

People, Places and Technology: Mapping the Locational Preferences of Home Based Workers in Sydney and Melbourne Metropolitan Areas

Abstract: Planning for healthy, well-functioning cities should include consideration to the diversity and vitality of home based enterprises. This can be enabled through advances in economic geography explaining the role of ongoing changes in the Information, Communication and Technology (ICT) sector on the way the work is organised and carried out. Although in this research field ICT is commonly regarded as facilitator of *work from anywhere*, attention of researchers is predominantly focused on implementation and analysis of telework strategies. Our paper is an attempt to provide a better understanding of the impacts of *work from anywhere* on cities, through analysis of a spatial distribution of home based workers in Sydney and Melbourne metropolitan areas. The research explores the correlation between home based workforce and socio-economic status of local government areas using 2011 Australian Bureau of Statistics (ABS) census data. It also considers the role of distance from major cities as factor influencing home based work in regional areas.

Results highlight a significant positive correlation between socio-economic qualities and the home-based workforce within the two major cities and their urban-rural fringes. In regional parts of New South Wales and Victoria the distribution of home-based workers is not related to the socio-economic qualities of areas but is strongly correlated with distance from major cities. This spatial arrangement provides an opportunity to delineate and map the distribution of lifestyle home based workers. These findings contribute to a better understanding of locational preferences of home based workforce and implication of these on city and regional planning and development.

Key words: Home-based Work, Urban Planning, Economic Development, Locational Preferences

Introduction:

“The workplace in 2030 will be built for us, in locations that are where we want to be” (Deloitte, 2013). This statement offers an illustration of the view, common both among many researchers and analysts, that work and workplace we know is ripe for change. Such belief is not new and can be tracked down to the early days of the ICT revolution (see Handy, 1984, or Toffler, 1980, who had predicting that advances in computer technology would form a new pattern of employment). Those initial, early studies in this field were based on predictions, rather than empirical data (Alizadeh and Sipe, 2013). Today’s literature on changing workplace locations offers more balanced approach, reflecting socio-economic advantages and disadvantages of different work arrangements and researchers generally agree that whilst technology is shifting boundaries of work (Towers et al, 2005 noticeably pointed out that “the walls of the office have moved outward”, see also Lake, 2013), this process occurs slower than anticipated. Notwithstanding the pace of this change, many researchers nowadays agree that work can be carried out from anywhere (Robinson 2011, Bourke 2009, also Mason et al, 2011, documenting home businesses in UK) and attention appears to be moving to analysing implications of this trend for cities, regions and economic development.

In this paper, we critically examine home based work, which we see as a ‘proving ground’ of changes to the work and workplace, facilitated not only by technology, but evolving lifestyle decisions. We do this to more clearly conceptualise the relationship between *work from anywhere* and city planning, in context of the paradigm of a changing global economy, which, as pointed by Moretti (2012), is shifting from economy centred on producing physical goods towards economy focussed on innovation and knowledge, where the key ingredient is human capital. Closer examination of home based work is urgently needed as there appears to be constantly growing interest of all levels of government in small business enterprises and flexible work arrangements (with home based work being at the centre of attention of both). In Australia, State and Federal Governments have recently initiated projects aimed at encouraging flexible work arrangements, and supporting and facilitating home based work (or work from co-working facilities) to mitigate negative impacts on cities’ infrastructure, particularly congested motorways. In addition, the Federal Government has embarked on an ambitious aim to have at least a doubling of proportion of teleworkers, including home based work arrangements between employees and employers by 2020, from its current level of approximately 6% (Wilmot et al, 2014). On the local government level, interest in this form of employment is seen through local economic development

strategies, which repeatedly include actions promoting home based work and attracting skilled entrepreneurs to migrate with their jobs to the area (see City of Ryde, or Golden Plains Shire Economic Development Strategy, or any other economic development strategy prepared at the local government level in the last year or two). All these policies have one obvious commonality: they attempt to employ changes to work and workplace to solve local issues located at the interface of urban planning and economic development. We are of the view that this interface has not been sufficiently examined by researchers, and many important research questions related with locational preferences of home based workers, their contribution to local economies, long-term sustainability and their impacts on cities' infrastructure remain unanswered. Another intriguing outcome of the popularisation of home based work is a move towards deregulation and informalisation of labour, which in the last few decades was subject to strict planning and environmental laws. Accordingly, this paper seeks to answer the following questions:

