transactions within bureaucratic, clearly hierarchical environments carry lesser costs than transactions conducted between firms (or organisations) that belong to different cultures and sit outside each other's sphere of governance.¹³ A strong technical division of labour between locales limits distant contributions to definable routines that rely on prescriptive drafting protocols and notational standards, thereby minimising the need for either cultural cohesion or long training. Besides, the reduction of the collaboration to clerical support

facilitates sub-contractors' selection on the open market. If proficiency in Autocad and Microstation (or familiarity with the RIBA's Plan of work, North American Architectural Graphic Standards, or the AIA's Masterspec) is mainly what is needed (and in fact advertised by many), drafting partners can be contracted on a project basis, thus saving outsourcing firms remote office set-up and ongoing costs while allowing the same partners to do concurrent work for more contractors, hence achieving horizontal economies of scale. As the leanest, and therefore most viable, form of geographic collaboration, distant data processing as a service to businesses is considered by some policy-makers an effective short-term strategy to facilitate, albeit in a limited way, some transfer of wealth and resources between developed and developing regions. The practice of lending data-entry workforce to other economies has been used in places such as Ireland, Korea, India and Mexico as a strategy to put a foot into the proverbial industrial door, and work up the 'labour/service/product' ladder.14

Although this may prove effective in certain instances, reducing architectural collaborations to the revenue generation potential of drafting services (and collaboration feasibility to project budget control and office management issues) is over simplistic and potentially counterproductive.

Unlike architecture and building, which require continuous negotiations between abstract representation and specific realities, 'data conversion' drafting is not environmentally specific or culturally embedded. As a manual activity, in fact, it needs capable tool operators more than capable building design professionals. And, since it relies on social

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agreements and information technologies that are not only common to but also more intensively used in other service sectors (such as software production, publishing and graphics), it can be exposed to horizontal competition from firms skilled in the means rather than the ends of the work.¹⁵

Yet this accidental, by-default connection to architecture could produce unintended effects. Different from the manufacturing of tangible goods or the production of intangible commodities, the physical generation of architectural information does not end with the artifact itself (a drawing as opposed to a microchip, a piece of garment, a unit of software, or a flight reservation slip). Architectural drawings not only respond to, but also spell out building strategies, procurement methods and technological paths. The information one works on or from, either as a designer or a drafter, becomes inevitably part of one's background. And given the project-based structure of the market (where design teams are formed and undone each time), the high employment turnover rate that characterises the profession, and the latter's exponential rate of growth in fast urbanising economies, this background ends up filtering through the industry. Work developed in collaboration with a foreign, higherwage partner can thus define an alternative form of technical education or building production, which will eventually reverberate at a local level and affect future environmental practices by positing indirect technology transfers. (A function which is explicitly recognised by policy-makers.) But whilst symbolic analysis allows for a critical examination of the work, data processing implies a much more passive acceptance of methods and solutions, less prone to

re-elaboration. The difference between drawing 'conception' and 'execution' could be critical to regions already burdened by environmental pressures, such as South and East Asia, which are expected to undergo further massive demographic and urbanisation increases. While there is an urge to build professional capacity at all levels, there is also a need to be discerning about the technological choices that are built into this capacity (Fig. 7).



Figure 7. Detail from *Tower of Babel*, ca. 1563, Bruegel the Elder. Photograph: Paolo Tombesi.

The concentration on non-professional design contributions has two further repercussions. The first concerns remuneration: since it relies mainly on generic, low value-adding activities, it commands wages that sit at the bottom of the salary scale. In Australia, for example, hourly rates for design work are over three times higher than they are for drafting, and a similar distinction applies to the salary structure of the profession in virtually every country.¹⁶ The second repercussion has to do with fee-negotiating leverage. If one needs electronic drafting tracers with little or no professional definition other than the training required to follow agreed normative procedures, the market of potential service providers expands, producing stiff downward competition within lower-wage areas. Rather than the difference in labour cost between the outsourcing and the sub-contracting region, it is the difference between rates obtainable in India, Vietnam, Sri Lanka, Malaysia, Philippines and South Africa that determines the price paid for the service. Dumping practices have started to appear, with drafting workshops setting their rates in relation to their digital competitors'. Reliance on cost cutting may take work and workforce further away from the symbolic analysis domain.

This is in fact what happened in the IT sector, where the concentration of export processing activities on low-skill and low-cost areas has not always triggered the chain reactions envisioned. In India, for example, the use of low-skilled labour for dataentry contracts has not helped small companies to obtain higher-value adding work. Ireland, by contrast, has been able to progress up the value chain, and now boasts annual revenues per software sector employee that are five times India's.¹⁷ Interestingly, the industry's accepted lexicon denotes a relationship between design and economic value that borrows from building. While drafting and modeling services are presented as data processing or conversion, software programming and development services are commonly advertised as 'system architecture', where the term architecture signifies the presence of expert-based, strategic decisions.

Acknowledging the competing motives and possible imports of a globalising practice helps us understand that cost-benefit analyses cannot be reduced to rent differentials and individual firms' savings. The dialectic nature of distant professional exchanges calls for a broader assessment of their repercussions. This includes the type of work that is or can be outsourced, the type of personnel that is activated, procured or created through this exercise, the type of professional and sectoral dynamics that are set in motion by connecting to specific foreign markets and adapting to particular models of practice, and the type of wealth that is generated at both ends of the established bridge.

From this perspective, the treating of architectural collaborations as a commercial business service does not help lower-wage countries maximise the economic and cultural potential of an electronicallybased international building design practice. The mostly clerical connotation of the service limits the production of both financial and social capital; it does not necessarily optimise the opportunities for professional capacity building and appropriate technology transfer; and it cannot protect local architectural firms from encroaching inter-sector competition.

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A possible way to deal with these limitations while retaining the practical benefits of a geographically expanded market is by shifting the focus on the social characteristics of the workforce as opposed to the type of work done. Routine production tasks can generate a positive industrial impact when performed by structures with symbolic analysis capabilities. Structures, that is, which are professional, which can learn from the work they are asked to carry out, and which can filter this experience through an environmentally specific critical framework. In this case, data processing can be conceived of as an instrumental form of internal specialisation, the aim of which is to generate revenues and expand the output of the industry, without undermining the nature of the offices involved but rather expanding their comparative technical horizons. In due course, these conditions also facilitate the progression of the services exported up the value chain. When symbolic analysis and routine production activities are performed in spatial contiguity and by a socially integrated workforce, as traditionally the case in the architectural office, the passage from technical to professional services is easier than it would be in a drafting-only environment.

Yet, despite the benefits that could be brought to lower-wage locales by facilitating the engagement of discipline-skilled workforce in distant collaborations, the open participation of local symbolic analysts (i.e. architecturally qualified individuals) in the routine production of globally-directed drawings is not always met favourably; particularly in those developing or transitional economies where the discussion about the culture and role of the profession has not fully settled yet, and its historical underpinnings are still intensely felt. Whilst the parallel supply of professional and technical services is considered a normal condition of contemporary Western architectural practice, where most firms are routinely involved in reciprocal specialised sub-contracting and multiple team assembly, the established profession in some former imperial territories appears reluctant to contemplate the subordinate servicing of other firms as an industrial development strategy, especially when offshore.¹⁸ This does not mean that collaborations do not take place; simply that they are not explicitly acknowledged in the professional discourse or considered in its technical policies.

