Optimizing accessibility in the home office: implications of accessible kitchen design literature

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Optimizing accessibility in the home office: implications of accessible kitchen design literature

by

YeaWon Her

A thesis submitted to the graduate faculty

In partial fulfillment of the requirements for the degree of

MASTER OF ARTS

Major: Art and Design (Interior Design)

Program of Study Committee:
Fred Malven, Major Professor
Maruja Torres
Christine C. Cook

Iowa State University
Ames, Iowa
2005

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Graduate College
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This is to certify that the Master’s thesis of

YeaWon Her

has met the thesis requirements of Iowa State University

Signatures have been redacted for privacy
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ABSTRACT

Kitchen design is an important phase of the overall field of residential design. On the basis of cost alone, the residential kitchen assumes a role of major import because it is the room with the highest cost per square foot.¹ Moreover, when designing the residential space, expertise in kitchen design is imperative as a result of the predominant role the kitchen typically assumes in the purchase decision.²

For these reasons, there has been extensive research on kitchen design, and it has been developed and supplemented based on the technological improvements, lifestyle changes and anthropometrics. These elements contribute to accessible design features which should be incorporated into the design process.

Research and literature on home office design, however, are considerably more limited. Telecommuters are expected to make their own workspace. Therefore, they are confronted with difficulties when creating their home workspace because they lack professional advice. If they began their professional careers in a corporate office building, telecommuters would be unfamiliar with the ways in which the home office environment can be converted into a

² Koontz Dagwell, xi.
professional work environment.

Kitchens and home offices share many similarities. Computers have made it possible to work at home away from the corporate office, and the new technology brought considerable changes in working style. In the same way, microwave ovens resulted in significant changes in approach to food preparation. In other words, these two inventions brought about epoch improvements in the work efficiency of their respective interiors.

Examination of the kitchen in terms of access and efficiency has transformed the way designers approach their development. Kitchen design has become one of the most technically and ergonomically challenging interior design undertakings. Does the humanistic emphasis now focused on kitchens offer important insight into the design of other high criticality in interiors? Specifically, does kitchen accessibility research offer important lessons for the design of equally critical home workspaces? This project will focus on the potential translation of kitchen literature for this purpose.

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3 Koontz Dagwell, p. 7.
CHAPTER 1. INTRODUCTION

Overview

Working at home can be a great arrangement for lawyers. All sort of tax benefits come into play. No longer must you endure lengthy commutes to the office, surly parking attendants or lunch-hour sales at Bloomingdale's. Mornings start off with a cup of coffee from your own kitchen instead of Starbuck's................. 4

This is a part of writing titled, ‘Working at home for lawyers’, which was written by a lawyer, Jennifer J. Rose, who works at home. In this writing, she describes a slice of his life as a home-based worker. And she suggests several rules to succeed in working at home for prospective home office workers based on his experience.

Recently, the population of working-at-home is drastically increasing because of many reasons. One of the reasons which most people agree on is about a matter of spatial advantage. A sense of home provides not only a physical convenience but also a psychological satisfaction for worker. For example, not having to commute saves the time and money. Moreover, increased flexibility allows female workers to continue working after they get married. Because women’s careers were often interrupted, or ended, when they had children. As a matter of fact, Zelinsky (1999)5 noted that, in today’s changing workplace,

---

CPAs, like many other professionals, face the challenge of better managing the complex demands of balancing work and life issues. In 1995, 53 percent of the new graduates hired by CPA firms were female, according to the American Institute of Certified Public Accountants (AICPA). Flexibility is the key to managing the new workforce, and the workhorse approach to structuring accounting careers is no longer appropriate in today’s marketplace—one major reason why women leave the accounting profession before they reach higher levels.

On the other hand, it could be seen that a sense of home was introduced even in a corporate office. Figure 1 is a picture of napping area of Gould Evans, an architectural and design company headquartered in Kansas City. Sleeping bag, pillow, and alarm clock in tent are equipped for a refreshment of employees.

Figure 1. A napping area in a corporate office.\(^6\)

\(^6\) Marilyn Zelinsky, p. 22.
In addition, Figure 2 shows a cafeteria in a corporate office of Loft Living. This cafeteria in office stems from a concept of kitchen at home. Open shelves invites business guests to feel more at home by helping themselves to refreshments during meeting.  

![Figure 2. Cafeteria in a corporate office.](image)

Ultimately, people have grown up with home and it was examined above that working at home can be a good option to balance work and family. In this thesis, a research about home office design will be performed and knowledge of kitchen design theory and their significant factors will be discussed in a way of giving benefits to design a solution of home office.

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7 Marilyn Zelinsky, p. 51.
Purpose of the Study

The purpose of this present study is to making meaningful guidelines for designing a home office. The process of this study takes advantage of scientific and logical kitchen design theory when designing an accessible home office.

The characters of the two spaces, kitchen and home office, are very different, but there are several feasible design components which suggest a good inspiration to the home office. The success of this study depends on finding an applicable theory of kitchen design and implementation, when comparing the two types of spaces.

Scope of the Study

This study begins with on the comparison of design components in kitchen design and proceeds to the components necessary to home office design, especially accessibility. Hence, the analysis of kitchen literature has been translated to the appropriate application for home office design. Otherwise, the implication of kitchen literature could lend significance to make guidelines for home a home office design.
Basically, the guidelines for kitchen design will be selected from the book, Universal kitchen and bathroom planning (1998). Additional guidelines will be brought from different sources which use critical components dealing with accessibility. In addition, pictures of existing home office will be collected and organized as evidence of good examples. Even though the book of Universal kitchen and bathroom planning covers all types of people, including handicapped, the outcome of this project will be limited to non handicapped.

**Methodology**

The discussion and information offered in this research are divided into the four sections:

- Traffic and workflow
- Workstation layout
- Cabinets and Storage
- Appliance placement and use/clearance space

This categorization follows Universal kitchen and bathroom planning except workstation layout. These four categories are closely involved with the design components
for a home office.

To begin, the issue of ‘traffic and workflow’ is one of the most important criteria, when planning an entire home office. The understating of the human scale or body space will give insight for a reasonable translation to create guidelines for home office design.

Next, the criteria of ‘workstation layout’ are designed to make fit the work environments and work flow patterns both in kitchen and home office. So the observation of each work styles needs to be investigated.

Then, the criteria of ‘cabinet and storage’ are a critical component of design. As a matter of fact, designing an intelligent storage makes it possible for convenient access to information while working.

Finally, the criteria of ‘appliance placement and use/clearance space’ can relate with access to storage and electronic equipment in home office such as computer, telephone, fax, etc.

Therefore, these four criteria will be compared and analyzed in this paper. Ultimately, the results of these procedures will be presented as guideline tables in chapter 3.
CHAPTER 2. LITERATURE REVIEW

Home Office Design

Overview

According to the High-Tech Dictionary from the website, http://www.computeruser.com/resources/dictionary, ‘telecommute’ is defined as:

to work at home or some other location remote from one’s place of employment, making use of a computer, telephone, fax, and/or modem to receive job assignments and send in completed work.\(^8\) This brief definition gives two critical factors regarding to ‘telecommute’.

First, as referred to this definition, one of the biggest distinctions of telecommuting is a matter of ‘location’ of work space. The work location should be away from the corporate conventional office. Mainly, the first option of the location should be a home.

Secondly, telecommunications plays an important role to accomplish a task. Advances in electronics have given workers a new freedom, and a new meaning to work place flexibility.\(^9\)

In conclusion, the significance of this study, designing a home office for

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telecommuters is closely related with the understanding of access to ‘location’ and ‘telecommunications’. Therefore, in this chapter, these two aspects will be investigated and discussed.

**History of Work-at-home**

The concept of work-at-home is not unfamiliar. Most people have their own desk at home and they usually do simple household takes on it. But, the author of Practical home office solution says that the more formal, more structured more mainstream tradition of working at home goes back a few centuries, when families farmed together and practiced a trade in a shop attached to the house.¹⁰

These aspects of family business continued until the Industrial Revolution in the nineteenth century. Marilyn Zelinsky (1992) describes how the work-at-home concept has changed from past to present:

The formal concept of working at home became a lost and forgotten work style for most people when the family farm started to erode in the late 1800s as the scale of manufacturing grew fast in the cities. Decades later the den with a desk made a quick comeback until televisions took over that room in the 1950s. People shunned the work-at-home concept up through the status-conscious years of the 1980s, when it was politically

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¹⁰ Marilyn Zelinsky, p. 2.
correct to tell people you took work home for evenings and weekends. And, there was an
unwritten rule that you never worked at home during a workday.

Numerous economic and social changes that began to take place in the early 1990s have
give the home office a fierce resurgence in popularity. In fact, here are a couple of interesting
work-at-home-related predictions for 1998 from the management consultant from Watson
Wyatt:

- In response to the huge number of corporate merge in 1997, next year will see another
  significant wave of corporate downsizing.
- A major company, probably in the service business, will exit its New York headquarters
  and have all but a few employees working at home in virtual offices.
- These general predictions-driven by corporate decision makers could have been made,
  and might have come true, during any one of the years in this decade. Wanting to leave a
  company is quite another matter, and lots of us want to do just that.  