- 1) What is the spatial distribution of home based workers in Australia and can this distribution be used to determine home based workers' locational preferences?
- 2) Is transition of the global economy towards knowledge-based activities reflected by changes of the occupation types of home based workers in cities and regions?

Responses to these questions will clearly contribute to a better understanding of as well as increase the evidence base to be able to provide timely advice to policy development concerning home based workers. This paper is structured in three essential sections: it begins with a literature review of home based work, positioning this type of work at the interface of evolving economy and urban planning. The second part focuses on the research questions and outlines data, methodology and results. The last part of the article discusses findings of our research with the aim to contribute to better understanding of, as put by Storper (2011), "an almost infinite range of forces" that shape complex economic processes of cities and regions in Australia.

Home-based work in a globalised economy

Approximately 6% of the Australian workforce works permanently from home (figures from the Census reinforced by ABS, 2013), however, overall, around 20% of the workforce in Australia is engaged in some form of home based work, and this number is growing (Burgess, Strachan, 2010).

Contemporary researchers examining home based work (Tietze et. al. 2009, Wapshott and Mallett 2011) point to a publication of Felstead and Jewson (2000) as an important and influential effort to explain the nature of this type of employment. Their book *In Work, At Home: Towards an Understanding of Homeworking* defines home based work as 'economic activity by members of households who produce within their place of residence commodities for exchange in the market'.

Similar definitions have been presented by other researchers: Burgess and Strachan (2010) defined home based work as officially classified employment being performed from home, Jain and Courvisanos (2013) defined home based businesses as micro-enterprises located at home, while others (for example Wang et al, 2009) offered alternative explanation through identifying the key characteristic of home based business, that is the use of the family home instead of premises such as shops, offices, factories, warehouses and other commercial real estate as a base for business. Carr et. al. (2000) made an important distinction that home based workers include two types of workers who carry out remunerative work within their homes: independent own-account producers and dependent subcontract workers. Ye (2012) captured this distinction from a different perspective: by identifying two factors initiating different types of home based work, that is a lifestyle decision to be independent (in which case home based work can be referred to as home based business) or a telework arrangement implemented by traditional office-based businesses as a mean to reduce costs or/and offer employees work/life balance benefits. In one of the largest studies dedicated to flexible work arrangements in Australia and New Zealand carried out in 2013 (*Future Work Programme*, by Bentley et al) it was demonstrated that 85% of teleworkers are based at home.

There is a vibrant discourse in literature as to whether home based work is a privileged form of employment or a necessity; this discussion has a geographical context though. While some researchers (Tietze et. al. 2009) point out that homeworking is not just another form of flexible employment, but should be positioned at the very core of work-life balance, others point out that in many, predominantly underdeveloped regions, this type of work is a necessity (Ezadichie 2012). Difference of the socio-economic background of home based work in developed and developing countries is explained by accessibility to, and availability of technological advances. Today, home based work in developed countries is increasingly common for white collar workers (Hislop and Axtell, 2009), which is often attributed to diminishing technological barriers (Ruiz and Walling, 2005). Audirac