It is easy to understand this position, in its effort to transcend past histories of domination, and prevent their reproduction under different forms.¹⁹ But the situation is more complex than it looks from the outside, and requires careful consideration of the various aspects involved in its management.

India: a case in point

India provides a significant and useful context for continuing such discussion while laying its various internal issues on concrete grounds.

With over one thousand million people and an annual growth rate of 1.8%, India is the world's second most populated country after China. Since independence from British colonial rule, urban concentration has doubled, rising from 15% in 1947 (60 millions) to over 30% in 2001 (307 millions).²⁰ Some of the major cities – Bangalore, Hyderabad and Delhi – have surpassed this trend by growing almost three times in 20 years.²¹ Despite

the high annual rate of urban land conversion, crowding parameters are very high. In 1993, Bangalore was the most spacious among major Indian cities, with 9.5 square metres of average floor space per person. France and Germany figures were in the 30s, New Zealand in the 40s, Australia in the 50s.²²

In terms of labour costs, the country is very competitive. Although its overall productivity is modest (GDP per employee/hr \$1.70 vs. Australia's \$25.11 in 1999), it can rely on a large active workforce, growing steadily at an annual rate of 6%, with lower wages than in all South and East Asian economies except the Philippines. The per capita portion of the gross national product is increasing, but still very limited. In 1999, it was \$2,149, over ten times smaller than Australia's (\$22,448), fourteen times smaller than the United States' (\$30,600), and lower than its regional neighbours', except for Pakistan, Bangladesh, and Vietnam²³. With them, India defines an area where the annual pay for skilled workers is inferior to China's, Latin America's and Eastern Europe's.24

These structural conditions are reflected in the numbers of the architectural profession. In 1996, the country had almost 20,000 registered architects (two-and-a-half times more than Australia, and over 60% self-employed), based for the most part in the Western states – with Karnataka, Maharashtra, Gujarat and Delhi collecting over 70% of registrations. (Training is currently provided through approximately 140 schools – a sharp increase from the 88 recorded in 1996 – with an average intake of 40 students/year (Fig. 8).) The remuneration of this body of practitioners falls in line with the general economic parameters. Currently, the

starting monthly salary for an architect is around 5,000 rupees, the equivalent of 185 Australian dollars. Graduates with up to three years of office experience earn between 60 cents and 2.60 dollars an hour, whereas draftspersons in practice for five years can expect between 0.4 and 1.7 dollars, depending on technical speciality and location of the office.²⁵ By comparison, the official minimum pay for architectural graduates and newly registered architects in the Australian state of Victoria in 1999 was, respectively, twelve dollars and fifteen dollars an hour.²⁶ In the same year, similar positions in the United States commanded, on average, hourly wages of twenty-nine and thirty-three Australian dollars.²⁷

India's official property costs are, by contrast, decidedly high. Data from the office market in the 1997–99 period show that rents in Melbourne are substantially lower than any Indian metropolitan centre, and that only Bangalore is cheaper than Sydney. (Yet Bangalore has the highest house-priceto-income ratio in India.) Overall, Mumbai, Delhi and Chennai are amongst the most expensive property markets in South-East Asia.²⁸ (One can either discount the impact that high office rents have on relocation, based on the relatively light incidence of this item in the architectural office budget - around 10% against labour costs' 50% or suggest the possibility that this puts existing local firms in an advantageous position to offer their services as off-shore sub-contractors.)

Technological infrastructure is also competitive, although the country's overall endowment is comparatively inadequate. In 1999, the World Economic Forum ranked India 55th out of the 59

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Figure 8. Map showing the distribution of registered architects by state, the location of architectural schools (1996 data) and main institutes of technology, and the distribution of STP earth stations with relative bandwidth utilisation.

countries surveyed. More specifically: 57th for telephone penetration, 50th in rate of filling orders for new connections, 52nd for investment in telecommunications per inhabitant. Telephone lines are statistically few (18.6 per 1,000 people in 1997) and very unreliable (196 average telephone faults per hundred mainlines in 1995), with high longdistance rates (in 2000, between 4 and 14 times the cost of similar calls in the United States). In 1997, India had 2.1 PCs per thousand people (vis-à-vis 406.7 in the US, 46.1 in Malaysia, 6.0 in China and 13.6 in the Philippines). Two years later, there were 0.13 internet hosts per 10,000 people (compared to 21.36 in Malaysia and 1.21 in the Philippines). Power supply also lags behind regional standards. Aside from the uneven quality of the service provided, with frequent electricity shortages and voltage fluctuations, India's per capita capacity is between 5 and 8 times lower than Malaysia or Korea's, and half that of China.29

Yet, two elements should be considered. First, equipment numbers may not be impressive on a per capita basis, but they are still very significant in absolute value. A survey conducted by the National Association of Software and Service Companies (NASSCOM) in January 2001 found that, as of December 2000, there were over five million operating PCs in the country. Out of these, more than 3.7 million machines had Pentium I and above processors (i.e. machines which could be effectively used for the Internet). In addition, over 81% of PCs sold during the financial year 1999–2000 were driven by the need to access the internet.³⁰ Second, overall statistical figures have relative geographic accuracy. They represent national averages in a country with

a huge and diverse territory, a rural population percentage still close to 70% of the total, a very uneven economic base, and highly skewed wealth distribution. In fact, India's communication infrastructure is characterised by strong clustering around specific, and essentially urban, locales – 'technological enclaves in otherwise backward economies'³¹. The NASSCOM survey reported that more than 200 cities and towns in India have Internet connectivity, with capital cities accounting for almost 80% of connections across the country. In some of these locations, cluster-centered infrastructure now approaches that found in some western countries.

The situation has historical roots. Geographic selection occurred first as a matter of colonial administration, with the concentration of commercial and bureaucratic resources in key ports such as Kolkata (formerly Calcutta), Mumbai (formerly Bombay), Chennai (formerly Madras), and finally in the new imperial capital at Delhi in the northern interior. It was then strategically pursued according to modified patterns after Independence, with the creation of decentralised loci for regional development across the country, and aggressively sought over the last twenty years, particularly in the information technology sector. In this case, the government decided to concentrate investment in a few southern cities and traditional centres - to some degree coinciding with the distribution of the architectural profession - so as to facilitate the development of locational economies, make the provision of adequate infrastructural support viable, and raise marketplace profile.32

The most distinctive result of this policy has been

the creation of software technology parks (STPs), i.e. tax exempted export processing zones for software development, with ample workspace, reliable electricity, datalines, internet, and guaranteed access to high-speed satellite links. First announced in 1990 in three locations (Bangalore, Pune, and Bhubaneswar), STPs have quickly multiplied. Today, there are thirty-five of these production and employment centres either in operation, planning or development.³³ Each STP provides an 'International Gateway' earth station, which is connected to a network of cyber-parks scattered within its territory. STPs thus function as catalysts of economic agglomeration, territorial nodes defining metropolitan industrial districts feeding off satellite institutions, local supply chains, and an 'industrial atmosphere' conducive to the export processing of IT related activities as well as the attraction of foreign investment (Fig. 8).34

These characteristics have contributed to making India the developing world's software leader. The country is estimated to have exported US\$5.1 thousand million-worth of software in 2000/1, after sustaining an average annual growth of more than 40% over the last ten years. Just under half of the Fortune 500 now outsource software development to India.³⁵