Figure 1 (in page 2) shows how the home office workstation has evolved during the
1900s. Zelinsky mentions that it started out with a simple boudoir desk for the home in 1909.
The right idea starts to emerge in 1956 with desk compartments and more space. The L-
shaped home office mimics the L-shaped secretarial desk, prevalent in corporations at the
time. Today, furniture manufacturers take the home office as a serious market to be catered to,
and they have designed furniture with space, compartments, and work surfaces to address the
serious, at-home worker.

11 Marilyn Zelinsky, p. 4.
12 Marilyn Zelinsky, p. 3.
Figure 3. The evolution of the workstation for home office worker in 1990s.
Statistical Background

A Population of Home-Based Workers

The work-at-home market continues to grow, showing the number of home office households reaching 34.7 million in 1997, up 15.6 percent annually from 1995. This table indicates the statistics in IDC/LINK’s 1997 Home Office Overview Report.

Table 1. Growth of Home-Working Households (in millions).

<table>
<thead>
<tr>
<th></th>
<th>1995</th>
<th>1997</th>
<th>1999</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home office households</td>
<td>27.3</td>
<td>34.7</td>
<td>40.2</td>
</tr>
<tr>
<td>Income-generating home offices</td>
<td>18.7</td>
<td>20.7</td>
<td>23.8</td>
</tr>
<tr>
<td>Primary self-employed</td>
<td>12.2</td>
<td>13.2</td>
<td>15.5</td>
</tr>
<tr>
<td>Part-time self-employed</td>
<td>10.8</td>
<td>9.4</td>
<td>10.7</td>
</tr>
<tr>
<td>Corporate home offices</td>
<td>13.6</td>
<td>26.4</td>
<td>28.9</td>
</tr>
<tr>
<td>After-hours home offices</td>
<td>10.2</td>
<td>24.3</td>
<td>26.1</td>
</tr>
<tr>
<td>Telecommuters</td>
<td>6.4</td>
<td>9.1</td>
<td>10.7</td>
</tr>
</tbody>
</table>

Note: Because some households have more than one home worker, households can belong in more than one category. As a result of these “two-home-office households,” the total of subcategories is greater than the home office group they compose.


Table 1 shows different types of populations of work-at-home, such as the data of part-time self-employed or after-hour home offices rather than commonly so-called telecommuters. The range of the population who works at home is probably wider than normally considered.

13 Marilyn Zelinsky, p. 6.
14 Marilyn Zelinsky, p. 7.
Survey on the Attitude and Behavior of Home-based Worker

In 1995, Ameritech commissioned the Gallop Organization to conduct a study of attitudes and behaviors of people who work at home, or more exactly, self-employed home-based entrepreneurs.\(^{15}\)

1. The average Work-at-Home Respondent is:
   a) Male (65 percent)
   b) 45 years old
   c) Married (78 percent)
   d) Lives in a suburb of a large metropolitan area (40 percent)

2. How they rate productivity working at home:
   a) 68 percent say they are more productive working from home than working from their former office.
   b) 79 percent say that they began working at home, they have been happier.
   c) 7 percent say they have been less happy since they began working at home.
   d) 59 percent say their stress levels have decreased from when they were working in their former office.

\(^{15}\) Marilyn Zelinsky, p. 7.
e) 47 percent report putting in fewer hours working at home than they did working in their former office setting.

f) 38 percent feel they are more respected by their clients or customers because they work at home.

3. On the upside, respondents said the biggest advantages to working at home are:

a) Getting more accomplished with less distraction (26 percent).

b) Increased flexibility (26 percent).

c) Not having to commute (17 percent).

d) Staying at home with family (16 percent).

As for work-at-home hassles, the biggest disadvantage are:

a) Interruptions and distractions (30 percent).

b) Feelings of isolation (18 percent).

c) Lack of access to proper equipment (17 percent).

4. Tools of the trade that respondents use:

a) Telephone: 98 percent of respondents have a telephone in their home office. 31 percent say that telephone is the most important piece of office equipment.

b) Computer: 46 percent say the computer is the most important piece of office
equipment.

c) Office: 74 percent have a room in their home dedicated to work-at-home activities.

5. Respondents said they would like to improve their home offices by:

a) Adding or upgrading a fax machine (13 percent)
b) Adding additional phone lines (9 percent)
c) Buying a computer or a faster computer (7 percent)
d) Buying a new or faster modem (6 percent)

6. Respondents considered their biggest challenges to be:

a) Attracting new clients (14 percent)
b) Fining and managing time (10 percent)
c) Expanding business (8 percent)
d) Staying organized (7 percent)
e) 95 percent of the self-employed say they would make the same decision to become self-employed again.
Development of Technology

Information technology is changing the way we work. Technology enables us not only to process and store information more efficiently, but makes it readily accessible. Telecommunications allow us to move this information around the world and communicate with anyone, anywhere and anytime. Libraries and archives, as repositories of knowledge, are being replaced by browsing the corporate database and the Internet. To move information now is swift, compact, and inexpensive. Therefore so large agglomerations of workers, huddled around equally large concentrations of paper, are no longer necessary or economic.16

Figure 4 shows the gradual change in employee organization.

Yesterday: Hierachy
Today: Teams
Tomorrow: Networks

Figure 4. Organizational scenarios.

Recently, the employee relates to the organization in quite a new way. Telecommunications and information technology are separating work from place. In parallel

16 Santa Raymond and Roger Cunliffe, p. 14.
but interlinked, attitudes towards property are changing.\textsuperscript{17} In other words, communications among employees are more flexible, regardless of the class of their position.

Zelinsky (1999) also assigns a powerful influence to technology and he notes that new technologies continue to help home office workers put on a professional face while easing the financial and psychological burdens of working at home.\textsuperscript{18} These are some examples which Zelinsky suggested as an evidence of major contribution of technology to a home-based business.

1. The Internet and global e-mail capabilities mean that home-based workers have access to the same online resources and communications as their colleagues and competitors who work in traditional settings. (In fact, 1998 reports say Internet traffic doubles every 100 days.)

2. The latest personal computers and networking have improved at a lower cost. While the average price of PCs purchased by home office households has remained between $1,500 and $2,200, capabilities of those machines have increased significantly over the past two years. Faster microprocessors, bigger hard drives, and removable storage are just some of the advanced capabilities vendors are including in computers targeted for home office use.

\textsuperscript{17} Santa Raymond and Roger Cunliffe, p. 11.
\textsuperscript{18} Marilyn Zelinsky, p. 202.
3. Multifunctional products are becoming more popular. The latest generation of “all-in-one products” provides reliable printing, faxing, copying, and scanning at very affordable process. The quality of output from a home-based business can now be equal to that of a Fortune 1000 firm.

4. Advanced telephone services such as voice mail and messaging services available from local telephone companies mean a home office can have the same automated attendant capabilities as a major corporation.

What many home office workers believe is that technology increases their competitiveness of business. Thus, the way to access to technology when designing home office should be elaborately considered.

Access to Home Office Equipment

This is the survey asking the respondents to specify what type of equipment they believed would be necessary to telecommute successfully. The Number indicates about how many respondents use the equipment and percentage means the using frequency of the equipment. For the benefit of development of technology, the equipment listed in this table

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makes an important role when performing tasks from home.

Table 2. A list of using equipment according to the using frequency for telecommuters.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone</td>
<td>45</td>
<td>95.74%</td>
</tr>
<tr>
<td>PC</td>
<td>43</td>
<td>91.49%</td>
</tr>
<tr>
<td>Internet Access</td>
<td>39</td>
<td>82.98%</td>
</tr>
<tr>
<td>Printer</td>
<td>29</td>
<td>61.70%</td>
</tr>
<tr>
<td>Voice Mail</td>
<td>27</td>
<td>57.45%</td>
</tr>
<tr>
<td>Chat Software</td>
<td>23</td>
<td>48.94%</td>
</tr>
<tr>
<td>Fax</td>
<td>16</td>
<td>34.04%</td>
</tr>
<tr>
<td>Teleconferencing</td>
<td>12</td>
<td>25.53%</td>
</tr>
<tr>
<td>Videoconferencing</td>
<td>9</td>
<td>19.15%</td>
</tr>
<tr>
<td>Electronic whiteboard</td>
<td>3</td>
<td>6.38%</td>
</tr>
</tbody>
</table>

This table shows that telephone is the most frequently used equipment in home office. So when planning the layout of home office equipment, the arrangement should be taken into consideration in terms of accessibility. For example, telephone should be placed in the range of maximum accessibility. So the result of this table is significant when defining the order of priority of home office equipment.
Working Postures When Working at Home

Figure 5 is taken from the book, ‘The writer’s desk’20. The author of this book visited each of the writers and interviewed them about their life, and then took a photograph of their work spaces. Most of them work at home, and their working postures are variable. Figure 5 show the flexibility of working spaces and working postures at home. But it has not proved yet if these postures encourage their work efficiency. Further research about working postures based on a statistical data will be investigated.