(2005) explains it as a “digital divide” that includes and affect those who lack access to digital technologies. Researchers are quite divided as to whether modern, that is largely knowledge based home work can be considered as legitimate businesses or secondary, almost hobby activities. According to study by Clark and Douglas, home based businesses operate as legitimate businesses rather than hobby or craft activities (2014). Similar conclusion was reached by Wang et al (2009) who analysed home based businesses in regional areas of Australia and concluded that these businesses are important as primary sources of regional household incomes and are operated by educated and qualified individuals. In addition, they reported that “the growth and performance results of HBBs suggest that they can be important local sources of business investment and innovation, both of which are tied to long-term regional prosperity” (Wang et al 2009). Other researchers however question economic performance of home based businesses (see research by Redmond and Walker, 2009. While their research concludes that home based businesses are in most cases economically unviable, they remind that this outcome largely depends whether the business was the primary or secondary income). It needs to be bear in mind though that home based businesses, particularly internet based, are not focused on building a big business or a company measured by its number of employees, turnover, stock or its assets (Van Gelderen et. al. 2008). Comparable discrepancy in opinions exists among researchers examining level of satisfaction of home based workers, and their opportunities to cope with both work and non-work demands. While Wapshott and Mallett, 2012, Redman et al, 2009, and Wang et al, 2009, report that home based workers value this type of work for its work-life flexibility, Crosby and Moore (2004) and Lal and Dwivedi (2010) reveal that home workers have problems with working longer hours than they are paid for and working longer hours than someone who did a similar job to them outside of the home (see also Hardill and Green, 2003, or Towers et al, 2005, who referred to uncontrolled work hours spent at home as "work extenders").

This overview of definitions shows the changing, evolving nature of global economy which now, particularly in developed countries, appears to be based on ‘me-economy’ (Deloitte, 2013). This is considered in literature in two ways. Firstly, from a purely economic perspective, debate suggests that in order to survive in hyper-competitive and global markets companies need to be more responsive and align themselves to the changing conditions (Redman et al, 2009). Audirac (2003) and Casson and Wadson (2007) point out that flexible work arrangements have become an organisational panacea, facilitating adaptation of firms to market condition in highly competitive and rapidly changing environments by reducing office costs and managing skill shortages. The second view considers changes to the lifestyle, facilitated by advances in telecommunication technology. Lake (2013) notes that the number of people working from home using computers has been growing by around 13 per cent a year in the last twenty years. As reported by Ettema (2010), advances in ICT have contributed to the increase of telecommuting, meaning that individuals work from home one or more days per week. Similar conclusion was reached in by Jane-Francis (see Jane-Francis et.al, 2012) and by Aoyama et. al. (2011) who noted that the spatial aspects of the new economy are further complicated by the emergence of cyberspace which duplicates material spaces in various functions, including work. While the researchers generally agree, and prove that the shift from office-based work towards work from anywhere is real, the geography of this shift is not very well documented. In our view there is a need for a much stronger evidence base on home-based work to support state and local governments’ efforts to develop meaningful policies to support and encourage the sector. This paper takes a first step in this direction by drawing on a recent ABS census to provide the most comprehensive profile to date of home-based work in Australia.

Research: Data and methodology

We based our research on data from 2006 and 2011 Census of Population and Housing by the Australian Bureau of Statistics (ABS). Both censuses included a question about the method(s) “a person used to get to work on Census Day”, which was used to identify home based workers. Under the ABS census, home based work, similar to other forms of employment, is classified into eight key occupation types: managers, professionals, technicians and trade workers, community and personal service workers, clerical and administrative workers, machinery operators and drivers, labourers and sales workers.

To respond to our first research question (analyse and map locational preferences of home based workers), we attempted to examine the correlation between frequency of home based workers and socio-economic characteristics of their neighbourhoods. For the indicators of these characteristics we used three sub-components of the Socio-Economic Index for Areas 2011 (SEIFA):

- The Index of Relative Socio-economic Advantage and Disadvantage (IRSAD), which summarises information about the economic and social conditions of people and households

within an area, including both relative advantage and disadvantage measures. IRSAD is comprised of 25 variables from the latest Census, including variables such as percentage of people with high stated household income, high monthly mortgage repayments, high level of educational attainment, percentage of dwellings with four or more bedrooms and number of cars per dwelling.