The initial strong emphasis of the first Indian prime minister, Jawaharlal Nehru, on science and technology education, and its prolonged momentum over decades have produced an enormous pool of human resources. In 1999, the compounded IT sector employed a workforce of 200,000. To these numbers, one must add the army of students preparing to join the ranks of the IT revolution. Educational institutions and polytechnics train more than 67,000 computer science professionals annually, while another 200,000 individuals enroll every year in the private software training institutes that have mushroomed during the 1990s.³⁶

The political and institutional support behind transformations of such magnitude has created not only positive expectations but also positive growth forecasts. The mission statement of the Information Technology Action Plan, approved in 1999 with the objective to reach IT penetration for all by 2008, recites: 'Move works to India'³⁷. Rhetoric aside, the current 25,000 working ISDN connections are expected to increase sharply, in line with the doubling of computer and Internet penetration percentages between 2002 and 2005.³⁸

Technological infrastructure provides a potential springboard for the use of India's two clearly strong theoretical advantages in the global market for professional services: the widespread use of English as the language of professional training and communication, and the relative parity of its professional institutions and curricula with the norms and standards of internationally dominant organisations such as the RIBA.

These cultural and institutional assets are legacies of India's earlier colonial history and have therefore been in place for some time. Indeed it could be argued that the origins of the contemporary Indian architectural profession in that earlier experience of globalisation within the British imperial framework effectively institutionalised external, geographically distributed modes of professional production in India. This imperial legacy ideally predisposes the

Indian profession to perform advantageously in the current climate of international collaboration and/or relocation. Certainly, the relative ease with which Indian-trained graduates migrate to jobs and further professional studies overseas would suggest that these structural conditions have been maintained if not strengthened over the years since the formal devolution of imperial relations. The flux of Indian students to Anglo-American universities is high and constant, with increasing numbers now opting for Australasian universities as well. Particularly significant is the percentage of Indian nationals granted work visas in the US. In 2000, Indian nationals comprised about 37% of the H-1B petitions subject to a cap, and 51% of those not subject to the cap. Computer-related occupations led with 53%, architecture, engineering and surveying services followed with 13%.39

In sum, India seems to possess all the conditions required to do well and benefit economically from the geographic expansion of its market. It also has reasons to seek to amplify its technical and professional base of human resources in order to manage, control, and direct the growth of its constructed environment: its large body of practitioners could use distant collaborations not only to increase the productivity of the sector but also to stimulate substantial growth in the number of building design cadres and experts that urbanising India needs; its telecommunication infrastructure is geographically intertwined with the distribution of the architectural profession, set to grow and penetrate the territory, and able to connect with the educational structure as well; its socio-technical conditions (availability of qualified workforce, absence of language barriers,

and the presence of a long-established professional tradition with historic ties to the West) are those required to minimise transaction costs in its dealings with the Anglo-American world; and its wage levels provide a definite market edge. Such a strong combination of comparative and competitive advantages means that India not only could 'perform', but could 'perform better' than its global competitors.

Yet, in spite of these conditions, the debate on distant outsourcing (or lack thereof) betrays the profound unease of the architectural profession in India when it comes to global trade. The strong institutional support that pervades India's IT industry and spearheads its growth is nowhere to be found as assertively in architectural practice. Unlike other countries, such as the United States, Australia, Singapore, and even Malaysia, where the internationalisation of practice and offices has recently become a central discussion topic, India's specialised professional literature has not tackled this type of collaborative work, either from an organisational or a critical point of view; the country's sharpest architectural commentators have so far left it on the side, and the idea of a regionalism embedded in physical form and materials still overpowers that of another regionalism - perhaps newer but as Indian as the first - based on digital work, software-related industrial strategies, and IT-led economic growth.

Cultural barriers to technical collaboration

In order to understand and appreciate this position fully, we must relate it to the institutional and cognitive legacies of India's recent past. In particular, we need to examine the specific colonial origins and

evolution of professional training in the country's architectural schools, and the implications of that contested tradition for the production of a skilled professional workforce today.

As mentioned earlier, the organisational structure of the architectural profession in India is a legacy of British colonial policy and practice. An equally significant consequence of the colonial past is the preponderance of the engineering profession in the Indian building world. Although the British were the effective rulers and administrators of India for close to two hundred years, it was not until the final decades of the regime that the colonial government had any sustained and significant demand for 'Architecture' as such. For most of the preceding century and a half, the government had relied on the engineers of the Public Works Department (PWD) to design and construct virtually all of its infrastructure and buildings. A clear distinction between the engineering and the architectural professions was finally reflected in official policy only at the turn of the twentieth century when the environmental design and planning priorities of the colonial administration had effectively shifted from technical to political challenges. Amidst mounting nationalist agitation against colonial rule, the death of Queen Victoria, the Empress of India, in 1901 provided an opportune pretext for an official turn toward a conspicuously more monumental manner of colonial architecture. For the first time on a department-wide basis, RIBA-qualified architects were engaged as salaried officers of the PWD to serve as the 'Consulting Architects to Government' in each of the provincial and presidency administrations. By contrast to the utilitarian pragmatism of

the technocratic engineers and their standard plans, the new government architects sought to upgrade the built image of the regime through the design of a more sophisticated and self-consciously imperial architecture for modern India.⁴⁰

However, the architectural profession was still faced with significant impediments. Without the regular patronage of the colonial administration in earlier years, there had been little to stimulate its independent development in British India. While the traditional design methods of the building crafts and guilds of the subcontinent had only been sustained sporadically through the patronage of certain princely states, there was virtually no pool of professional labour to draw on in India that was adequately equipped with the skills and working knowledge of 'modern' architectural practice. The new consulting architects to government perceived, therefore, that they had a double mandate. On the one hand they had to define and establish a role for professional architects in what would prove to be the final swan-song of British Indian empirebuilding. On the other hand they had to pioneer the educational foundations for the future profession in India in order to address their own acute need for suitably trained Indian recruits. The Architecture course at the Government School of Art in Bombay (the 'Sir J.J. School' today), first established in 1914 by the Consulting Architect to the Government of Bombay and his staff, was the first and for many years the only recognised course through which prospective Indian architects could gain entry to the profession⁴¹ (Fig. 9).

With its effective monopoly on architectural education in the final years of the colonial era, and

Figure 9. The Sir J.J. School, by George Wittet, Consulting Architect to Government: Bombay, c.1970s. (Adapted from C.W. London (ed.), Architecture in Victorian and Edwardian India.)



its original instrumental purpose to supply skilled subordinate staff to the government architects' offices, the Bombay course had far-reaching implications for the subsequent development of the profession. In the first place it promoted the latent Arts and Crafts values of its founders, idealising the notion of the architect as something distinct from the techno-scientific engineer. But quite the opposite of an autonomous professional - skilled in the symbolic analysis and novel representation of design issues - the curriculum aimed to produce craftsmen-like architectural technicians who could selflessly assist in knitting together the seamless synthesis of Indian and European building traditions that colonial technocrats had come to favour as the appropriate style to represent Britain's essentially conservative interests as an imperial power in India. Accordingly, the Bombay course focused predominantly on the development of technical skills, not least the meticulous measured drawing of India's architectural archaeology.42 This contributed to historical knowledge, but it was effectively an

uncritical mode of data processing, the primary value of which was the development of practical architectural skills with which the school's graduates could serve the architectural profession in colonial India, rather than lead it. Actual opportunities for architectural employment in government service remained guite limited until the end of the colonial era, but graduates of the Bombay School also found employment as the junior service corps of the first commercial firms established in India. In turn, it was the expatriate British principals of those firms, such as Claude Batley of the successful Bombay practice, Gregson, Batley and King, who were to succeed the staff of the Consulting Architect to Government as the principal academic staff and patrons of the Bombay School.43