Figure 5. Flexible working environment.
Ergonomics in the Home Office

For many years it has been recognized that the office, as a workplace, has as much potential need for ergonomic expertise as the more traditional areas such as the production line.\textsuperscript{21} Fucigna (1967) points out the many interrelated factors that require optimization in the office environment, including job procedures, physical work environment, location of work areas, the equipment and furnishings. Preferably, ergonomics should be applied at the design stage of all aspects of the office work environment: Otherwise there may be consequences in terms of implications for job performance, job satisfaction, and health and safety.\textsuperscript{22} Thus, office designers are aware of functional recommendations for workplace design such as desk and chair height, reach range of equipment, posture for using computer, and so on.

\begin{figure}[h]
\centering
\includegraphics[width=0.7\textwidth]{figure6.png}
\caption{Compromise dimensions for office furniture.\textsuperscript{23}}
\end{figure}

\textsuperscript{22} Etienne Grandjean, p. 141.
On the other hand, Table 3 with statistical data shows behavior variables in office according to the tasks, torso posture, and upper extremity postures. The computer-based worker is exposed to most frequent use of mouse. And regarding about a torso posture, the posture toward forward is the most general one among different kinds of postures. These all behavior is mainly performed when the worker is sitting. And back pain from sitting posture has been reported as one of the most common discomforts. So home office worker should take into consideration about ergonomics of discomfort when selecting office furniture and other equipment based on the statistical data of Table 3.
Table 3. Behavior variables in office.\textsuperscript{24}

<table>
<thead>
<tr>
<th>Behavior Variables</th>
<th>Percent of Time</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tasks</strong></td>
<td></td>
</tr>
<tr>
<td>Mouse</td>
<td>18.74%</td>
</tr>
<tr>
<td>Key</td>
<td>19.70%</td>
</tr>
<tr>
<td>Read VDT</td>
<td>7.73%</td>
</tr>
<tr>
<td>Converse</td>
<td>12.82%</td>
</tr>
<tr>
<td>Phone</td>
<td>12.35%</td>
</tr>
<tr>
<td>Read paper</td>
<td>17.32%</td>
</tr>
<tr>
<td>Rest</td>
<td>3.86%</td>
</tr>
<tr>
<td>Write</td>
<td>7.60%</td>
</tr>
<tr>
<td><strong>Torso Posture</strong></td>
<td></td>
</tr>
<tr>
<td>Forward</td>
<td>45.25%</td>
</tr>
<tr>
<td>Upright</td>
<td>26.95%</td>
</tr>
<tr>
<td>Recline</td>
<td>14.50%</td>
</tr>
<tr>
<td>Turn</td>
<td>5.75%</td>
</tr>
<tr>
<td>Lean</td>
<td>4.25%</td>
</tr>
<tr>
<td><strong>Upper Extremity Postures</strong></td>
<td></td>
</tr>
<tr>
<td>Neutral</td>
<td>28.94%</td>
</tr>
<tr>
<td>Neutral Extended Reach</td>
<td>51.76%</td>
</tr>
<tr>
<td>Far Extended Reach</td>
<td>15.62%</td>
</tr>
</tbody>
</table>

Workstation Arrangement

When planning to make a work space at home, balancing business work and household life is a key to design a home office. There are many possibilities when it comes to layout office furniture and other furniture such as bed and sofa. Figure 7 shows the options for different configurations at home.
Figure 7. A variety of JB system configurations at home.\textsuperscript{25}

-Courtesy of Herman Miller for the Home, Zeeland, MI

\textsuperscript{25} Neal Zimmerman, \textit{Home office design: everything you need to know about planning, organizing, and furnishing your work space}, (New York: John Wiley & Sons 1996), p. 103.
Kitchen Design

Overview

Because of its necessary in sustaining life, the preparation and consumption of food has occupied a central place in the lives and shelters of human beings since earliest times.\textsuperscript{26} The central place, kitchen has been developed by the benefits of the technology to satisfy the people who want to have their best convenience.

Recently, when it comes to discuss about kitchen design, accessibility and universal design frequently mentioned and these two concepts are often used interchangeably. Accessible space is generally thought to be a space which accommodates a behavior for handicapped. But universal design have a connotation to meet the needs of all kinds of people, so the term ‘accessibility’ needs to become a broader meaning when planning and designing a space. In this section, the research on kitchen space will be focused on the accessibility based on the universal design of kitchen space.

\textsuperscript{26} Koontz Dagwell, p. 3.
History of Kitchens

Conran (1977) reports that cooking facilities in early shelters consisted simply of open fires or central hearths located in the center of household and family activities. Over the centuries, gradual improvements occurred in both technology and the overall quality of life. Likewise the evolution of workstation for home office worker, the kitchen design has influenced by a combination of economic, societal, and technological factors at the beginning of the twentieth century.

The most important of these factors was the continuing success of the industrial revolution, which, combined with changes in social and economic norms, resulted in a greatly reduced availability of inexpensive household labor as workers removed from lower-paying domestic positions to higher-paying jobs in factories.

So people recognize the need of efficiency in kitchen space when they experience food preparation, cooking and related activities by themselves. And this phenomenon makes it possible to stir a practical invention and development to provide a convenience when working at kitchen. So kitchens are started to design with the best of intentions of belief that the burden of work could be reduced by its layout, design, and appliances.

27 Koontz Dagwell, p. 3.
28 Koontz Dagwell, p. 4.
The Universal Kitchen

A universal kitchen is one designed to accommodate the greatest diversity of users possible, including those of varying ages, heights, and abilities. Implementation of this approach to kitchen design can be especially beneficial when there are two or more cooks and they are of very different height, when children are included in food preparation activities, for persons who may need to be seated while performing certain tasks, or for those who may be temporarily or permanently disabled.29

Ergonomics in Kitchen

Safety for the users of the kitchen may be enhanced through an understating of the relation of ergonomic factors to the design of the kitchen space. Placement of work surfaces, appliances, and storage so that they are easily accessible within the normal reach of the individual user makes the performance of tasks easier and less fatiguing as well we more convenient.30

Table 5 shows selected reach dimensions for potential users of the kitchen space. Each of four groups provided the recommended dimension based on their research. And the guideline which will be demonstrated in chapter 3 follows the literatures of Grandjean.

29 Koontz Dagwell, p. 65.
Table 4. Ergonomics of reach (all dimensions in inches).  

a- Based on 5'-2" height; b- Based on 5th percentile data;  
c- Based on average female; d- Based on small female.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Females</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum reach</td>
<td>68</td>
<td>72(^a)</td>
<td>72(^b)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>65.5(^b)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum reach to back to shelf</td>
<td>70(^a)</td>
<td>69(^b)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>59(^a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Elderly Females</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum reach</td>
<td>67.3(^c)</td>
<td>67-71</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>63(^d)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum reach over base cabinets</td>
<td>59.3(^a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum reach to back of shelf</td>
<td>30.8(^c)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>29.7(^d)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Males</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum reach</td>
<td>72</td>
<td>76</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum reach over base cabinet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Wheelchair User</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forward reach</td>
<td>51.5(^d)</td>
<td>46-63(^e)</td>
<td>48</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>45.5(^e)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forward reach over an obstruction</td>
<td>55.5(^d)</td>
<td>46(^e)</td>
<td>44</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lateral reach</td>
<td>48.5(^c)</td>
<td>54</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lateral reach over obstruction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>46</td>
</tr>
</tbody>
</table>

\(^{31}\) Koontz Dagwell, p. 153.
Work Triangle

Work triangle is a representation of the flow of work in the kitchen as food is prepared and progresses through the three major work centers, the refrigerator center, the sink center, and the cook center. Even though there are different types of work surface layout in kitchen, the work triangle is always the critical issue and accommodate it to make fit in every single configurations.

Figure 8. Work triangle.\textsuperscript{32}

Work triangle (Figure 8) concept is one that researchers and designers use as a tool to evaluate both the efficiency of the kitchen layout and the adequacy of counter work surface and storage provided by the proposed plan. The work triangle is formed by drawing straight

\textsuperscript{32} Koontz Dagwell, p. 57.
lines connecting the centers of the refrigerator, sink, and range or cooktop so that the shape of a triangle is created. The legs of the triangle must be straight; they cannot bend or break around other appliances, cabinets, or walls.\footnote{\textit{Koontz Dagwell}, p. 57.}

The theory of work triangle has a potential to give a sense of work flow pattern in home office design and the translation and application from kitchen design to home office design will be discussed again.
As it was discussed above, the work triangle is devised for maximize the efficiency of work flow pattern. The movement through the kitchen and work triangle seldom intersects each other. Ideally, Peter Douglas (1979)\textsuperscript{34} analyzed that the work flow in kitchen can be illustrated in Table 5. Understanding this work flow pattern in kitchen allows people to organize tasks and to make a priority among them.

Table 5. Work flow pattern in kitchen.