- The Index of Education and Occupation (IEO), which is designed to reflect the educational and occupational level of communities. The IEO index does not include any income variables.
- The Index of Economic Resources (IER) which focuses on the financial aspects of relative socio-economic advantage and disadvantage, by summarising variables related to income and wealth. Whilst it is comprised of similar variables as the above two, it excludes data measuring education and occupation as they are not direct measures of economic resources.

Each of the indexes focuses on a different aspect of socio-economic advantage and disadvantage and is a summary of a different subset of Census variables from the following six categories: income, education, employment, occupation, housing and other. We used these indexes as a representation of socio-economic characteristics of the areas, which we analysed at the local government area scale.

To measure the correlation between home based work in regional areas and distance from major cities we used the Accessibility/Remoteness Index of Australia (ARIA+). The ARIA+ index has been developed by the National Key Centre for Social Applications of Geographical Information Systems (GISCA) at the University of Adelaide. It uses Geographic Information System (GIS) technology to provide a measure of remoteness (from service centres) for all places and points in Australia. We employed this Index as a representation of a physical distance (considered as an environmental attribute), from a regionally located place to a major city.

We have established the following methodology for our research:

- 1) Firstly, we measured changes to the structure of home based work by comparing occupational classification between the 2006 and 2011 censuses.
- 2) Secondly, we examined correlation between the prevalence of home based workers and socio-economic conditions of their areas of residence, expressed by the Socio-Economic Index for Areas (SEIFA). We used Pearson's correlation formula for this examination.
- 3) In the next stage of our research, we measured home based workers against their proximity to Sydney and Melbourne's CBDs. For this exercise we used the Accessibility/Remoteness Index for Australia (ARIA+). Again, Pearson's correlation formula was employed for this exercise.
- 4) Lastly, we compared changes to the frequency of home based workers in Sydney and Melbourne between 2006 and 2011.

Results

The results included in this part of the research are presented in order guided by the methodology of our research, outlined above. Consequently, in first stage we looked at the changes to the key eight occupational types of the home based workers between the 2006 and 2011 censuses, in comparison with changes in Australian labour force in the same period of time. The results are presented in the table below.

The comparison reveals very strong (25.5%) increase of the *professionals* occupation category among Australian home based workers between 2006 and 2011. *Professionals*, according to the ABS classification, comprise of occupations involving analytical, conceptual and creative tasks through the application of theoretical knowledge and experience in the fields of the arts, media, business, design, engineering, the physical and life sciences, transport, education, health, information and communication technology, the law, social sciences and social welfare. Another occupation type which noted a significant increase was home based *sales workers*: 13.4%. Increase in both these occupational types among home based workers is significantly higher than in Australian labour force. On the other end of spectrum, proportion of home based labourers and machinery operators, that is labour-intensive occupations, strongly declined.

Tab 1. Home based work in Australia in 2006 and 2011, classified into occupation types by ANZSCO (Australian and New Zealand Standard Classification of Occupations) standards. Source: ABS

Home based workers				Australian labour force
Occupation	2006	2011	Change	Change 2006-2011
Managers	144165	132659	-8%	7.63%
Professionals	93872	113139	25.5%	18.5%
Technicians and Trades Workers	31324	32894	5%	8.85%
Community and Personal Service Workers	22235	24804	11.5%	21.20%
Clerical and Administrative Workers	86251	92892	7.7%	8.62%
Machinery Operators And Drivers	6673	5775	-13.5%	9.09%
Labourers	15379	13110	-14.7%	-0.52%
Sales Workers	16936	19210	13.4%	5.13%
Inadequately described	7601	7523	-1%	20.3%
Not stated	2088	1935	-7.3%	6.61%
Total	426524	443941	4.08%	8.32%

We carried out an additional comparison of the *professionals* category: we distilled home based workers classified as *professionals* and compared frequency of this occupation in cities (Sydney and Melbourne) and in the regional areas of Victoria and New South Wales between 2006 and 2011. The comparison showed significant increase of the *professionals* occupation among home based workers in local government areas within Sydney and Melbourne – increase from 32% to 39% (of all home based workers) and moderate increase in rural and regional areas – from 9% to 11.5%.