At the time of Independence, the Bombay School and associated firms remained the only established stronghold of the architectural profession in India and the obvious source from which to recruit capable and duly qualified Indian successors to the retiring British staff of both government and commercial architectural agencies. The corporate service ethos that characterised the first generations of Bombay-trained Indian architects was thereby diffused throughout the fast-ramifying PWD system of post-Independence India, seamlessly sustaining and propagating the characteristically utilitarian design forms and methods attributed to that powerful and influential institution (Fig. 10). As with the most significant and technically challenging public works projects in the colonial past - which the British administration had reserved for the 'Imperial Engineering Service' (a euphemism for British engineers trained in England)⁴⁴ - major



architectural commissions in the new India were entrusted to leading international consultants such as Le Corbusier and Louis Khan. But the more routine and largely repetitive design work of the PWDs, in domains such as public housing and minor public buildings, was entrusted to this new cohort of public service focused architects (Fig. 11). These were the counterparts to the Indian-trained engineers of the former 'Provincial Engineering Service' of the colonial era that had been delegated the everyday routine engineering tasks and procedures of the local government PWDs. Moreover, little had



changed in the organisational hierarchy of the PWD since the colonial era and these salaried architects of the PWD continued to work in a subordinate service capacity to the executive engineers who dominated the senior management of the departmental system.

In the 1950s and 1960s, the still fledgling architectural profession in India was infused with a new and very different spirit through the influential projects of Le Corbusier and Louis Kahn and the leadership of some of their ambitious Indian associates, and through the overseas training and work experience of others schooled in international modernist powerhouses such as Gropius's reconstituted Bauhaus course at Harvard. Though notionally committed to the same development prerogatives as the architects in the Indian public service, new schools of architecture - such as those established New Delhi, Chandigarh, Madras, in and Ahmedabad in this period - promoted a more avant-garde modernist/humanist ethos closely in tune with contemporary European and American schools. This posed a direct ideological challenge to the uncritical, corporate-service ethos of the old Bombay School and government establishment. It also introduced several new and increasingly important locations to the professional geography and related regional development of contemporary Indian architecture (Fig. 12).45

By the 1970s the first generations of graduates from the new schools had established their own practices. In turn, they had begun to consolidate their avant garde status as the putative intellectual leaders of the profession by reproducing their values in succeeding batches of their own students, and Figure 10. Typical PWD building. Photograph: Peter Scriver.

Figure 11. Chandigarh. Photograph: Peter Scriver.

Figure 12. Sangath, Ahmedabad (1979–81), Balkrishna Doshi. Photograph: Peter Scriver.

Figure 13. British Council, New Delhi (1987–92), Charles Correa. Photograph: Peter Scriver.





student employees, many of whom went on to develop their own practices and the further concentration of architectural expertise in the same few cities. As the critical avant garde overseas began to scrutinise the functionalist orthodoxies of Modern Architecture, the elite schools and associated practices had embarked on a passionate but increasingly introverted re-appreciation of India's own rich and regionally varied pre-modern building traditions. In the 1980s, growing recognition of both the romantic and critical inflections of this regionalist sensibility in the internationally published projects of architects such as Balkrishna Doshi, Raj Rewal and Charles Correa further reinforced this ostensive resistance to the modernist globalisation of architectural form and methods (Fig. 13).46

In the meantime, however, the pace of actual social and economic modernisation in India was unrelenting. The country was urbanising exponentially and the demand for design and building services was growing accordingly. New polytechnic colleges and academies of architectural technology were being established to fill the continuing

demand in both public and private sector design agencies for skilled providers of basic architectural services. As a result the profession had effectively split into two sub-cultures. On the one hand were independent architectural professionals, committed to both the creative and the cultural integrity of their work. On the other hand was the vocation of the government architect, committed to the ethical prerogatives of a developing country: to provide appropriate shelter and accommodation for the greatest numbers with the minimum of public resources. Both camps had their worthy role models.⁴⁷ But the failings of each were also baldly apparent. Whilst PWD architects could be accused of slavishly replicating substandard type-designed buildings, 'high-art' architects could just as easily be criticised for their detachment from social reality when designing costly and seemingly self-indulgent buildings for elite clients.⁴⁸ As long as the ideological certainties of progressive and equitable development through 'modernisation' prevailed as the guiding ideals of economic and social policy, the profession remained divided. By the mid 1980s,

however, the balance had begun to shift as the economic success of influential portions of India's growing middle-classes gave power and expression to new values and agendas, not least an increasing ambivalence in India as abroad with regard to the universalist assumptions and aesthetics of modernism.

The proliferation of a raft of new schools and academies of architecture across the country in the 1990s was indicative of several further factors of change in the Indian architecture and building scene. The general liberalisation of the economy under the government of Rajiv Gandhi in the mid 1980s, the main engine behind the growth of the IT industry, had generated considerable new wealth by the end of that decade, and a corresponding increase in consumption and the consuming patterns of the newly moneyed middle and uppermiddle classes of urban India. Capitalisation in luxurious new homes, commercial buildings, and five-star hotels was one of the more conspicuous signs of growth. This served to raise awareness of and a resulting demand for architecture as a valueadding service/investment, if not a necessary means towards such ends. In a few short years fully computerised new firms rose to industry leadership as exclusive purveyors in India of the latest in fashionable architectural imagery worldwide (Fig. 14).49

The reduction of trade barriers did not only affect the set up of an export-orientated IT sector; it also had a specific impact on the construction industry. Not only could builders now afford to import an ever wider range of building materials and foreign manufactured components to satisfy the global spectrum of new consumer tastes, but previously



inaccessible construction and materials processing tools and technologies as well. The importation of tools such as Italian diamond saw technology, for example, enabled a major revival of masonryinspired designs employing affordable skin-deep veneers of the magnificent marbles and sandstones of India's imperial architectural past (Fig. 15).⁵⁰ The rising aspirations of the new rich for new avenues of professional security and prestige into which their college age children might be directed also raised new demand for architectural training and qualifications. But with so few established schools of architecture – moreover, schools that were



Figure 14. Hiranandani Gardens, Powai, Mumbai (c.1997), Hafeez Contractor. Photograph: Peter Scriver.

Figure 15. Five-star hotel in construction, New Delhi (1990). Photograph: Peter Scriver.

Figure 16. Commercial building, C.G. Road, Ahmedabad (c. 1990s). Photograph: Peter Scriver. ideologically antagonistic to this new populist eclecticism of the building market – new schools were needed and soon established. Since 1996, over 50 new institutions have seen the light of day. It is particularly noteworthy that major builders and property developers directly sponsored several of the most successful of these new schools.⁵¹

Options and opportunities for architects in the public service have waned in recent years as the PWDs and municipal development authorities have resorted increasingly to new government policies of outsourcing major projects to prestigious independent architectural consultants working in the private sector.⁵² However, the old schism persists between those attached to the ideal of the architect as an autonomous design professional on the one hand, and the corporate/client-service camps of this evolving architectural industry on the other. A new cohort of architectural graduates is being groomed in these new demand-driven and still largely unaccredited schools and training colleges. They are no longer entering public service, nor the patronage of the established elites. Rather they serve the construction and property development industries as the architectural image-makers for a new client base in the increasingly powerful, globally connected new business sectors of metropolitan India (Fig. 16).