<table>
<thead>
<tr>
<th>Goods Receipt</th>
<th>Storage</th>
<th>Preparation</th>
<th>Cooking</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bulky Stores</td>
<td>Meat/Fish</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dry Goods</td>
<td>Vegetables</td>
<td>Hot/Cold</td>
</tr>
<tr>
<td></td>
<td>Cold Stores</td>
<td>Pastry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perishables</td>
<td>Sweets</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Housekeeping</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Daily Stores</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Besides, every kitchen will have invisible “corridors” or traffic patterns passing through it, especially from one doorway to another. It is wise to locate the work triangle out of the path of any doorways, if possible.\textsuperscript{35} In addition to the traffic pattern for food preparation and cooking, other traffics such as travel with groceries form the back door to the refrigerator or family member’s drop to pick some foods can be seen in kitchen. Following traffic patterns are caused by the environmental distinction of home and are much related with the behavior of family members. In the article, ‘When work comes home: mapping the work-family interface’, there are meaningful researches from obtaining a variety of information about the families and family members interviewed, in part with in-depth qualitative interviewing and observation and research resources were concentrated on fewer families.\textsuperscript{36} Basically the research target is the families with telecommuter, this situation could be applied to the kitchen space as well, when it comes to think about the relationship between the worker in kitchen and other persons at home. And the result of this investigation stimulates to contemplate the physical and psychological responses among family members as it is seen in Figure 9.

\begin{footnotesize}
\begin{enumerate}
\item Bo Niles, Juta Ristsoo, \textit{Planning the perfect kitchen} (New York: Simon and Schuster), 1988, p. 23.
\item \textit{When work comes home: mapping the work-family interface,} Retrieved March 13, 2005. \url{http://www.emergence.nu/papers/famitel.pdf}.
\end{enumerate}
\end{footnotesize}
**Work Surface Layout**

There are many possibilities to plan a layout of kitchen units. Table 6 is composed based on the contents of the book, 'Kitchens: plan, remodel, build' (2002). It describes the distinctive features in each configuration. In addition, Figure 10 provides a configuration with various workstation arrangements in kitchen.
Table 6. Work surface layout.

<table>
<thead>
<tr>
<th>Kitchen Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-wall kitchen</td>
<td>Efficient use of small, open spaces, but they are not terribly efficient for the cook. They work best with the sink in the center, flanked by fridge and cooktop with 4 feet of counter space between each pair. Place doors away from the one-wall shape to avoid foot-traffic hassles.</td>
</tr>
<tr>
<td>Gallery kitchen</td>
<td>Being built between parallel walls, allowing the cook to move easily from one work area to another. Plan for at least 4 feet of space between opposite counters; think about putting the sink and fridge on one wall with the cooktop centered between them on the opposite wall. If there are doorways at each end of the gallery, foot traffic can cross the work triangle.</td>
</tr>
<tr>
<td>L-shape kitchen</td>
<td>Require two adjacent walls and are particularly efficient when work areas are kept close to the crook of L. You'll save yourself extra steps by planning the work flow from fridge to sink to cooking, then to serving areas. Crossing foot traffic is rarely a problem for a cook in the L-shape kitchen.</td>
</tr>
<tr>
<td>L-shape with island</td>
<td>Make room for multiple cooks, snack bars, and increased space for storage and family dining. The island also works as a visual room divider.</td>
</tr>
<tr>
<td>U-shape kitchen</td>
<td>Usually place one work station on each of three walls. The design possibilities are many and can be efficient for one cook, but you'll need at least an 8X8 foot kitchen space. Small U-shapes can be a tight squeeze for multiple cooks.</td>
</tr>
<tr>
<td>U-shape with island</td>
<td>Solve the dilemma of making a big kitchen efficient. You can work a sink or cooktop into the island, even a special-function countertop such as butcher block for chopping or marble for rolling out pastry. Allow 42 inches of aisle space on all sides of the island; 48 inches is better in a two-cook kitchen.</td>
</tr>
<tr>
<td>G-shape kitchen</td>
<td>Feature an island anchored to a line of cabinets. Cooktops or sink work well situated on the peninsula, which can also function as a dining bar or buffet. The peninsula can be a room divider, allowing family and friends to hang out with the cook without crossing paths.</td>
</tr>
<tr>
<td>Two-cook kitchen</td>
<td>Call for work zones or triangles that allow each cook to work without crossing the other's path. Two work triangles can, however, share a leg and are often anchored at the fridge. Multiple-cook arrangements may-but need not-include an extra prep sink, an additional stretch of countertop, or small second refrigerator.</td>
</tr>
</tbody>
</table>
Figure 10. Various workstation arrangements in kitchen.\textsuperscript{37}

A Comparison of Kitchen Space to Home Office Space

Most design components in kitchen space and home office space are examined in this paper. The next chapter, literature of kitchen design will be translated into guidelines of home office design. A parallel comparison of these two spaces is conducted in this table. First, this table begins with analyzing the reason why people want to access to each space. Next, the accessibility is defined by three level of access: access to space, access to task, and access to equipment. It is an interesting analysis because of the corresponding criteria in each section. In addition, the contents in Table 7 summarize the design components which have been reviewed above.
Table 7. A Comparison kitchen space to home office.

<table>
<thead>
<tr>
<th>Components</th>
<th>Kitchen</th>
<th>Home Office</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication with family members.</td>
<td>Participating in food preparation, enhancing an intimacy among family members.</td>
<td>Working with taking care of children, communicating with family not to disturb the worker.</td>
</tr>
<tr>
<td>Entertainment</td>
<td>Entertaining in a bar area, talking and watching in a dinning table.</td>
<td>Watching TV, listening music, and reading magazines.</td>
</tr>
<tr>
<td>Most suitable location.</td>
<td>Considering a convenient approach from entrance to kitchen.</td>
<td>Considering a convenient approach from other spaces at home to home office.</td>
</tr>
<tr>
<td>Partitions (walls) and openings.</td>
<td>Considering noise and odor from kitchen to other places.</td>
<td>Finding the best place to make a home office; individual room, bedroom, guest room, kitchen, corridor, attic, garage, etc.</td>
</tr>
<tr>
<td>Traffic pattern, a relationship with adjacent space.</td>
<td>Making pocket door, swinging door, window (ventilation, releasing humidity and odors), division between kitchen and living room.</td>
<td>The advantage and disadvantage of walls and openings to get rid of distractions, the degree of welcoming to come into the home office.</td>
</tr>
<tr>
<td></td>
<td>Relationship between eating place and cooking place, the allowing line for guest and children.</td>
<td>Corridors or stairs to reach the home office.</td>
</tr>
</tbody>
</table>
Table 7 (continued). A Comparison kitchen space to home office.

<table>
<thead>
<tr>
<th>How people access to task</th>
<th>The layout of work surfaces</th>
<th>One line, corridor kitchen, L-shaped kitchen, L-shaped variations, U-shaped kitchen.</th>
<th>Similar variations with the layout of kitchen units.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The electrical appliances</td>
<td>Microwave oven, range, oven, refrigerator, dish washer, exhaust hood.</td>
<td>Computer, keyboard, monitor, printer, fax machine, copy machine, scanner, telephone.</td>
<td></td>
</tr>
<tr>
<td>Operational sequence, Access to the collaboration of multi-task</td>
<td>Theory of working triangle: Sink-cook center-refrigerator</td>
<td>Computer-based work with reading, writing, filing and talking over the telephone.</td>
<td></td>
</tr>
<tr>
<td>Required space</td>
<td>Personal habits (left-handed, right handed) and human scale, necessary passage to and fro.</td>
<td>Personal habits (left-handed, right handed) and human scale, necessary passage to and fro.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>How people access to equipment</th>
<th>Storage for electrical equipments</th>
<th>Storage for big electrical equipments such as microwave oven, toasters, mixer</th>
<th>Pop-up shelf or drawer for monitor, storing printer and scanner</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Storage for others</td>
<td>Storage for food, plates, bowls and utensils</td>
<td>Storage for books, documents, mails, etc.</td>
</tr>
<tr>
<td></td>
<td>Recycling materials</td>
<td>Food, paper, can, bottle</td>
<td>Paper, ink cartridge</td>
</tr>
<tr>
<td></td>
<td>Choosing cabinets</td>
<td>Built-in cabinet, wall cabinet, Island kitchen unit, freestanding cabinet, wagon</td>
<td>Built-in bookshelf, freestanding cabinet (with wheels)</td>
</tr>
<tr>
<td></td>
<td>Storage for tools</td>
<td>Container for cooking tools, spoons and knifes</td>
<td>Stationary organizer</td>
</tr>
</tbody>
</table>
CHAPTER 3. ANALYTICAL ARRANGEMENT

Data Forms

In this chapter, databases which contain guidelines of home office design will be presented as a result of this study. The databases are called ‘data units’ because each data unit has a form of analysis cards.

On the top of each data unit, a title is specified by the following four categories: traffic and workflow; workstation arrangement; cabinets and storage; appliance placement and use/clearance space. The background of each title is in black. Under the title, every table is divided into two sections, guidelines of kitchen design and guidelines of home office design. The section of kitchen design on the left side provides a guideline. Likewise, the section of home office design in the right side provides a guideline which corresponds to kitchen guideline.

Next, the presented guidelines are supported by illustrations on each side. The illustrations of kitchen design are generally scanned from kitchen literatures and are presented. The illustrations of home office design are scanned from different sources or they are drawn by the author with drawing tools in Microsoft Word.
Then, the section of 'rationale' discusses the guideline's translation from kitchen design into home office design. Three methodologies are stated as three levels: direct, indirect, and inspired. "Direct" is noted when a guideline of kitchen design is applicable to the certain case of the home office design without transforming a kitchen literature, in a straight way.

"Indirect" is noted when a guideline of kitchen design is applicable to the certain case of the home office design with a little modification of the kitchen literature. "Inspired" is noted when some criteria of the guideline of kitchen design motivate or contribute to creating a guideline of the home office design.