In the second stage of our research we focused on the three SEIFA indexes. For each local government area in Sydney and Melbourne, we measured the correlation between the proportion of home-based workers (as provided under the 2011 Census) and the Index of Relative Socio-economic Advantage and Disadvantage (IRSAD), the Index of Education and Occupation (IEO) and the Index of Economic Resources (IER).

Tab 2. Correlation between frequency of home based work and socio-economic characteristics of areas, measured in SEIFA sub-indexes.

SEIFA index:	Home based workers in:	
	Sydney	Melbourne
IRSAD	0.70	0.70
IEO	0.59	0.62
IER	0.52	0.41

Pearson's correlation formula showed a strong relationship between the frequency of home based work and the socio-economic conditions of their places of residence in Sydney and Melbourne measured by the Index of Relative Socio-economic Advantage and Disadvantage. In other words, areas (LGAs) with higher collective socio-economic characteristics (features such as low unemployment rate, high income, high level of owner-occupiers, or high level of educational attainment) tend to encourage home based work stronger than areas demonstrating lower socio-economic characteristics. Correlation between home based work and other indexes, while still visible, is less significant than with the IRSAD index.

We then compared geography of changes in the home based workforce between 2006 and 2011 in Sydney and Melbourne. We noted that the growth of home based work was stronger in local government areas which had high SEIFA values in 2006 and in 2011 census. On this basis, we conclude that home based workers in Sydney and Melbourne metropolitan areas are more likely to be located in neighbourhoods demonstrating strong socio-economic characteristics and less likely to occur in areas not able to exhibit these features.

Figure 1. Frequency of home based work within Melbourne's local government areas, ranked (coloured) according to their socio-economic conditions (expressed in the IRSAD index).