Contrasting professions

In sum, this case history of the development of architectural education and practice in contemporary India presents us with a picture of at least two professions. The first is a critically and formally sophisticated constellation of architectural



practitioners, academics, and students closely associated with a handful of elite 'avant garde' schools of architecture of established and more recent origin, that opposes the expansion of this particular trans-regional dimension of the market on regionalist and ethical grounds. The reasons are clear and worth supporting: a significant ideological commitment to the formal and theoretical autonomy of Indian architecture from the globalising forces of the present world market of architectural forms and services, and from its colonial and modernist pasts. Within this context, the export of services is seen as a reproduction of earlier histories and an implicit

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recognition of the historical dominance of the engineering profession in India. At the same time, however, this group has the most significant stake in protecting the more universal structuring institutions of professional privilege and authority in contemporary world architecture, namely the international recognition and mobility of its members on the basis of exclusive professional training in which fluency in English and the symbolic analysis of architecture are highly valued.

This profession is counterbalanced by a second, or parallel, formation on the Indian architectural scene, which consists of a possibly much larger grouping of both certified practitioners and informal and/or uncertified (and therefore less easily accountable) providers of architectural services. The defining characteristic of this less exclusive, more heterogeneous group is its commercial or 'market' focus. Training is valued but the major currency in this regard is architectural data processing skills, not least facility with sophisticated CAD packages and other digital tools. This group has no common formal or ideological commitments, and similarly little regard for the formal institutional frameworks and protocols of the architectural profession, such as validation by the institute of architects. It can therefore be comparatively liberal and innovative in its response to the established norms of design and construction in the region, but is often the opposite in deference to the tastes of conservative clients. It serves an ostensibly large and distributed market with both local and international clients and collaborators, but frequently operates within relatively closed networks of clients and sub-cultural connections,

such as caste groups, and NRI networks (nonresident Indians). It also operates in more direct collaboration with local building and property development industries often by-passing unnecessary symbolic representation and analysis of design and construction issues through informal direct communication and basic trust. English language skills are not necessarily useful and potentially even counterproductive in this mode of work.

Here is the point: India's participation in the market of distant design collaborations is based, in large part, on this second group. Browsing through ArchitectureAsia.com - the electronic information clearinghouse for the design professions in the region - brings up whole lists of Indian offices advertising their services on the net. Virtual public display is complemented by private approaches. In the last two years, many architects in the Englishspeaking professional world have been receiving electronic messages from India, celebrating the savings achievable by farming drawing production out to the company sending the message. The analysis of the offices involved shows that most of this work relies on the availability of technology and the existence of parallel, stronger service sectors. While few companies have a proper architectural background, the knowledge-base of many is image processing or mechanical drafting. The provision of architectural construction drawing services reflects a horizontal expansion of the technical skills available. Occasionally, collaborations are sought by Indian students enrolled in post-graduate degrees overseas, who act as salespersons for drafting shops located back home. Rates are organised by piecework (drawing size) or by turnover time (the closer

the production deadline, the higher the rate). The emphasis is on data processing, reduction of labour costs, and acceleration of project schedules. In performance terms, the work does not yet stand out as a winner. Poor service from some providers has had negative repercussions for the whole sector, earning India's on-line drafting firms a reputation as producers of cheap, non-professional services. On this limited evidence, relocation in India is perceived to be desirable or achievable only when quality is not an issue. Large firms from Singapore, for instance, have looked into the region but found it does not yet present sufficient guarantees to invest in more permanent professional bridges, preferring Malaysia and the Philippines instead. Australian firms have also found themselves embroiled in litigation over their collaboration with Indian partners who did not provide sufficient quality control to the projects. A recent European Community funded project - CaribCAD - arrived at the same conclusion in one of its case-studies⁵³.

The deep rift that separates these two fronts lies at the core of India's ability to enjoy the possibilities and overcome the perils of a global market: to do well and to do good at the same time.

On one side, there is a profession with legitimate concerns about its work and cultural function, but at odds with the rates of productivity and the social/ environmental challenges posed by a maturing and overly polarised developing economy. A profession, moreover, with only nominal authority to protect its market of services from non-professional competition. On the other side, there is a dynamic group of business-oriented practices, unencumbered by the weight of history, which does not have the disciplinary ability to capitalise on the opportunities provided by the emergence of a new technological paradigm. As long as the two remain separate and the ruptures unresolved, it is unlikely that the expectations for this discrete form of architectural service will be met. Routine production will stay with routine production, and symbolic analysis with symbolic analysis.

Yet the attractions and potential of India for a more comprehensive mode of professional relocation, predicated on the social recomposition of its intellectual and technical employment base, remain strong – partly because of architecture's ability to act as a broader point of reference.

The application of highly-skilled, higher-valueadding professional human resources to distant design collaborations could set an example for the small scale local IT sector, thus far frustrated in its attempts to upscale its foreign trade from dataentry and data-conversion to design responsibilities. Architecture's primacy over technical services would be reflected in the success of its actual practice rather than the borrowing of gualifying terms in the software industry. Contributions could be mutual. The architectural sector would benefit by reproducing some of the institution-building that has characterised the Ministry of Communications and Information Technology's policies since 1984. The Indian Institute of Architects and the Council of Architecture, for example, could be providing a steering function similar to that of STPI and NASSCOM in the software industry.

A critical evaluation: from routine production to symbolic analysis

In conclusion, this analysis demonstrates that the discussion of what is happening versus what may be happening can take place at different levels.

At the first level, the relocation of design work is seen as a function and result of natural entrepreneurship: firms seek distant collaborations not 'by specific design' but, more simply, by generic pursuit of technological opportunity. The collective outcome of this type of practice is a low-cost and lowrevenue cottage industry, defined more by the means than the ends of the work. Due to its strong IT component, India seems to be well positioned to operate in such a way. In this context, however, the delivery of non-routine, quality-focused (and professionally gualifying) architectural design services that can command higher prices and induce demand, is difficult. The internal economies of the propulsive sector, IT, make the passage from electronic drafting (or modeling) to professional planning unlikely.

The second level entails professional participation. Office relocation from higher-wage to lowerwage areas could be used to expand the market and the size of the lower-wage area profession. This would not only increase revenues but also anchor the architectural workforce to its region (possibly limiting brain drain). In this context, symbolic analysis skills would likely be added to routine production responsibilities.

At this level, service quality is paramount, since the development of a market implies demonstrable advantages in product definition rather than cost cutting. To this end, the workforce must specialise professionally, and professional labour practices must be instituted. All of which require the profession's acceptance of the phenomenon.

Once this is obtained, distant collaborations enter the realm of institutional planning. The strategic facilitation of office relocation could create opportunities to rethink the structures of professional practice and training in the host region: by selectively introducing process or product innovation that can be usefully appropriated locally, by balancing the supply and demand of professional services across the territory, by stimulating their growth in particular sub-regions, and by funding centres of higher education. In this case, policies regarding geographic access of non-local firms, and types of work for which collaboration is sought or permitted, would be necessary.