In the following section, 'discussion', a logical explanation to achieve the guideline of home office design is clarified. And each data unit is concluded by presenting a source. Numbering each illustration gives a sense of their correlation. For instance, images of 1-1a and 1-1b define a correspondent comparison of two situations and the first number, '1', belongs in a same unit, unit 1.
Data Units
## 1. Traffic and Workflow

### Clearance at Doorways

<table>
<thead>
<tr>
<th>KITCHEN</th>
<th>HOME OFFICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doorway should be at least 32” wide and not more than 24” deep in the direction of travel.</td>
<td>Minimum doorway should be 31.5” wide when carrying by hand at home. Don’t place a workstation in the direction of travel near a doorway.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>KITCHEN ILLUSTRATION</th>
<th>HOME OFFICE ILLUSTRATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Figure 1-1. NKBA Guideline 1a, Doorway" /></td>
<td><img src="image2" alt="Figure 1-2. Compromise dimensions for office furniture." /></td>
</tr>
</tbody>
</table>

- Figure 1-1. NKBA Guideline 1a, Doorway
- Figure 1-2. Compromise dimensions for office furniture.

<table>
<thead>
<tr>
<th>Passage between wall and table when carrying by hand.</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3" alt="Figure 1-3a" /></td>
</tr>
</tbody>
</table>

- Figure 1-3a: Passage between wall and table when carrying by hand.
- Figure 1-3b: Passage between wall and table when carrying by hand.
**RATIONALE**

Direct: The two situations are virtually identical. Kitchen guidelines can be directly translated into office application.

**DISCUSSION**

According to figure 1-2, the minimum depth of a work station is more than 23.7” (17.7”+8”=25.7”). The depth of a work stations is more than 24”.

In conclusion, the work station in a home office should be away from the space near the doorway to make sufficient space for foot traffic.

**SOURCE(S)**

| Universal kitchen and bathroom planning, 1998 | Ergonomics of the home, 1973 |
| Body space, 1986 |
### 2. TRAFFIC AND WORKFLOW

#### CLEARANCE AT WALKWAYS

<table>
<thead>
<tr>
<th>KITCHEN</th>
<th>HOME OFFICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walkways (passages between vertical objects greater than 24” deep in</td>
<td>If there is a walkway between a work surface and a wall, the minimum</td>
</tr>
<tr>
<td>the direction of travel, where no more than one is a work counter or</td>
<td>required space depends on the following.</td>
</tr>
<tr>
<td>appliance) should be at least 36” wide.</td>
<td>1. Free space between wall and storage ≥ 27.5” (Figure 2-2b)</td>
</tr>
<tr>
<td></td>
<td>2. Free space between wall and workstation ≥ 31.5” (Figure 2-3b)</td>
</tr>
<tr>
<td></td>
<td>3. Free space between wall and pull-out drawer ≥ 39.5” (Figure 2-4b)</td>
</tr>
</tbody>
</table>

#### KITCHEN ILLUSTRATION

![Figure 2-1. NKBA Guideline 1b, Free space between the wall and work counter.](image)

#### HOME OFFICE ILLUSTRATION

![Figure 2-2a. Free space in front of the refrigerator.](image)  
Figure 2-2b. Free space in front of the storage.
Figure 2-3a. Passage between wall and table when carrying something.

Figure 2-3b. Passage between wall and work station when carrying something.

Figure 2-4a. Space for opening a drawer.

Figure 2-4b. Space for opening a drawer.

**RATIONALE**

Direct: The two situations are virtually identical. Kitchen guidelines can be directly translated into office application.

**DISCUSSIONS**

Figure 2-2a indicates a free space in front of the refrigerator. It could be translated into the same situation, free space in front of storage which has similar door opening with a refrigerator’s way of opening.

**SOURCE(S)**

Universal kitchen and bathroom planning, 1998.

## 3. TRAFFIC AND WORKFLOW

### CLEARANCE AT WORK AISLES FOR ONE PERSON

<table>
<thead>
<tr>
<th>KITCHEN</th>
<th>HOME OFFICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work aisles (passengers between vertical objects, work counters or appliances) should be at least 42” wide in one-cook kitchens.</td>
<td>Free space for one person with two work surfaces</td>
</tr>
<tr>
<td>Minimum</td>
<td>One work station and walkway (Figures 3-2b and 3-3b).</td>
</tr>
<tr>
<td></td>
<td>→ 19.5”+23.5”=43”.</td>
</tr>
<tr>
<td>Desirable</td>
<td>One work station and walkway (Figures 3-2b and 3-3b).</td>
</tr>
<tr>
<td></td>
<td>→ 29.5”+31.5”=61”.</td>
</tr>
</tbody>
</table>

### KITCHEN ILLUSTRATION

![Figure 3-1. NKBA Guideline 1c, One-cook kitchen aisle.](image)

### HOME OFFICE ILLUSTRATION

![Figure 3-2a. Sitting at table.](image)  
![Figure 3-2b. Sitting at table.](image)
Figure 3-3a Passage between wall and table, hands free.

Figure 3-3b Passage between wall and table, hands free.

Figure 3-4. Space to work for one person.

**RATIONALE**

Direct: The two situations are virtually identical. Kitchen guidelines can be directly translated into office application.

**DISCUSSIONS**

One work surface and one island cooktop can be translated into two work surfaces in a home office for one person.

Most computer-based works are usually performed when seating on a chair. On the other hand, kitchen labor requires more activities while standing. The required minimum space is different between the two spaces.

**SOURCE(S)**

<table>
<thead>
<tr>
<th>Universal kitchen and bathroom planning, 1998</th>
<th>Ergonomics of the home, 1973</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>Lowe's creative ideas, 2004</td>
</tr>
<tr>
<td>KITCHEN</td>
<td>HOME OFFICE</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>Work aisles (passengers between vertical objects, both of which are work counters or appliances) should be at least 48&quot; wide in multiple-cook kitchens.</td>
<td>Free space for two persons with two work surfaces</td>
</tr>
<tr>
<td></td>
<td>&lt;Minimum&gt;</td>
</tr>
<tr>
<td></td>
<td>Space for placing two chairs (Figures 4-2b and 4-3b). -&gt;19.5&quot;+29.5&quot;=49&quot;.</td>
</tr>
<tr>
<td></td>
<td>&lt;Desirable&gt;</td>
</tr>
<tr>
<td></td>
<td>Space for placing two chairs (Figures 4-2b and 4-3b). -&gt;29.5&quot;+39&quot;=68.5&quot;.</td>
</tr>
</tbody>
</table>

**KITCHEN ILLUSTRATION**

![KITCHEN ILLUSTRATION](image)

Figure 4-1. NKBA Guideline 1c, Two-cook kitchen work aisle.

**HOME OFFICE ILLUSTRATION**

![HOME OFFICE ILLUSTRATION](image)

Figure 4-2a. Sitting at table.

Figure 4-2b. Sitting at table.
RATIONALE

Direct: The two situations are virtually identical. Kitchen guidelines can be directly translated into office application.

DISCUSSION

One work surface and one island cooktop can be translated into two work surfaces in a home office for two persons.

The calculation of required space is based on the consideration of placing two chairs. In Figure 4-4, the dimension of 43” follows the result of data unit 3 because that space is a walkway so only one chair is allowed to place.

SOURCE(S)

Universal kitchen and bathroom planning, 1998
Ergonomics of the home, 1973
Body space, 1986
5. TRAFFIC AND WORKFLOW

DISTANCE AMONG EQUIPMENT

KITCHEN

The work triangle (the shortest walking distance between the refrigerator, sink, and primary cooking surface) should be no more than 26', with no single leg of the work triangle shorter than 4' nor longer than 9'. The work triangle should not intersect an island or peninsula by more than 12".

HOME OFFICE

Keep items which are used most frequently within reach or nearby to minimize strain and twisting.

A distance between a user and equipment is defined by the horizontal arc of grasp and working area.

An eye to eye screen distance should be at least 25" or preferably more.

KITCHEN ILLUSTRATION

HOME OFFICE ILLUSTRATION

Figure 5-1a. NKBA Guideline 2, Work triangle.

Figure 5-1b. Access from home office worker to work equipment.

Figure 5-2. Horizontal arc of grasp and working area at tabletop height.
RATIONALE

Indirect: There is no direct counterpart to the kitchen work triangle in the office. Its indirect translation is the development of a similar relationship of individual distances relative to the user in the office.

DISCUSSIONS

There is no typical traffic pattern with placing equipment in a home office such as the work triangle in the kitchen. Position items considering adjacency among them will help avoid overusing the worker’s arm, shoulder, and back muscles.