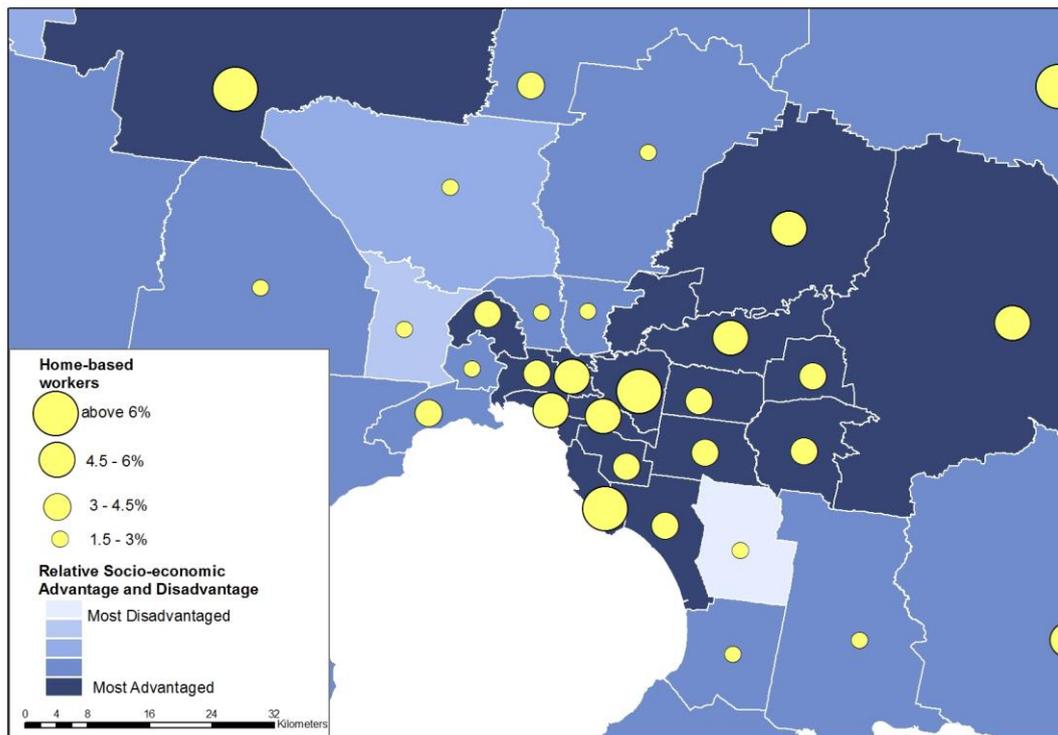
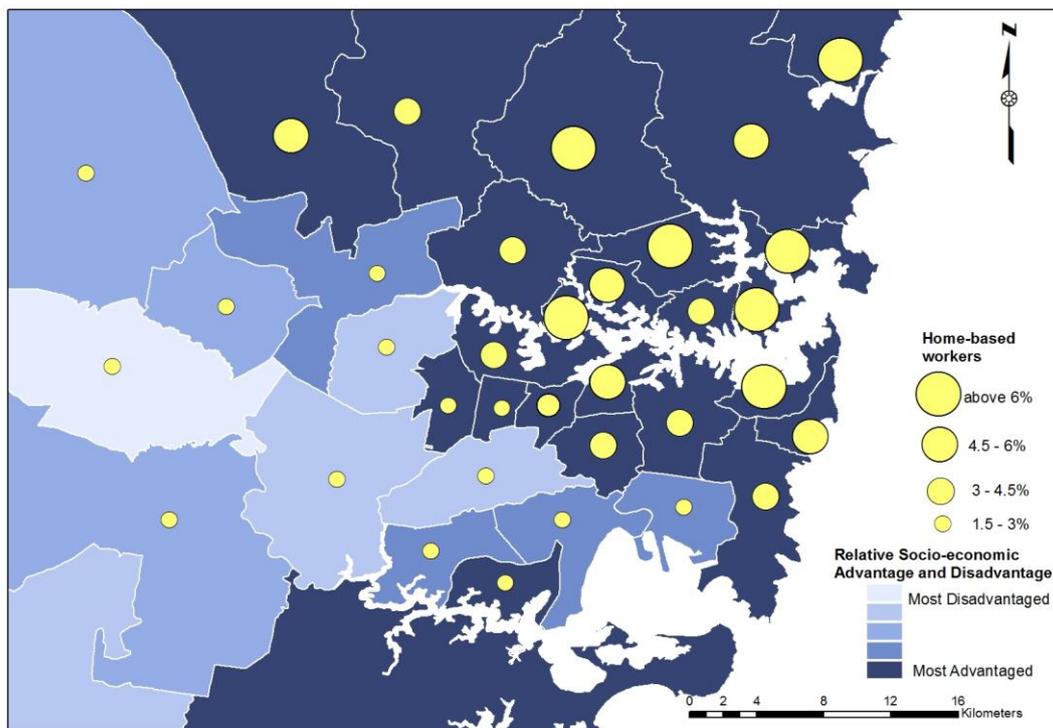


Figure 2. Percentage of home based workers within Sydney's local government areas, ranked (coloured) according to their socio-economic conditions (expressed in the IRSAD index).