The attitude described would produce several advantages: it would define a context where the obtaining of work depended on clear or proven professional expertise; where foreign firms' savings would come from the minimisation of professional transaction costs rather than the minimisation of up-front labour costs.⁵⁴

The spatial concentration of similar offices in specific areas, with a thick network of relationships between enterprise and local institutions, would also produce a situation where cooperation and competition were likely to go together, much in accordance with the classic idea of the industrial district as articulated, for example, by Piore and Sabel, and used by several scholars to evaluate India's IT-based economic restructuring.⁵⁵ In a context where quality is an important parameter, and the region specialises in supplying a specific

service, not performing well creates the possibility that the next commission will be taken over by other local competitors.

Last, the creation of zones of technical collaboration based on common environmental conditions could have an effect on the osmotic potential of the work carried out. Host-region firms could be exposed to work that is relevant to their environment, while the selection of foreign firms for a particular district based on the work performed could provide an indication of which knowledge and experiences are deemed worthy of consideration by the host government.

To end, the changing division of design labour elicits a variety of responses, from outright denial or refusal, to conditional acceptance and active policymaking. The first is almost a natural reaction to it, but does not help our understanding of its causes, the environment in which it takes place, or the profession that will be affected by it. The other responses provide deeper levels of elaboration and should thus be considered carefully. But for this to be the case, our cultural approach to the problem must change, this time trying to separate our own 'symbols' from proper 'analysis'. Rather than looking down on those practices that have decided to use distant collaborations, we should broaden our perspective and acknowledge that, given the presence of certain conditions, these collaborations can yield positive results. Rather than considering architectural institutes as bureaucratic guardians of parochial protectionism, we should start looking at them as potential planning entities to set up proper environmental and technological relationships between different locales. Rather than isolating the profession within its own practices and history, we should reposition it in the context of its urban geography, and use it to ameliorate the quality of that geography.

Notes and references

- See: Australian Bureau of Statistics, Selected Technical Services Australia, 1992–93, ABS 8676.0; S. Draganich, Architectural Office Profile and Financial Benchmarking (Melbourne, Royal Australian Institute of Architects, 1999); S. Draganich, 1998 Profile of the Architectural Profession (Melbourne, Royal Australian Institute of Architects, 1998); Productivity Commission, Review of Legislation regulating the Architectural Profession, Report no 13 (Canberra, AusInfo, 2000); U.S. Department of Commerce, Bureau of the Census, Census of Service Industries, 1992 (Washington DC, Government Printing Office).
- The Practice of Architecture: Industry Statistics (Washington DC, The American Institute of Architects, 1996).
- 3. S. Draganich 1998, op. cit.
- 4. Fibre optic network connections have not only reached every industrial labour region in the world, but are rapidly expanding in developing countries, where government agencies are being set up to address, specifically, technological barriers to trade. See: Industry Commission Telecommunications, Equipment, Systems and Services, final inquiry report (Canberra, AusInfo, 1998). The global telecommunication market was expected to expand from a total of \$460 billion in 1993 to as much as \$1,1 trillion in 2000, largely due to the limited number of telephone lines available in developing countries. China alone was scheduled to add 35.5 million telephone lines between 1993 and 2000, while Vietnam is planning to install 300,000 lines annually, all using fibre-optic technologies. See: B. Parker, Globalisation and business practice (SAGE Publications

Ltd., 1998), pp. 557–559. International telephone costs and satellite utilisation charges fell tenfold between 1970 and 1990, the year by which the price of fax machines had dropped to 25% of what it was in 1980. See: World Bank, World Development Report 1995 -Workers in an integrating world (New York, Oxford University Press, 1995). According to the 2001 Automation and Information Technology Survey by PSMJ, A/ E firms in the US spend on average US\$2,700 per capita per year on technology. The same study reports that, in 1999, hardware and software acquisition costs for architectural firms were around US\$5,900 per employee. We have calculated that, at current Australian prices, the establishment of a remote workstation in South-East Asia requires approximately 22,000 Australian dollars per seat in initial costs and 3,500 in ongoing costs. The installation of shared office facilities such as scanning, printing, plotting and tele-conferencing equipment, back-up power supply, network/license servers, and dedicated connections could require over twice as much the 'per-seat' investment. Operating costs would add another 25,000 Australian dollars per year. In a global labour scenario, these expenses amount to the difference in local annual salaries between three Sri Lankan architects and three Australian ones. P. Tombesi, 'Shifting geographies? The new international division of labour in architecture', Oriental-Occidental Geography, Identity, Space (ACSA 2001 International Conference, Istanbul) (Washington, DC, ACSA, 2001), pp. 443-447.

- 5. P. Dalal, 'Internet use at firms accelerates', *AlArchitect* (June 2000).
- PSMJ A/E Automation and Information Technology Survey (Dedham, Massachusetts, Practice Management Associates, 2001); ZweigWhite Successful Firms Survey of A/E/P and Environmental Consulting Firms (Natick, Massachusetts, ZweigWhite, 2001). For a more detailed description of the findings, see: P. Tombesi, 'Super Market', Harvard Design Magazine, 17 (2002), pp. 26–31.

- Some examples can be found in: P. Tombesi, 'A true south for design? The new international division of labour in architecture', Architectural Research Quarterly, 5/2 (2001), pp. 171–180.
- World Architecture. 'World Survey of the Top 300 Architectural Firms', World Architecture 92 (January 2001).
- World Trade Organisation. Architectural and Engineering Services: Background Note by the Secretariat (Geneva, WTO, 1998); Government of Canada, Canadian Architectural Services: A Consultation Paper in preparation for the World Trade Organisation General Agreement on Trade in Services. (2001) (http:/ /strategic.ic.gc.ca/SSG/sk00034e.html); WTO Services Database, Opening World Markets for Services (2002) (http://gats-info.eu.int/gats-infoswtosvc.pl? &SECCODE=01.A.g).
- 10. See: F. Frobel, J. Heinrichs & O. Kreye, *The New International Division of Labour*, (Cambridge University Press, 1980). The book describes the relocation of manufacturing operations to Third World countries, which gathered momentum in the 1970s and was facilitated by new technologies and better transport. According to its authors, multinationals used the shift to respond to intensified competition in world markets, reduced rates of economic growth and lower profitability. Relocation, however, only affected basic manufacturing processes involving low levels of skill. Thus the new internationalisation of labour is one where some regions of the world specialise in low-paid, routine manufacturing operations while others specialise in the high-value added part of the production process.
- R.B. Reich, *The Work of Nations* (New York, Alfred A. Knopf, 1991).
- 12. The simplification must of course be taken with a grain of salt. There can be no clear-cut distinction between design and design documentation tasks. Yet, it is still

possible to separate architectural workers into those who prevalently make decisions and those who prevalently document them. For an expanded discussion, see: Tombesi, P. (1999) 'The Carriage in the Needle: Building Design and Flexible Specialisation Systems,' *Journal of Architectural Education* 52/3:134–142 (1999). Hillier and Hanson make a similar distinction between what they call 'professional' versus 'procedural' knowledge in bureaucratic organisations, but with a view to the programmatic organisation of architectural space rather than the structure of architectural work that we discuss here. See: B. Hillier and J. Hanson, *The Social Logic of Space* (Cambridge, Cambridge University Press, 1984).