SOURCE(S)

Universal kitchen and bathroom planning, 1998


http://www.bbc.co.uk/health/healthy_living/health_at_work/physical_workstations2.shtml.

http://www.ergonomics.ucla.edu/Tips_Users.html
## 6. WORKSTATION ARRANGEMENT

### ONE-WALL ARRANGEMENT

<table>
<thead>
<tr>
<th>KITCHEN</th>
<th>HOME OFFICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A one-wall kitchen lines up all its cabinets, counter space, and equipment along one wall. This arrangement flattens the work triangle into a straight line. Try to locate the sink between the range and refrigerator for maximum accessibility.</td>
<td>In one-wall arrangement, make a hierarchy of equipment according to use frequency and place them horizontally, based on the consideration of arm-reach. Try to locate a computer between supporting equipment. The accessibility to computer-based task will be maximized in this environment.</td>
</tr>
</tbody>
</table>

### KITCHEN ILLUSTRATION

<table>
<thead>
<tr>
<th>HOME OFFICE ILLUSTRATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Figure 6-1a. One-wall kitchen." /></td>
</tr>
<tr>
<td><img src="image" alt="Figure 6-1b. Straight workstation arrangement." /></td>
</tr>
<tr>
<td><img src="image" alt="Figure 6-2. Horizontal arc of grasp and working area at tabletop height." /></td>
</tr>
</tbody>
</table>
**RATIONALE**
Indirect: These two arrangements have similarities when equipment has to be set in place in a linear shape. Equipment is not identical.

**DISCUSSIONS**
This layout is a variation of the old-fashioned “desk pushed up against a wall” except that it can be customized for width and length. It makes excellent use of wall space above for filing storage. This arrangement is good for any room or even a narrow hallway.

**SOURCE(S)**
# 7. WORKSTATION ARRANGEMENT

## L-SHAPED ARRANGEMENT

### KITCHEN

An L-shaped layout allows space for a table and seating without blocking the work path between the main activity zones. For safety, the cooking zone, including the range or built-in oven, cooktop, and microwave, should not be placed immediately next to a doorway. If possible, plan the refrigerator’s position towards the end of a run of cabinets near the door so that groceries can be brought in and unpacked easily.

### HOME OFFICE

In this arrangement, make the three zones in the work surface. Center, one leg inside, another leg in direction of door. Place the computer in the center, and store documents which need to be kept with security towards the inside of the room. Place equipment which needs to have public access on another leg in the direction of the door.

### KITCHEN ILLUSTRATION

![Figure 7-1a. L-shaped kitchen.](image)

### HOME OFFICE ILLUSTRATION

![Figure 7-1b. Corner workstation environment.](image)
### RATIONALE

Indirect: placing a refrigerator near entrance of kitchen gives a sense of accessibility in home office according to the degree of public and private access.

### DISCUSSIONS

L-shaped arrangement provides working space on each side of a computer station. If the room is spacious, the arrangement detached from corner can be also considered.

### SOURCE(S)

- Planning the perfect kitchen, 1998.
- Home office design, 1996.
- Making the most of work spaces, 1998.
8. WORKSTATION ARRANGEMENT

TWO-WALL ARRANGEMENT

**KITCHEN**
The distance between facing cabinets should be no less than 42", the minimum needed to use appliances with room for others to pass safely. Items requiring plumbing, such as the dishwasher and sink, should be close together to limit the length of plumbing runs. The same applies for ventilation ducting, so plan the position of the cooktop, oven, or range against an exterior wall to keep ducting minimal. Install the primary refrigerator in the food-preparation area and a small model for soft drinks or snacks close to the doorway.

**HOME OFFICE**
In this arrangement, it is recommended that related equipment be close together on one side for convenient access. Place restricted or more private material farther away from the entrance. A chair with attached wheels on legs is recommended if a user needs to keep working by turns on each work surface.

**KITCHEN ILLUSTRATION**

**HOME OFFICE ILLUSTRATION**

Figure 8-1a. Corridor kitchen.

Figure 8-1b. Gallery workstation arrangement.
<table>
<thead>
<tr>
<th>RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect: These two arrangements have similarities, but the way to access work is not necessarily identical.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DISCUSSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>This layout is equivalent to compound of two one-wall galleries. It has the advantage of double storage and work space. This layout is preferable to the one-wall layout, if space permits.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SOURCE(S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning the perfect kitchen, 1998</td>
</tr>
</tbody>
</table>
## 9. WORKSTATION ARRANGEMENT

### U-SHAPED ARRANGEMENT

<table>
<thead>
<tr>
<th>KITCHEN</th>
<th>HOME OFFICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A U-shaped plan incorporates a logical sequence of work centers with minimal distances between them. When planning the layout, position the dishwasher, cooktop, and built-in oven toward the center of the countertops. These appliances should stand well away from the entrance and corners of the room so that access to them is unrestricted.</td>
<td>In this arrangement, three work areas are created. Decide on main work area and plan other two work areas with a supporting system such as storage and equipment. The supporting system should be toward the computer or main work area. This U-shaped arrangement attached on two walls or three walls depends on the size of a room.</td>
</tr>
</tbody>
</table>

### KITCHEN ILLUSTRATION

![Figure 9-1a. U-shaped kitchen.](image)

### HOME OFFICE ILLUSTRATION

![Figure 9-1b. U-shaped workstation arrangement.](image)
RATIONALE
Indirect: These two arrangements have similarities, and the arrangement of kitchen appliances gives a sense of layout for equipment in home office.

DISCUSSIONS
This layout is equivalent to two-wall galleries, so the advantages between the two are similar. A U-shaped layout has one more work surface than the arrangement of two-wall galleries. It has three work surfaces.
If a room is cramped, workstation arrangement attached to three walls should be considered for maximum use of the room.

SOURCE(S)
Planning the perfect kitchen, 1998.
Home office design, 1996.
10. CABINET AND STORAGE

WORKSTATION IN HORIZONTAL REACH

<table>
<thead>
<tr>
<th>KITCHEN</th>
<th>HOME OFFICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>At least 60&quot; of wall cabinet frontage, with cabinets at least 12&quot; deep, a minimum of 30&quot; high (or equivalent), should be included within 72&quot; of the primary sink centerline.</td>
<td>A range of width of the work surface should be considered, based on the horizontal reach of the arm.</td>
</tr>
<tr>
<td>&lt;a range of the arm reach&gt;</td>
<td></td>
</tr>
<tr>
<td>Women: 63&quot;</td>
<td></td>
</tr>
<tr>
<td>Men: 68.5&quot;</td>
<td></td>
</tr>
</tbody>
</table>

KITCHEN ILLUSTRATION

Figure 10-1a. NKBA Guideline 7, Wall cabinet frontage.

HOME OFFICE ILLUSTRATION

Figure 10-1b. Horizontal reach for grasping and for working on a surface.

RATIONALE

Indirect: Ranges of accessibility in two spaces are different.

DISCUSSIONS

Mainly in the home office, workers can cover horizontal work surfaces within reach of their arms. On the other hand, workers in the kitchen can reach farther because of the standing position. The length of recommended horizontal work surface in the home office is shorter than the work surface in the kitchen.

SOURCE(S)

Universal kitchen and bathroom planning, 1998.

II. CABINETS AND STORAGE

WORKSTATION IN VERTICAL REACH

<table>
<thead>
<tr>
<th>KITCHEN</th>
<th>HOME OFFICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>At least five storage/organizing items, located between 15-48” above the finished floor should be included in the kitchen to improve functionality and accessibility. These items may include, but are not limited to lowered wall cabinets, raised base cabinets, tall cabinets, appliances garages, bin/racks, swing-out pantries, interior vertical dividers, specialized drawers/shelves etc.</td>
<td>The reach range for sitting people can be analyzed from the guidelines for handicapped persons. Items in the range of 15-48” above the finished floor are the most accessible for sitting persons. When standing, the range of 24-72” above the finished floor is possible to reach.</td>
</tr>
</tbody>
</table>

**KITCHEN ILLUSTRATION**

![Accessible storage](image)

Figure 11-1a. Accessible storage.

**HOME OFFICE ILLUSTRATION**

![Reach range guidelines for seated person](image)

Figure 11-1b. Reach range guidelines for seated person.

![Non-reachable storage space](image)

Figure 11-1c. Non-reachable storage space.
RATIONALE
Indirect: A reach range for the handicapped can be translated into the range for sitting person in home office.

DISCUSSIONS
Design reachable storage, based on data for handicapped persons. It should be noted that the seating height of a person who is on an office chair is usually a little lower than the for a person in a wheelchair.
The indication of reachable/ nonreachable zone clarifies a plan for accessible storage.

SOURCE(S)
12. CABINETS AND STORAGE

KNEE SPACE

KITCHEN
For a kitchen with usable corner areas in the plan, at least one functional corner storage unit should be included.

HOME OFFICE
If a main work station with a computer is located in a usable corner area, the work station in front of the chair needs knee space underneath. Instead, the strategy to make usable corner areas in kitchen, which are shown in kitchen guideline, can be applied to the designing upper storage or cabinet. A minimum knee space at the work surface is shown in Figure 11-1b.

KITCHEN ILLUSTRATION

HOME OFFICE ILLUSTRATION

Figure 12-1a. NKBA Guideline 11, Usable corner areas in kitchen cabinets.

Figure 12-1b. NKBA Guideline 13, Minimum knee space at work surfaces.

Figure 12-2. Knee space in front of chair; main work surface is in corner areas.
RATIONALE

Inspired: Knee space under the work surface in home office should be calculated.

DISCUSSIONS

Different from designing a corner space in a kitchen, the corner space in a home office is usually designed for locating chair and computer (main work surface). The corner space can be translated to the center of the work surface in an L-shaped arrangement in the home office.