While the correlation test delivered consistent result for both Sydney and Melbourne, it failed to do so elsewhere, that is in the regional parts of NSW and Victoria. The spatial distribution of home based workers in rural/regional areas relates more to the natural resource and amenity base (family owned farms or bed and breakfast accommodation) and less to the socio-economic features. In order to

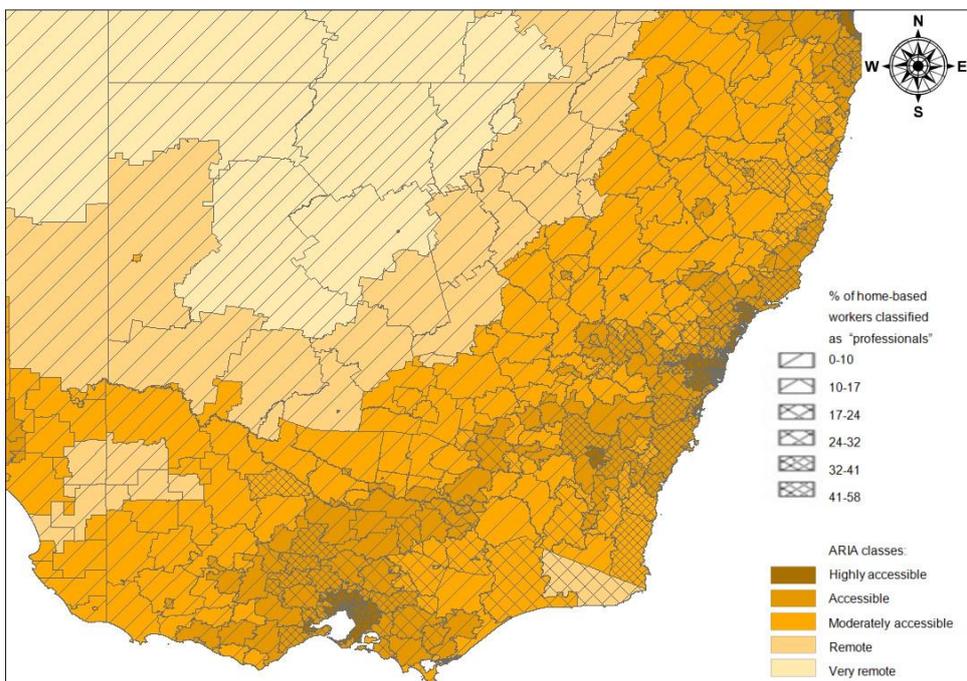
examine our research questions which target the spatial distribution of home based workers in context of the global economy transitioning towards knowledge-based activities, we chose to focus only on the *professionals* occupation type, which does not include traditional types of employment, such as previously mentioned agriculture or B&B accommodation. Further, we assumed that in rural and regional areas, home based *professionals*' locational patterns will be more linked to the scenic/natural amenities and proximity to a major city (see literature review of locational choices by Montgomery and Curtis, 2006, study on amenity-led migration to rural areas by Argent et al, 2011, or Storper, 2011, and Glaeser, 2011, on the importance of proximity and accessibility in the knowledge-based economy). To test this assumption, we measured the correlation between home based *professional* workers and accessibility/remoteness of places, expressed by the ARIA index. The results were as follows:

Tab 3. Correlation between home based workers classified as professionals and the ARIA+ for the regional parts of Victoria and New South Wales.

Home based workers classified as professionals in:	ARIA+
Regional Victoria	- 0.55
Regional New South Wales	- 0.65

These results show strong (regional Victoria) and very strong (regional NSW) negative correlation between the frequency of home based work and accessibility to a nearest major city (expressed by the ARIA+ index). As presented on the map below, proportion of the home based workers classified as *professionals* is significantly stronger in regions located closer to the major cities, and weaker in the more remote locations. Similarly, home based workers classified as *professionals* appear to prefer coastal locations more than inland areas.

Figure 3. Correlation between the home-based workers classified as 'professionals' and the Accessibility/Remoteness Index for Australia (ARIA+).