- 13. According to the definition provided by Oliver Williamson, a transaction occurs when 'goods or services are transferred across a technologically separable interface.' The theory of the firm developed by Williamson assumes that transactions carry costs that ultimately determine the organisational form of production. These costs result from the activities that firms must undertake in order to acquire knowledge, services or products that are external to their sphere of governance: price discovery and negotiation, physical exchange of documents, monitoring of performance, etc. The higher the degree of technical or physical correlation between functions, or the need of coordination between labour processes, the higher are the costs involved in recomposing separated functions. Two tasks are likely to split, i.e. result in two autonomous structures, insofar as the economies accruing from their separation (for example, better location, more efficient plant, lower wages, etc.) are not offset by the 'additional' cost of managing the social re-integration of their scope. See: O. Williamson, The Economic Institutions of Capitalism: Firms, Markets, and Relational Contracting (New York, The Free Press, 1985).
- 14. Body-shopping and competitive wage advantages have been widely used to generate revenues and promote the inflow of foreign investment. The idea that electronic links and low skill technical employment can contribute to capacity building is certainly the position of the World Trade Organisation and the World Bank. The European Community also has funded projects for drafting education in low-wage areas. G. Augenbroe and S. Lockley, 'CaribCAD: a technology to outsource CAD production work' in R. Amor (ed.), ECPPM 1998 Proceeding: Product and Process Modelling in the Building Industry (Watford, Building Research Establishment, 1998), pp. 29-36; G. Augenbroe and S. Lockley, 'Workflow managed remote design collaboration', INCITE 2000: Implementing IT to Obtain a Competetive Advantage in the 21st Century, Hong Kong (www.bre.polyu.edu.hk/crc/ incite2000/Theme3/049.doc).
- 15. The IT sector, in particular, has shown great facility in moving horizontally between multimedia, animation, graphics, web design, and architectural drafting. Both software trade associations and specialised research include construction drawing production in the description of the services provided by IT firms. So does the World Trade Organisation in its presentation of electronic business services. On their part, service providers normally advertise 3D animation, multimedia projects, web design, and drafting as equivalent sub-specialities. Mechanical and industrial drawing bureaux are also showing a tendency to expand the scope of their work to architectural data conversion services.
- APESMA, Architects Remuneration Survey Report 1998–99 (Melbourne, APESMA Architects Branch, 1998). Interestingly, the salary structure in the Indian software industry presents equivalent differences: in 1995, a project leader was expected to make US\$23,000 whereas documentation staff would reach

US\$8,000. See: R. Heeks, 'Indian software labour: cost breakdown and comparison' (University of Manchester, IDPM, 1999).

- 17. A.L. Saxenian, 'Bangalore: The Silicon Valley of Asia?', Report prepared for the Conference on Indian Economic Prospects: Advancing Policy Reform, Center for Research on Economic Development and Policy Reform, Stanford, May 2000; R. Heeks, 'The Uneven profile of Indian Software Exports', Development Informatics Working Paper Series (Manchester, Institute for Development Policy and Management, October 1998); R. Heeks and B. Nicholson, 'Software Export Success Factors and Strategies in Developing and Transitional Economies', Development Informatics Working Paper Series (Manchester: Institute for Development Policy and Management, 2002); S. O'Riain, 'The Flexible developmental state: Globalisation, information technology and the Celtic Tiger', Paper presented at the 'Global network, information and regional development: The informational region as development strategy' Conference (Santa Cruz, University of California, 1999).
- 18. By contrast, the broad acceptance of Coxe and Maister's conceptual framework of North-American architectural firms as either strong-idea, strong-service or strong-delivery constructs suggests various possibilities of being professional, all defined by the quality of the service performed rather than its scope. See: W. Coxe, N. Hartung, H. Hochberg, B.J. Lewis, D. Maister, R.F. Mattox, P.A. Piven, Success strategies for Design Professionals – Superpositioning for architecture and engineering firms (New York, McGraw-Hill, 1987).
- Professional trade literature provides a few good examples of the difference in perception between working as local or global drafters. See for example: D. MacLeod, 'Computer service bureaus: taking up the load', *The Canadian Architect* (March 1988), p. 41; and S. Ross, 'Collaboration by wire', *Architectural*

Record (September 1997), pp. 131–137; as opposed to F. Housley Carr and W. Krizan, 'Offshore design soaring?', *Engineering News Record* (January 21, 1988), pp. 20–22; and R. Korman 'Shifting jobs where pay is low', *Engineering News Record* (December 18, 1995), p. 15.

- 20. In 2001, India had 300 cities with more than 100,000 people, 18 cities with 1 to 5 million residents, two with 5 to 10 millions, two with over 10 millions. Urban India, *Urban Scenario* (Ministry of Urban Affairs and Employment, 2002, http://urbanindia.nic.in/scene.htm).
- Between 1971 and 1991, Bangalore grew from 1.7 to
 4.1 million people, Hyderabad from 1.8 to 4.3, and
 Delhi from 3.7 to 8.4 (Urban India, *op. cit.*).
- Between 1983 and 2001, Bangalore converted an average of 1,311 hectares of agricultural land per year. (UNESCAP. Municipal Land Management in Asia: A Comparative Study. Chapter 7, 2001, http:// unescap.org/huset/m_land/chapter7.htm)
- World Bank. World Development Indicators 2000, 4.11 – Structure of consumption in PPP terms, 4.12 – Relative prices in PPP terms, 3.11 – Urban Environment. (Washington, World Bank, 2000.)
- 24. Average figures may be misleading, since India's sub regions present major economic differences. The state of Punjab, for example, produces over six times more wealth than the state of Bihar. See: B. Sutcliffe, 100 Ways of Seeing an Unequal World (New York, Zed Books Ltd., 2001).
- 25. We are indebted to Yatin Pandya and Surya Kakani for their help in collecting this information. From a regional employment perspective, India's local salary scales in absolute dollar value appear to be lower than they are in neighbouring countries such as Indonesia and Sri Lanka. See: Tombesi (2001), *op. cit*.
- APESMA, Architects Remuneration Survey Report 1998/ 99 (Melbourne, APESMA Architects Branch, 1998).

- The American Institute of Architects, Compensation at U.S. Architecture Firms (Washington, AIA Press, 1999).
- Brooke International, Asian Property Market Survey (Hong Kong, Brooke International, April 1998); World Bank, op. cit., 3.11; ULI, ULI Market Profiles 2000: Pacific Rim (Washington, Urban Land Institute, 2000).
- A.O. Krueger and S. Chinoy, 'The Indian economy in global context', Working paper No. 98, Stanford University, Center for Research on Economic Development and Policy Reform, 2000.
- National Association of Software and Service Companies, 'Internet Survey', January 2001 (http://www. nasscom.org/).
- A.L. Saxenian, 'Bangalore: The Silicon Valley of Asia?' Paper prepared for the Conference on Indian Economic Prospects: Advancing Policy Reform, Stanford University, CREDPR, May 2000.
- In fact, the number of high-speed leased lines in software rose from 10 in 1992 to more than 1,200 in 2001.
- See the website of Software Technology Parks of India (STPI), the society set up by the Ministry of Information Technology in 1991 (http://www.stpi.soft.net/).
- 34. In 2002, STPI had over 7,000 member companies.
- 35. The data presented in these pages come from the following sources: A.L. Saxenian, op. cit.; R. Heeks and B. Nicholson, 'Software export success factors and strategies in developing and transitional economies', Development Informatics Working Paper Series (University of Manchester, Institute for Development Policy and Management, 2002); R. Heeks, 'The uneven profile of Indian software exports', Paper No.3, Development Informatics Working Paper Series (University of Manchester, Institute for Development Policy and Management, 1998); R. Heeks, India's Software Industry: State Policy, Liberalisation and Industrial Development (New Delhi, Sage Publications, 1996).