SOURCE(S)

Universal kitchen and bathroom planning, 1998.

Universal kitchen and bathroom planning, 1998.

IKEA catalog, 2005.

### 13. CABINETS AND STORAGE

#### ACCESS TO REMOVING WITH SECURITY

<table>
<thead>
<tr>
<th>KITCHEN</th>
<th>HOME OFFICE</th>
</tr>
</thead>
</table>
| At least two waste receptacles should be included in the plan; one for garbage and one for recyclables, or other recycling facilities should be planned. | A home office needs two types of shredder when removing something from the space. 1. shredder software for computer

File shredder is a small file utility that will completely erase the contents of sensitive files and folders that you specify. Normal file deletion only removes a file’s directory entry, but leaves the data contained in the file on your disk drive. File shredder completely overwrites the contents of a file and then deletes it. 2. shredder

Shredder provides security during document disposal and is ideal for home office environments. It is built to shred paper, staples, small paper clips and credit cards. |

<table>
<thead>
<tr>
<th>KITCHEN ILLUSTRATION</th>
<th>HOME OFFICE ILLUSTRATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Figure 13-1a. NKBA Guideline 12, Accessible receptacles." /></td>
<td><img src="image" alt="Figure 13-1b. Shredder software for computer downloading." /></td>
</tr>
</tbody>
</table>
**RATIONALE**

Inspired: Different from a kitchen, a security of waste from business in home office should be considered.

**DISCUSSIONS**

Removing items from home office is as important as a storing something from works.

**SOURCE(S)**

<table>
<thead>
<tr>
<th>Universal kitchen and bathroom planning, 1998.</th>
<th>Shredder software</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><a href="http://www.gregorybraun.com/shredder.htm">Http://www.gregorybraun.com/shredder.htm</a></td>
</tr>
<tr>
<td></td>
<td>Shredder</td>
</tr>
</tbody>
</table>

Figure 13-1c. Shredder, Model: fellowes PS60C-2 Cross Cut Paper Shredder (38605).
## 14. CABINET AND STORAGE

### ACCESS TO STORING AND REMOVING

<table>
<thead>
<tr>
<th>KITCHEN</th>
<th>HOME OFFICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The receptacle should be easily accessible and should be removable without raising the receptacle bottom higher than the unit’s physical height. Lateral removal of the receptacle, which does not require lifting, is most desirable.</td>
<td>Garbage from a home office can be divided into two types, garbage with business/ non-business information. The garbage with business data needs to be collected and removed with consideration. 1. Garbage with business data: hard disk in computer, document, mail, recordable CD 2. Garbage with non-business data: newspaper, bottles, aluminum cans, ink cartridges, stationary such as clips or staples</td>
</tr>
</tbody>
</table>

### KITCHEN ILLUSTRATION

![Kitchen Illustration](image1.png)

Figure 14-1a. NKBA Guideline 12, Waste receptacles

### HOME OFFICE ILLUSTRATION

![Home Office Illustration](image2.png)

Figure 14-1b. Recycling bins.

### RATIONALE

Indirect: An idea of recycling materials in kitchen gives a sense of recycling materials from home office.

### DISCUSSIONS

A classification of the garbage from home office depends on the character of materials.

### SOURCE(S)

Universal kitchen and bathroom planning, 1998.
15. CABINET AND STORAGE

DIFFERENT LEVEL OF ACCESS TO STORAGE

<table>
<thead>
<tr>
<th>KITCHEN</th>
<th>HOME OFFICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials should be stored based on the understanding of available keeping period and using frequency. The well-planned storage accommodates the most suitable place to keep the materials.</td>
<td>Equipment, document and stationery should be stored according to the level of access and availability.</td>
</tr>
</tbody>
</table>

**KITCHEN ILLUSTRATION**

<table>
<thead>
<tr>
<th>Figure 15-1a. A kitchen organizer.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 15-2a. Refrigerator drawer is convenient to reach daily-consumed vegetables.</td>
</tr>
</tbody>
</table>

**HOME OFFICE ILLUSTRATION**

<table>
<thead>
<tr>
<th>Figure 15-1b. Stationery should be easily accessible from seating.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 15-2b. Short-term documents are stored near work space for easy reach and removal.</td>
</tr>
</tbody>
</table>
Figure 15-3a. A revolving shelf placed near cooking center is a good place to store spices.

Figure 15-3b. Rotary type of high-density filing system.

Figure 15-4. Produce with long-term preservation such as jam and canned food are stored together.

RATIONALE
Indirect: The materials which need to be stored in each space are different. But they have similarities to choose a storage system according to the type of materials.

DISCUSSIONS
The intelligent storage system in two spaces resembles each other in many ways.

SOURCE(S)
IKEA catalog, 2005.
Kitchen Planner, 2005.
http://www.lehighgroup.com/whatnew.htm
Making the most of work spaces, 1996.
16. APPLIANCE PLACEMENT AND USE/CLEARANCE SPACE

CLEARANCE AT EQUIPMENT

<table>
<thead>
<tr>
<th>KITCHEN</th>
<th>HOME OFFICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A clear floor space of 30&quot;X48&quot; should be provided at the sink, dishwasher, cooktop, oven, and refrigerator.</td>
<td>Calculate the clear floor space for using equipment. These illustrations indicate examples of required free space of home office equipment and furniture.</td>
</tr>
</tbody>
</table>

KITCHEN ILLUSTRATION

HOME OFFICE ILLUSTRATION

Figure 16-1a. NKBA Guideline 14, Clear floor space.

Figure 16-1b. Free space for copy machine.

Figure 16-1c. Free space for drawer.
**RATIONALE**

Indirect: Equipment in each space is different, but the required free space for using them should be considered when planning the space.

**DISCUSSIONS**

Enough space makes it easy to access and use equipment.

**SOURCE(S)**

Universal kitchen and bathroom planning, 1998.

### 17. APPLIANCE PLACEMENT AND USE/CLEARANCE SPACE

#### ADJACENCY OF WORK AREAS

<table>
<thead>
<tr>
<th>KITCHEN</th>
<th>HOME OFFICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>If the kitchen has only one sink, it should be located between or across from the cooking surface, preparation area, or refrigerator.</td>
<td>A main work area is not necessarily located in the center of the home office. A scale of work station in the home office is smaller than the one in a kitchen, and the way of arrangement of workstation, equipment and storage is more flexible.</td>
</tr>
</tbody>
</table>

#### KITCHEN ILLUSTRATION

- Figure 17-1a. NKBA Guideline 17, Sink, cooking surface, and preparation area or refrigerator.

#### HOME OFFICE ILLUSTRATION

- Examples of existing home office.
  - Figure 17-1b. Free standing work station is surrounded by U-shaped storage.
  - Figure 17-1c. Work station is located between storage and equipment (fax and telephone).
INDIRECT: The presented examples show the various adjacency among items in the home office.

DISCUSSIONS (LOGIC)

The arrangement of work station, storage, and equipment can vary according to the user’s preference and environmental conditions of the room.

SOURCE(S)

Universal kitchen and bathroom planning, 1998.

Making the most of work spaces, 1996.

18. APPLIANCE PLACEMENT AND USE/CLEARANCE SPACE

**IMPLICATIONS OF WINDOWS**

<table>
<thead>
<tr>
<th>KITCHEN</th>
<th>HOME OFFICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The cooking surface should not be placed below an operable window sunless the window is 3” or more behind the appliance and more than 24” above it. Window, operable or inoperable, above a cooking surface should not be dressed with flammable window treatments.</td>
<td>1. A window treatment to control the amount of light is important to provide a clear sight for the worker.</td>
</tr>
<tr>
<td></td>
<td>2. Electronic equipment should be protected from direct rays of light by installing window treatments such as a curtain or a blind.</td>
</tr>
<tr>
<td></td>
<td>3. The height of a work surface close to window should be lower that the bottom of the window frame. The space between window frame and work surface provides storage or shelves to display something.</td>
</tr>
<tr>
<td></td>
<td>4. A surge protector is an important device in the home office that protects a computer from fluctuations in power. It regulates the amount of electricity that flows to the computer and prevents high-voltage surges from damaging a computer.</td>
</tr>
</tbody>
</table>

**KITCHEN ILLUSTRATION**

![Figure 18-1. NKBA Guideline 20, the cooking surface and window.](image)

**HOME OFFICE ILLUSTRATION**

![Figure 18-2a. A workspace with a good view through window. The window and work surface are connected with shelf to display something.](image)
**RATIONALITY**

Inspired: The significance of a window in the kitchen and the home office is different and one of the devices which accommodate safety is a surge protector.

**DISCUSSIONS**

Window implies a safety issue in the kitchen. A window in a home office can either provide or be distracting.