Conclusion

The first question of our research sought to explore the spatial distribution of home based workers in Australia and describe their locational preferences. While it has been well documented that people generally locate where they can maximise their access to jobs (Glaeser, 2011, Moretti, 2012), assessment of the relative importance of other factors considered in location decision continues to be a larger problem (Storper and Manville, 2006). Through our examination of the ABS data, we have

demonstrated that home based work in two largest Australian cities, whilst considered as *work from anywhere*, is not evenly distributed; its presence is very strongly correlated with the collective socio-economic characteristics (expressed through the Index of Relative Socio-economic Advantage and Disadvantage, which considers features such as low unemployment rate, high income, high level of owner-occupiers, or high level of educational attainment) of the neighbourhoods they live in. Further, we demonstrated that in regional parts of New South Wales and Victoria, these collective socio-economic characteristics are less important in decision to commence home based work. Instead, certain types of home based work, classified as *professionals* occupation type (including occupations from the fields of the arts, media, business, design, engineering, the physical and life sciences, transport, education, health, information and communication technology, the law, social sciences and social welfare) are strongly correlated with the accessibility/proximity to a major city. These findings provide further insight into the economy of cities and regions at the micro (small business) scale, and highlight that for the city-based home based workers, availability of jobs and access to telecommunication technology is not enough. In his book *Bowling Alone – The Collapse and Revival of American Community*, Robert Putnam (2000) makes a point that firms come to communities that invest in making themselves better places to live and recreate. If we consider home based workers as small firms – and as a matter of fact there is not a big difference between home-based businesses and home based workers – than this phrase can be used to describe significance of correlation between them, and socio-economic qualities of places they choose to live in.

The second question of our research sought to assess the influence that ongoing changes of the global economy towards knowledge-based activities have on home based work. We found that in recent years (2006-2011), home employment in Sydney and Melbourne was transitioning towards occupations classified as *professionals* and *sales workers*, which was paired with diminishing proportion of labour-intensive occupations, such as labourers and machinery operators. This suggests that technology is indeed changing the workplace and influences home based occupations. As noted by Audirac (2005), IT is part of a more profound and pervasive sociotechnical change transforming the organization of production, institutions, and everyday life. In our view, this process requires response from practitioners and policy makers to recognise and articulate the implications of IT, sometimes referred to as *digital urbanism* (Buksh and Mouat, 2015) in long term strategic plans for cities and regions. Finally, our research found that advances in telecommunication technology do not result (or perhaps have not yet resulted) in significant increase of home based workers in the rural/urban periphery and in regional parts of New South Wales and Victoria. Particularly, the growth of home based professionals in the regional parts of Victoria and New South Wales appears to be significantly slower than in Sydney and Melbourne metropolitan areas. In the regional areas of these states, location of home based professionals is strongly correlated with accessibility/distance to Sydney or Melbourne. This finding confirms what Glaeser's calls the central paradox of the modern metropolis: even as the cost of connecting across distance falls, so the value of being close to cities rises (technological changes and improved electronic communications seem, paradoxically, to be making cities more, rather less, important – Glaeser, 2011). To benefit from networks of other productive and well connected people and businesses, knowledge-intensive activities cluster in inner cities rich in skilled workers and leading firms – it appears that the same process takes place among home based workers. Those results also concur with findings of recent works on the importance of amenities and face-to-face interactions even for businesses relying on new technologies and internet (e.g., video game industry) (Darchen, 2015). Thus the emergence of new technologies does not necessarily mean the death of distance, as we have demonstrated in this paper that accessibility to the city amenities and proximity to the centre is an important factor when considering where home based work develops in metropolitan areas.

Further research

Results offer an extension to our understanding of the home based workers' locational preferences, and provide an insight into ongoing transition of this important part of the labour force. In this context however, we see a room for further research addressed at closing a gap between studies on locational preferences and policy approach, frequent in economic development strategies at the local government level, which are often aimed at attracting home based workers to migrate to an area. Further research is needed on two main points: 1. Find out more about the factors influencing the location of home-based workers; 2. Identify what are the planning policies in place to attract home-based workers and provide recommendations. Specifically our aim is to explore further the role of the proximity to amenities in the location of home-based workers specialised in the new economy sectors. Based on our findings, the aim is to discuss in further publication about the role of planning in facilitating the establishment of home-based workers/live and work communities in strategic areas of the city.

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