- 36. A.L. Saxenian, op.cit. For a detailed discussion of these figures, see: R. Fernandes, A. Arora, J. Asundi, 'Supply and demand for software development in India', Working paper (Carnegie Mellon University, September 2000); A.V. Desai, 'The peril and the promise: Broader implications of the Indian presence in information technologies', Working paper No.70 (Stanford University, Center for Research on Economic Development and Policy reform, October 2000).
- 37. See the PowerPoint presentation prepared by STPI and downloadable from its website.
- 38. 5.88 PCs per 1000 people by March 2002, with a projected 12.72 PCs per 1000 people by 2005. 2002 Internet penetration among businesses owning computers is estimated at 50%, with a projected reach of 80% in 2005; household penetration is currently 85%, with a projected increase to 95% in 2005 (http://www.dotindia.com/). The number of private servers is also expected to grow. More than 120 private ISPs were estimated to be fully operational by June 31, 2001 (out of the projected 500 licenses to be given by that date).
- 39. United States Immigration and Naturalisation Service. Characteristics of Specialty Occupation Workers (H-1B): October 1999 to February 2000 (2000). The success of skilled Indian workers in emigrating overseas raises the issue of 'brain drain', and its relation to the development of globally marketable skills in low-wage areas.
- 40. N. Evenson, op. cit.
- 41. The present discussion reflects the argument of a forthcoming monograph: P. Scriver, *The Scaffolding of Empire: Building and Thinking in the Public Works Department of British India* (forthcoming). See also: P. Scriver, *Rationalisation, Standardisation, and Control in Design: A cognitive historical study of architectural design and planning in the Public Works Department of British India*, 1855–1901 (Delft, Publicatiebureau

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Bouwkunde, Delft University of Technology, 1994); and P. Scriver, 'Complicity and Contradiction in the Office of the Consulting Architect to the Government of India, 1903–1921', in P. Goad and J. Willis (eds.), Loyalty and Disloyalty in the Architecture of the British Empire and Commonwealth, proceedings of the Society of Architectural Historians, Australia and New Zealand (SAHANZ) (Melbourne, 1997). Relationships between architecture, ideology and the cultural politics of British India have also been examined lucidly in T.R. Metcalf, An Imperial Vision: Indian Architecture and Britain's Raj, (London, Faber and Faber, 1989). See also J. Lang, M. Desai and M. Desai. Architecture and Independence: The Search for Identity - India 1880-1980 (New Delhi, Oxford University Press, 1997); G.H.R. Tillotson, The Tradition of Indian Architecture: Continuity, Controversy and Change Since 1850, (New Haven and London, Yale, 1989), N. Evenson, The Indian Metropolis: A View Toward The West, (New Haven and London: Yale, 1989); Phillip Davies, Splendours of The Raj: British Architecture in India, 1660 to 1947, (London, John Murray, 1985); S. Gupta, Architecture of the Raj: Western Deccan; 1700–1900 (Delhi, B.R. Publishing Co., 1985); Robert Grant Irving, Indian Summer: Lutyens, Baker, and Imperial Delhi (New Haven and London, Yale University Press, 1981); Jan Morris, with S. Winchester, Stones of Empire: The Buildings of the Raj (New York, Oxford, 1983); C. Tadgell, The History of Architecture in India; from the dawn of civilisation to the end of the Raj (London, Architecture Design and Technology Press; 1994). For the earlier building norms of the engineers of the colonial Indian PWD system, see Sten Nilsson, European Architecture in India 1750-1850 (London, Faber, 1968); and Anthony D. King, Colonial Urban Development: Culture, Social Power and Environment (London, Routledge & Kegan Paul, 1976), which remains the seminal sociological study of the colonial

built environment that became synonymous with the designs and planning of the PWD engineers.

- 42. Metcalf, Tillotson, op. cit.
- 43. Scriver 1997, Lang, Desai and Desai, op. cit.
- 44. Scriver 1994, op. cit.
- 45. Lang, Desai and Desai, op. cit.; V. Bhatt and P. Scriver, After the Masters: Contemporary Indian Architecture (Ahmedabad and New York, Mapin, 1990). See also: Jyoti Hosagrahar, 'South Asia: Looking Back, Moving Ahead – History and Modernisation', Journal of the Society of Architectural Historians, 61:3 (September 2002): 355–369; and A.G.K. Menon, 'Architecture Education in India in This Time of Globalisation', unpublished keynote speech, Forum II Conference, Gazimagusa, Turkey, 22–24 April, 1998.
- For example: William J.R. Curtis, *Balkrishna Doshi: An* Architect for India (Ahmedabad and New York, Mapin, 1988); Bhatt and Scriver, op. cit.
- 47. On the Delhi scene, for example, Achyut Kanvinde and the late Joseph Stein have remained respected paragons of the humanist face of the universal modernist idioms that they brought from the USA to India in the 1950s. On the other side, their close friend and colleague, Habib Rahman, upheld similar professional ideas and integrity over decades of service in the architectural wing of the Central Public Works Department.
- S.K. Sharma, 'Architectural Management: An Essential Environmental Need', *Indian Institute of Architects Journal* (July/Sept, 1983), pp. 14–17.
- 49. A key example is the firm of Hafeez Contractor. Established in Bombay as recently as 1983, it was the 2nd top earner of all Indian firms in 2000, with 300 employees including 30 fee-earning architects (World Architecture 2001).
- 50. Among the more conspicuous manifestations of this new trend was what one architectural writer has appositely described as the 'Punjabi Baroque' of South

Delhi, and 'Marwari Mannerism' of Calcutta's Salt Lake suburban sprawl. See: Bhatia, G. *Punjabi Baroque and Other Memories of Architecture* (New Delhi, Penguin, 1994).

- For example: Rizvi College of Architecture and the Kamla Raheja Academy in Mumbai, and the T.V.B. Habitat School of Architecture in Delhi.
- 52. S.K. Sharma, op. cit.
- CaribCAD. Cooperative Approach to the Realisation of Internet Based CAD (CaribCAD, The Netherlands, 2000) (http://funredes.org/caribcad/index.html).
- 54. The stability of the work arrangements would have positive consequences on the salary premium that foreign firms tend to pay to attract a qualified local professional workforce. The work would, in a sense, be guaranteed by being part of a government policy with a strong geographic base.
- 55. M. Piore and C. Sabel, The Second Industrial Divide: Possibilities for Prosperity (New York, Basic Books, 1984); P. Cadene and M. Holmstrom (eds.), Decentralised production in India: Industrial Districts, Flexible Specialisation and Employment (Sage Publications, 1998). Industrial districts can be defined as communities of persons and firms who operate in a limited territorial space, marked by the presence of economies external to the firms, but internal to the district in question. These economies solicit the formation and development of a specialised productive apparatus, in which small firms have a highly relevant role (P. Ginsborg, Italy and its Discontents 1980-2001 (London, Penguin Books, 2003)). For a detailed discussion of the possible application of the industrial district idea to architectural design, see: P. Tombesi (1999), op. cit.