**SOURCE(S)**

<table>
<thead>
<tr>
<th>Universal kitchen and bathroom planning, 1998</th>
<th>Making the most of work spaces, 1996</th>
</tr>
</thead>
</table>
### 19. APPLIANCE PLACEMENT AND USE/CLEARANCE SPACE

#### ACCESS TO WORK WITH SECURITY

<table>
<thead>
<tr>
<th>KITCHEN</th>
<th>HOME OFFICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The final placement recommendation (microwave ovens) should be based on the user’s physical abilities, which may require placement outside of the preferred 24 to 48” range.</td>
<td>In the home office, access by children should be restricted. If there is equipment which needs to be located out of reach of children, it should be placed in the range between the reach of children and the reach of user.</td>
</tr>
</tbody>
</table>

#### KITCHEN ILLUSTRATION

![Image of elbow height](image1.png)

Figure 19-1. NKBA Guideline 21, Convenient microwave height (left).

![Image of shoulder height](image2.png)

Figure 19-2. NKBA Guideline 21, Safe microwave height (right).

#### HOME OFFICE ILLUSTRATION

![Graph of average weight and height](chart.png)

Figure 19-3. Average Weight and Height of U.S. Children and Youth.

#### RATIONALE

Indirect: Its indirect translation is a consideration of children’s accessibility in home office.
<table>
<thead>
<tr>
<th>DISCUSSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>The convenient height and safety height to access sometimes not coincide. Some documents or equipment need to be kept away from children’s reach. It should be taken into account both the convenient height for user and safe counter height that is out of reach from children.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SOURCE(S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Universal kitchen and bathroom planning, 1998.</td>
</tr>
<tr>
<td><a href="http://www.doh.state.fl.us/family/childhealth/childreport/goals/goal1/goal1.html">http://www.doh.state.fl.us/family/childhealth/childreport/goals/goal1/goal1.html</a>.</td>
</tr>
</tbody>
</table>
20. APPLIANCE PLACEMENT AND USE/CLEARANCE SPACE

ACCOMMODATION TO WORK ENVIRONMENT

<table>
<thead>
<tr>
<th>KITCHEN</th>
<th>HOME OFFICE</th>
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<tbody>
<tr>
<td>Varying counter heights will create work spaces for various tasks and for cooks of varying stature, including seated cooks.</td>
<td>There are many tasks which require different heights of work surfaces. 1. Data entry work 2. Drawing, cutting 3. Writing, reading Work station design should accommodate the agronomical convenience for users.</td>
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KITCHEN ILLUSTRATION

![Kitchen Illustration](image)

Figure 20-1a. NKBA Guideline 21, Counter heights in kitchen.

![Figure 20-1b](image)

Delicate work: men 39.3"-43.3" women 37.4"-41.3"  
Light manual work: men 35.4"-37.4" women 33.4"-35.4"  
Heavy manual work: men 29.5"-35.4" women 27.5"-33.4"

Figure 20-1b. Heights recommended for tables for standing work. The horizontal zero line is that of elbow height which, on the average, is 104 cm for men and 98 cm for women.
Figure 20-1c. A reception desk. An example of a work station, which has more than two different work surface heights.

Figure 20-1d. Supplementary surface for keyboard. Lower surface than monitor.

Figure 20-1e. Raised surface for monitor.

Figure 20-1f. Flattened surface without monitor.
Figure 20-1g. Different work station heights for computer and equipment.

Rationale
Indirect: Its indirect translation is the development of work surfaces with different heights in home office.

Discussions
Work surfaces which have different heights are ergonomically desirable. They enrich the quality of work and satisfy the need of easy access to work.

Source(s)
Universal kitchen and bathroom planning, 1998
The office interior design guide, 1994
Pottery barn work spaces, 2004
Unifor work environments, 2002
### ACCESS FOR USER-ORIENTED CONVENIENCE

#### KITCHEN
When side-by-side refrigerators are specified, it is preferable to design the space so that the countertop can be easily accessed by an individual using the fresh food section.

#### HOME OFFICE
The direction of opening storage should be toward the main work surface.

1. Storage on the right side of the user → opening from left to right
2. Storage on the left side of the user → opening from right to left

#### KITCHEN ILLUSTRATION

![KITCHEN ILLUSTRATION](image)

**Figure 21-1a. NKBA Guideline 28, Distance from the refrigerator to the countertop.**

#### HOME OFFICE ILLUSTRATION

![HOME OFFICE ILLUSTRATION](image)

**Figure 21-1b. Appropriate storage openings.**

### RATIONALE
Direct: The two situations are virtually identical. Kitchen guidelines can be directly translated into office application.

### DISCUSSIONS
All of the elements in the home office should be designed for user-oriented convenience.

### SOURCE(S)
Universal kitchen and bathroom planning, 1998.
CHAPTER 4. DISCUSSION

In the process of this study, several strengths and weaknesses in surveying information and developing an analytical arrangement were exposed. This evaluation would be necessary for the future extended studies related to this topic and for the other research employing similar research methods.

Strengths

Even though many researchers have investigated the efficiency of work-at-home concept based on a statistical data for a home-based business, there have been limited studies about designing a workspace at home. Most telecommuters decide to make a work space at home themselves rather than hire a professional interior designer. The literature that contains practical guidelines and solutions for designing home offices is essential to the population of working from home.

This study begins with an implementation of kitchen design literature. The guidelines of ‘Universal kitchen and bathroom design’ are verified by design professionals and home office spaces can be analyzed and translated in terms of the theory of kitchen design. Even though kitchens and home offices have different features, each accommodates a particular purpose of work, sequence of work, and environmental similarities which comes from an interface with
family life.

In practical application of this study’s data, units are expected to be selected differently according to the environmental conditions of home office, the character of work, and the user’s taste.

In summary, this study’s strengths are as follows:

1. It provides guidelines which give a practical help to people working from home with non-professional knowledge of interior design.

2. It provides guidelines in terms of a new direction of approach, oriented from an implementation of kitchen space.

3. It provides a flexible solution which accommodates different environments by conditional selections of data units.

**Weaknesses**

During the course of the project, certain limitations were also identified. The analysis is limited within the scope of kitchen design guidelines from ‘Universal kitchen and bathroom planning’ even if the section of ‘workstation layout’ is added. So analyzed data units covers only certain aspects of home office design.
Next, because of the limited availability of figures taken, the illustration for home office design does not necessarily explain exactly what the guideline needs to describe. For example, the figures which indicate the required free space in terms of anthropometrics in section of ‘traffic’ are used equally in both tables for kitchen and home office design with a little touch of transforming. The figures from other sections are often difficult to visualize for easy translation from kitchen literature to home office design guideline.

Finally, the issue of the interaction with family members is dealt with only in the accessibility to work materials from other family members, such as the restriction of an access from children to equipment and work materials.

In summary, this study’s weaknesses are as follows:

1. The limitation of the range of analysis from kitchen design literature which does not cover wide aspects of design components.

2. The limitation of available figures which provides a satisfactory comparison and explanation of guidelines.

3. The limitation of research about an interaction between family members.
Additional Research

The data units in chapter 3 are just presenting an example that can be continually added to and developed to create a useful database. If there is additional literature on kitchen design with an agreement of design professionals, it will be also used and provides a meaningful contribution in creating guidelines for home office design.

Furthermore, if a great number of data units are accomplished, creating a numerical value according to the degree of accessibility in design components in each space, kitchen and home office presents scientific and precise measurements to define a behavior which leads for better work efficiency in both spaces.
CHAPTER 5. CONCLUSION

Summary

The intention of this study is to provide guidelines for home office design focused on accessibility to critical design components. There are many tasks which a user needs to accomplish in a home office and research of certain space in terms of accessibility provides a sense of evaluation for highly-efficient work space.

The analysis of this study is categorized by four sections, traffic and workflow, workstation layout, cabinets and storage, and appliance placement and use/clearance space. These four categories are referred by kitchen design literature and home office design guidelines consist of direct, indirect, and inspired translations of kitchen design literature.

Some of the kitchen design literature is directly applicable to home office design. In contrast, others are difficult to apply directly to home office design. In those cases, the kitchen design guidelines which contain criteria establishing a theory of home office design are selected and those are translated into guidelines of home office design.

Technological development has facilitated the use of convenient kitchen space and it allows people to work at home as one of the representative flexible work styles. Good quality kitchen design literature was produced before quality home office design literature, thus
research on kitchen design is necessary to contribute effective guidelines for creating home office space.

Conclusion

The goals of this thesis are examining the possibilities of taking benefits of kitchen design literature to home office design, and presenting home office design guidelines to both professional interior designers and non-professional users.

If telecommuters would make use of these guidelines when designing their home office, they could accomplish their tasks under more efficient and organized environmental conditions. Furthermore, they could be better prepared and better able to cope with the change in their work environment, such differences in room or differences in required space for storing files.

This study suggests possible solutions which users are faced with, but provides more diverse guidelines to help telecommuters find the most suitable solution for their situations. Thus, further research on kitchen design literature needs to be conducted and translated into guidelines of home office design.
GLOSSARY

Direct rationale
An explanation in this case;
When a guideline of kitchen design is applicable to the certain case of the home office design without transforming a kitchen literature, in a straight way.

Indirect rationale
An explanation in this case;
When a guideline of kitchen design is applicable to the certain case of the home office design with a little modification of the kitchen literature.

Inspired rationale
An explanation in this case;
When some criteria of the guideline of kitchen design motivate or contribute to creating a guideline of the home office design.

Telecommute
To work at home or some other location remote from one’s place of employment, making use of a computer, telephone, fax, and/or modem to receive job assignments and send in completed work.

Universal design
The design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.
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